PN-ABS-687

Workshop on

Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994

Bamenda, Cameroon

Organized by

International Fertilizer Development Center

Muscle Shoals, Alabama 35662, U.S.A.

Sponsored by

The Fertilizer Sub-Sector Reform Program

(Technical Supervisory Committee and USAID/Cameroon)

Module A: Introduction

Workshop on

Efficient Marketing of Fertilizers in Cameroon

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Serial Number	Activity Number	Time	Activity	Responsibility
			Monday, March 28, 1994	
			Module A: Introduction	
1	A1	0830	**Registration**	R. S. Giroti IFDC
2	A2	0900	**Inauguration** Official opening. Welcome speech to participants.	S. Njinyam Minister Ministry of Agriculture
		0930	**Break**	
3	A3	1000	**Program Description, Participant Introductions, and Baseline Exercise** An overview of program objectives and activities. Participant introductions. Opportunity for participants to obtain an indication of their knowledge of fertilizer marketing and use through an IFDC test exercise.	R. S. Giroti/ T. A. Nix IFDC
4	A4	1130	**IFDC Story** An overview of IFDC, including a summary of program activities, staffing, funding, physical facilities, etc. with focus on IFDC-Africa.	R. S. Giroti/ H.G.M. Gerner IFDC
		1200	**Lunch**	

Serial Number	Activity Number	Time	Activity	Responsibility
			Monday, March 28, 1994 (Continued)	
			Module B: Cameroon Agricultural Sector	
5	B1	1300	**Agriculture in Cameroon** An overview of the agricultural sector in Cameroon, including policy, production, marketing, and outlook.	B. Nami Ingénieur Général d'Agriculture H.C. Director Department of Agriculture Ministry of Agriculture F. Nkonabang Ingénieur Agro-Planificateur Sub-Director Sub-Department of Agricultural Production Administrative Coordinator FSSRP Technical Support Unit Department of Agriculture Ministry of Agriculture
6	B2	1400	**Global Fertilizer Use Perspectives** Perspectives on world fertilizer production and consumption. Africa and Cameroon's place therein.	H.G.M. Gerner
		1430	**Break**	
7	B3	1500	**Fertilizer Use Data in Cameroon** Presentation of time-series farm- and macro-level data on fertilizer use in Cameroon. Distribution of reports.	B. Tarounga Statistician AEERD
8	B4	1615	**Cameroon Fertilizer Sub-Sector Overview** Breakdown and overview of sub-sectoral breakdown of Cameroon's fertilizer sector.	R. Molu Ingénieur Agro-Pedologue Technical Coordinator FSSRP Technical Support Unit Department of Agriculture Ministry of Agriculture
		1645	**Adjourn**	

Serial Number	Activity Number	Time	Activity	Responsibility
			Tuesday, March 29, 1994	
			Module B: Cameroon Agricultural Sector (Continued)	
9	B5	0830	**Subsidized/Small Farmer - FSSRP** Overview of the FSSRP program: Characteristics and results, including discussion on the role of the subsidy.	F. Nkonabang
		1000	**Break**	
10	B6	1030	**SODECOTON - PSIE** Overview of the PSIE program: Characteristics and results.	D. F. Siméon Economist/Statistician Ministry of Plan and Regional Development
		1200	**Lunch**	
11	B7	1300	**Modern Agricultural Sector** Series of brief, 20-minute presentations by representatives of Cameroon's plantation sector.	Representatives of Modern Agricultural Sector
		1445	**Break**	
12	B8	1500	**Cameroon's Agri-Input Markets** Overview of seeds and pesticide sectors in Cameroon.	J. Elang Deputy Director Department of Agriculture Mr. Djongue Sub-Director Sub-Department of Plant Protection Department of Agriculture
13	B9	1600	**The FSSRP Technical Support Unit** Presentation of the GRC's Fertilizer Information Unit, its role and functions.	R. Molu
		1630	**Adjourn**	

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Serial Number	Activity Number	Time	Activity	Responsibility
			Wednesday, March 30, 1994	
			Module C: Fertilizer–Technical Aspects	
14	C1	0830	**Essential Nutrients and Their Role in Crop Production** The essential nutrients (including micronutrients) needed for crop production are discussed. Nutrient deficiency symptoms in crops are identified and the need for a balanced fertilization program in sustaining good yields is discussed.	F. Meppe Soils/Systems Agronomist Institute of Agricultural Research Ministry of Scientific and Technical Research
15	C2	0930	**Fertilizer Products and the Product Decision** Physical and chemical specifications of fertilizer materials are discussed. Recent trends in nitrogen, phosphate, and potash fertilizers are examined.	T. A. Nix
		1030	**Break**	
16	C3	1045	**Developing a Soil Testing Program** A discussion of the use of soil tests to assess fertilizer needs. Methods of assessing soil nutrients, estimating nutrient needs to satisfy yield targets, and determining expected nutrient uptake efficiency are examined. Fertilizer use and soil pH relationships are discussed. Customer service is emphasized. Availability of soil testing in Cameroon.	M. Doube Chief Soil Science Department University of Dschang
		1200	**Lunch**	
17	C4	1300	**Field Trip: North West Province** 1. Fertilizer Retailer: The Farmers House 2. Fertilizer Storage: NWCA–Nkwen Rural Development Center 3. Fertilizer Stockist: Akum Farm Services Center 4. Coffee Processing: NWCA, Santa Union	Provincial Delegation of Agriculture North West Province
		1630	**Adjourn**	

Serial Number	Activity Number	Time	Activity	Responsibility
			Thursday, March 31, 1994	
			Module C: Fertilizer – Technical Aspects (Continued)	
18	C5	0830	**Economics of Fertilizer Use** The profitability of fertilizer use is discussed. The most commonly used indicators of the profitability of fertilizer are examined. Data for Cameroon are presented.	F. Kamajou Dean, Faculty of Economics and Management University of Dschang and H.G.M. Gerner
19	C6	0930	**Price Policy Analysis/Fertilizer** Data from a UCD study sponsored by the FSSRP are presented by the investigator for discussion.	F. Kamajou
		1015	**Break**	
19a		1030	**Devaluation and Fertilizer Use** A brief examination and discussion of the effects of the recent devaluation of the FCFA on fertilizer use and crop production in Cameroon.	R. Longang Economist Office of Economic Analysis and Policy Reform Implementation, USAID
20	C7	1100	**Fertilizer Quality Control and Regulations** Discussion of the importance of quality control and fertilizer legislation in fertilizer sector development.	S. Diouf, IFDC/ Representative of Société Générale de Surveillance
		1200	**Lunch**	
21	C9	1300	**Response Database Presentation** Presentation of the IFDC-Africa fertilizer data base.	R. Molu/H.G.M. Gerner
			Module D: Fertilizer Marketing	
22	D1	1415	**What is Marketing?** Film/discussion on the evolution of marketing.	T. A. Nix
		1500	**Break**	
23	D2	1530	**Introduction to Marketing Fertilizer** Marketing is defined and the marketing functions required at the macro/micro-levels are discussed. Examination of major decisions confronting marketing managers to match resources of organization with needs and opportunities in their markets.	H.G.M. Gerner
		1630	**Adjourn**	

Serial Number	Activity Number	Time	Activity	Responsibility
			Friday, April 1, 1994	
24	C8	0830	**Field Trip: West Province** 1. Fertilizer Stockists: Foumbot Market 2. Modern Agricultural Sector: PROLEG 3. Coffee Plantation: COOPAGRO 4. Soils Testing: UCD	Provincial Delegation of Agriculture, West Province
			Saturday, April 2, 1994	
			Rest	
			Sunday, April 3, 1994	
			Rest	

Serial Number	Activity Number	Time	Activity	Responsibility
			Monday, April 4	
			Module D: Fertilizer Marketing (Continued)	
25	D3	0830	**Fertilizer Marketing Channels in Cameroon** As a lead-in to participant presentations, an overview of Cameroon's fertilizer marketing channels is presented.	R. Molu
26	D3	0845	**Fertilizer Marketing in Cameroon** Participants from each company make 10-minute presentations including company profile, their role within the company, and the company's fertilizer marketing system and/or strategy. For commercial banks, their bank's perspectives on financing fertilizer importation and distribution are presented.	Participants/IFDC
		1000	**Break**	
	D3	1030	**Fertilizer Marketing in Cameroon** (Continued)	Participants/IFDC
		1200	**Lunch**	
	D3	1300	**Fertilizer Marketing in Cameroon** (Continued)	Participants/IFDC
27	D4	1530	**Market Information Sources for Fertilizers** The importance of accurate and timely market information to support fertilizer business decision-making is discussed. The availability of market information from various sources is discussed.	P. Volkert IFDC
		1630	**Adjourn**	

Serial Number	Activity Number	Time	Activity	Responsibility
			Tuesday, April 5	
			Module D: Fertilizer Marketing (Continued)	
28	D5	0830	**Fertilizer Procurement** Key factors involved in efficient fertilizer procurement are outlined, with focus on market intelligence, procurement techniques, financing considerations, cargo inspection, etc.	S. Diouf
		0945	**Break**	
29	D6	1000	**Fertilizer Pricing** Fertilizer pricing practices are discussed. A recommended approach to pricing in a market-based economy is presented.	S. Diouf
30	D7	1100	**Fertilizer Packaging** The principal considerations in fertilizer packaging are discussed. Bag specifications, method of closure, and handling and storage considerations are examined.	T. A. Nix
		1200	**Lunch**	
31	D8	1300	**Fertilizer Storage** The principals of fertilizer storage are discussed, including facility location, warehouse size, inventory control, and technical considerations.	I.J. Scarr Fertilizers & Chemicals, Ltd. Nigeria
		1400	**Break**	
32	D10	1430	**Fertilizer Bulk Blending and Bagging** The characteristics of fertilizer bulk blending and bagging facilities, and their role in product flexibility and price. An examination of bulk blending and bagging potential for Cameroon.	I. J. Scarr
		1630	**Adjourn**	

Serial Number	Activity Number	Time	Activity	Responsibility
			Wednesday, April 6	
			Module D: Fertilizer Marketing (Continued)	
33	D14	0830	**Demand Forecasting Techniques** A discussion of fertilizer demand forecasting techniques.	P. Volkert
		0930	**Break**	
34	D15	1000	**Dealer Selection and Development** The role of the fertilizer (and agri-inputs) dealer is reviewed. The dealer selection and development process is discussed.	S. Diouf
35	D13	1100	**Fertilizer Promotion Programs** The importance of promotion in fertilizer marketing is discussed, with emphasis on farmer meetings, fertilizer demonstrations, production contests, promotional literature, and radio advertising. Examples from Cameroon are presented. Group assignment: Develop a cost-effective fertilizer promotion campaign for a target market in Cameroon.	S. Diouf
		1200	**Lunch**	
36	D16	1300	**The Role of Credit in Fertilizer Marketing** The role of farm-level credit in fertilizers marketing is discussed. Types of credit arrangements are presented, with examples from Cameroon.	Representative of Cameroon Cooperative Credit Union League (CamCCUL)
		1400	**Break**	
37	D17	1430	**Group Presentations** Work groups present their marketing projects.	R. S. Giroti/ T. A. Nix
		1630	**Adjourn**	

Serial Number	Activity Number	Time	Activity	Responsibility
			Thursday, April 7	
			Module D: Fertilizer Marketing (Continued)	
38	D9	0830	**Fertilizer Transportation** The principles of fertilizer transportation are discussed, including technical and efficiency considerations.	T. A. Nix
		0930	**Break**	
39	D12	1000	**Consumer Identification and Buyer Behavior** A discussion of the techniques used in evaluating buyer behavioral patterns and in identifying target markets for the fertilizer marketing organization. Examples from Cameroon are discussed.	R. S. Giroti
			Module E: Business Management	
40	E1	1100	**Developing a Fertilizer Dealers Association** The potential role and utility of a fertilizer trade association for Cameroon. Guidelines for formation of such an association. Examples from other associations are discussed.	R. S. Giroti/ T. A. Nix
		1200	**Lunch**	
41	E2	1300	**Effective Communication in Fertilizer Marketing** Effective methods of communication are discussed. Participants will be involved in a "hands-on" exercise.	R. S. Giroti
42	E3	1400	**What Managers Do** A film presentation on the role of the manager in the modern business world.	R. S. Giroti
		1500	**Break**	
43	E4	1530	**Working Smarter, Not Harder** A film presentation on improving time use efficiency.	R. S. Giroti
44	E5	1600	**Financial Management and Analysis** Techniques of financial management used in business management and planning are discussed.	T. A. Nix
		1700	**Adjourn**	

Serial Number	Activity Number	Time	Activity	Responsibility
			Friday, April 8	
			Module E: Business Management (Continued)	
45	E6	0830	**Financing of Fertilizer Importation and Distribution** Methods and arrangements of financing fertilizer importation and distribution are discussed, with specific examples drawn from Cameroon.	A. Ngu Account Relationship Manager Standard Chartered Bank Cameroon A. Khan Corporate and Institutional Banking Manager Standard Chartered Bank Cameroon
		0945	**Break**	
46	D11	1015	**The Fertilizer Market Plan** A discussion on the components of a marketing plan.	T. A. Nix
			Module F: Conclusion	
47	F1	1100	**Program Summary**	R. S. Giroti
48	F2		**Followup Exercise/Program Evaluation** Participants are allowed an opportunity to test their post-course knowledge of fertilizer marketing.	R. S. Giroti/ T. A. Nix
49	F3	1230	**Closing Ceremony**	A. A. Innocent Secretary General Ministry of Plan and Regional Development Chairman FSSRP Technical Supervisory Committee
		1300	**Lunch**	
50	F4	1430	**Individual Meetings** Participants and/or IFDC staff may schedule individual meetings to discuss points of interest.	IFDC
		1630	**Program Concludes**	

WORKSHOP ON
EFFICIENT MARKETING OF FERTILIZERS IN CAMEROON

March 28-April 8, 1994
Bamenda, Cameroon

Speakers/Resource Persons

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Ministry of Agriculture
Yaounde
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LISTE DES PARTICIPANTS AU SEMINAIRE

"EFFICIENT MARKETING OF FERTILIZERS IN CAMEROON"

NOMS & PRENOMS	TITRE	SOCIETE	ADRESSE
1. Monsieur ANYE Joseph	Distributeur	Independent distributor	Tél. 42.41.62 BP . 591 Douala
2. Monsieur BANKOUE Dieudonné	Directeur d'Agence	ADER (Bafoussam)	Tél. 44.24.59 49.15.15 BP . 989 Bafoussam
3. Monsieur BATOCK Daniel DIKANDA	Directeur Général Adjoint	AFRICAN TRADING COMPANY	Tél. 43.20.00 43.32.32 BP . 1613 Douala
4. Monsieur BETRU GEBREGZIABHER	Directeur Général	IBEX CAMEORUN	Tél. 43.04.18 BP . 5853 Douala
5. Monsieur BEUNANG	Chef Service Adm. Fin	Coopérative des Planteurs de Melong	BP . 121 Melong
6. Monsieur Dominic ASONGANYI	Marketing officer BMBC Bamenda	MERIDIEN BIAO	Tél. 42.80.11 42.98.05 BP. 4001 Douala
7. Monsieur DOUNTSOP KAFO	Director	Ets DOUNTSOP and Cº	BP. 3481 Douala
8. Monsieur EBOT ABAH	Chargé du Marketing	AFRICAN TRADING COMPANY	Tél. 43.20.00 43.32.32 BP . 1613 Douala
9. Monsieur EL-HADJ MBOHOU M.	Directeur	Ets MBOHOU	Tél. 39.01.45 BP . 9071 Douala
10. Monsieur Fru Roland NGWA		BAKAH ENTERPRISES	Tél. 30.13.57 BP . 4818 Douala
11. Monsieur FOTSO DOPNA Siméon	Chargé d'Etudes Assistant	(MINPAT) Secrétariat Général	Tél. 23.32.91 Yaoundé
12. Madame Grace N. TIMA	Chief of Section Extension and Training	Provincial Delegation of Agriculture N.W.P Bamenda - Cameroon	Tél. 36.11.29 36.32.39
13. Monsieur Henry NGOMESIA	Trainee	AMITY BANK	Tél. 43.20.55 BP . 2705

NOMS & PRENOMS	TITRE	SOCIETE	ADRESSE
14. Monsieur John AKWAR	Managing Director AKWAR NATIONAL & INT. ENT	Distributeur IBEX (Nord-Ouest)	Tél. 36.17.23 BP . 337 Bamenda
15. Madame Laura STOTZ	Managing Director	The IBE GROUP INC	Tél. 42.61.62 BP . 591 Douala
16. Monsieur MBOU	Directeur	Coopérative Agricole des Planteurs de la Mifi	Tél. 44.12.20 Bafoussam
17. Monsieur MOUMIE MAMA LINDOU		The IBE GROUPE INC	Tél. 42.61.62 BP. 591 Douala
18. Monsieur MUNANG Samuel MUFUA	Chief of service	North West Coop.Association LTD	Tél. 36.12.12 BP. 41 Bamenda
19. Monsieur MUNJI MARCUS TEBID	President	MOGHAMO AREA COOPERATIVE	Tél. 36.11.00 BP . 2 Batibo, Momo
20. Monsieur NANGA NDY Etienne	Chef de service Com.	GROUP ONE CAMEROON	Tél. 23.42.98 BP. 11 574 Yaoundé
21. Monsieur NDIBEWU Peter PAPOH	Marketing and Technical Development Manager	PELENGET (Farmers House)	Tél. 21.01.72 BP . 597 Yaoundé BP . 178 Bamenda Tél. 36.17.73
22. Monsieur NGALIM WIRBIR	Provincial Delegate	MINPAT (Délégation du N.O)	Tél. 36.13.87 Bamenda
23. Monsieur NGATCHA	Directeur d'Agence	ADER CAMEROUN	Tél. 23.09.51 23.59.04 BP. 2535 Yaoundé
24. Madame NGUFOR Rosemary	Manager	FARMERS HOUSE	Tél. 36.17.73 36.41.02 BP. 178 Bamenda
25. Monsieur NGUIMKENG François	Directeur T.DS	Distributeur	Tél. 31.74.06 BP . 1222 Yaoundé

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26. Monsieur NGOULAYE	Gérant	Ets NGOULAYE	Tél. 48.24.24 48.22.00 BP . 05 Foumban
27. Monsieur NINTIDEM André	Président Directeur	COOPAMOR MENOUA	Tél. 45.15.08 BP . 107 Dschang
28. Monsieur NWATCHOK A YAKAN	Chef de Service des Etudes Stratégiques	S.N.H.	TéL. 20.19.50 21.04.30 BP. 955 Yaoundé
29. Monsieur NZE KOULY Emmanuel	Chargé d'Etudes	FOGAPE	Tél. 36.16.22 BP . 183 Bamenda
30. Monsieur ONGUENE Alphonse	Cadre Exploitation Responsable du Service des Projets Spécifiques	Crédit Agricole du Cameroun	Tél. 23.23.60 BP. 11801 Yaoundé
31. Monsieur OUSSIL Jean-Marie	A.C Broker	The IBE GROUP INC	Tél. 42.61.62
32. Monsieur SEMA DJOUMBI Lazare	Directeur Général	Union des Coopératives Agricoles du Littoral.	Tél. 49.25.00 BP . 728 Nkongsamba
33. Monsieur SECKE Jean-Claude	Chef Service Etudes et Projets	S.N.H.	Tél. 20.19.10 21.04.30 BP . 955 Yaoundé
34. Monsieur SIMO TEKUE Jean-Marie	Attaché de Direction	Union des Coopératives Agricoles de l'Ouest.	Tél. 44.14.39 BP . 1002 Bafoussam
35. Monsieur TANDJEU Jean Baptiste	Agronomist	Environ-Protect	Tél. 23.54.35 BP . 13623 Yaoundé
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39. Monsieur TICHA Nelson ABAM	Distributeur	GROUP ONE CAMEROON	Tél. 23.09.46
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41. Monsieur Yves PEKOKEY			
42. Monsieur ZAMBOU T. Samuel	Chef Service Achat, Transport Approvisionnement A.T.A.	Coopérative Agricole des Planteurs de la Ménoua	Tél. 45.11.25 Fax 45.12.84 BP. 130 Dschang

DISCOURS DU MINISTRE DE L'AGRICULTURE

A LA CEREMONIE D'OUVERTURE DU SEMINAIRE SUR LA COMMERCIALISATION EFFICACE DES ENGRAIS AU CAMEROUN

(*BAMENDA, 28 Mars-9 Avril 1994*)

MONSIEUR LE GOUVERNEUR,

MONSIEUR LE DELEGUE DU GOUVERNEMENT AUPRES DE LA COMMUNE URBAINE DE BAMENDA,

MONSIEUR LE SECRETAIRE GENERAL DU MINISTERE DU PLAN ET DE L'AMENAGEMENT DU TERRITOIRE,

MESSIEURS LES REPRESENTANTS DE I.F.D.C,

MESSIEURS LES REPRESENTANTS DU F.E.D,

HONORABLES INVITES,

MESDAMES ET MESSIEURS,

C'EST POUR MOI UN REEL PLAISIR D'AVOIR A PRESIDER, AU NOM DE MONSIEUR LE MINISTRE DE L'AGRICULTURE EMPECHE, LA CEREMONIE D'OUVERTURE DU SEMINAIRE SUR LA COMMERCIALISATION EFFICACE DES ENGRAIS AU CAMEROUN. CE SEMINAIRE QUI CONSTITUE L'UN DES MAILLONS DE NOTRE POLITIQUE DE LIBERALISATION ET DE PRIVATISATION REVET UNE TRES GRANDE IMPORTANCE, DANS LA MESURE OU LE COMMERCE DES ENGRAIS QUI, PENDANT LONGTEMPS, CONSTITUAIT UN MONOPOLE DE L'ETAT, ETAIT ET EST ENCORE MAL MAITRISE PAR BEAUCOUP DE NOS OPERATEURS ECONOMIQUES QUI CONNAISSENT POURTANT BIEN TOUS LES ROUAGES DE L'IMPORT-EXPORT.

EST-IL BESOIN AUSSI DE RAPPELER QU'A CAUSE DU MONOPOLE DE L'ETAT, IL SE POSAIT DE NOMBREUX PROBLEMES TELS QUE LENTEURS ADMINISTRATIVES, COUT ELEVE DES FINANCEMENTS, RUPTURE DE STOCKS, ETC.

A CAUSE DE TOUTES CES TARES ET DE BIEN D'AUTRES ENCORE, LE GOUVERNEMENT, AVEC L'APPUI FINANCIER ET TECHNIQUE DU GOUVERNEMENT DES ETATS-UNIS D'AMERIQUE PAR LE BIAIS DE SON ORGANISME DE COOPERATION, L'USAID, A ENTREPRIS UNE VASTE REFORME DE CE SOUS-SECTEUR DONT LES 3 OBJECTIFS MAJEURS ONT PORTE SUR :

- LIBERALISATION DE L'IMPORTATION ET DE LA DISTRIBUTION DES ENGRAIS,
- LA PRIVATISATION DU COMMERCE DES ENGRAIS,
- LA SUPPRESSION DE LA SUBVENTION ETATIQUE SUR LES ENGRAIS.

GRACE AUX DISPOSITIONS INSTITUTIONNELLES MISES EN OEUVRE ET AUX APPUIS FINANCIERS ET TECHNIQUES DE L'USAID, JE PUIS DIRE QUE LE BILAN DE CE PROGRAMME EST HAUTEMENT POSITIF POUR LES RAISONS SUIVANTES :

1- <u>AU NIVEAU DE LA LIBERALISATION</u> :

* LES APPELS D'OFFRES, OBJET DE TANT DE PROCEDURE ET DE TRANSACTIONS DE COULISSES, ONT ETE SUPPRIMES ;
* LES QUOTAS D'IMPORTATION N'EXISTENT PLUS ;
* LES ALLOCATIONS QUANTITATIVES FAITES AUX SOCIETES D'ETAT ET AUX COOPERATIVES ONT DISPARU ;
* LE MONOPOLE DE DISTRIBUTION QUE DETENAIT L'EX-FONADER A DISPARU AVANT CELUI-CI.

2- <u>AU NIVEAU DE LA PRIVATISATION</u> :

* UN FONDS DE CREDIT RENOUVELABLE, CONSTITUANT UN FONDS DE CREDIT COMMERCIAL A TAUX D'INTERET BONIFIE A ETE MIS EN PLACE POUR FACILITER L'ACCES DES OPERATEURS AU CREDIT ;
* UN FONDS DE CREDIT D'INVESTISSEMENT A MOYEN TERME A ETE CREE POUR FACILITER LES INVESTISSEMENTS PRIVES ;
* UN SYSTEME INSTITUTIONNEL A ETE ELABORE POUR PERMETTRE UNE PARTICIPATION AISEE DES OPERATEURS ECONOMIQUES NATIONAUX AU PROGRAMME.

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3- <u>AU NIVEAU DE LA SUBVENTION</u> :

CELLE-CI A ETE DEGRESSIVE, PASSANT DE PLUS DE 70 % EN 1986 A 0 % EN 1994, CE QUI A PERMIS A L'ETAT DE REALISER DES ECONOMIES BUDGETAIRES IMPORTANTES.

4- <u>AU NIVEAU DES IMPORTATIONS</u> :

JE PUIS DIRE QU'APRES QUELQUES FLUCTUATIONS INHERENTES AUX NOUVEAUX MECANISMES, CELLES-CI SE SONT STABILISEES AUTOUR DE 65/80.000 T, QUI CONSTITUENT LES BESOINS REELS.

5- <u>AU NIVEAU DES PRIX</u> :

ON PEUT DIRE QUE CEUX-CI ONT SUBI UNE HAUSSE DE L'ORDRE DE 35-40 %, ALORS QUE LA SUBVENTION PASSAIT DE PLUS DE 80 % SUR CERTAINS PRODUITS A 10 %.

IL VA SANS DIRE QUE CE PROGRAMME N'A PAS CONNU QUE DU POSITIF. BIEN DES ECUEILS ONT AUSSI ETE ENREGISTRES, PAR EXEMPLE AU NIVEAU DE LA DIMINUTION DU NOMBRE DE PARTICIPANTS REELS, AU NIVEAU DE L'APPROVISIONNEMENT DE CERTAINES ZONES DU PAYS JUGEES PEU ATTRACTIVES COMMERCIALEMENT, ETC.

POUR DIRE DONC QUE L'OPTION DU GOUVERNEMENT EN MATIERE DE DESENGAGEMENT A ETE TENUE, CE QUI A PERMIS DE REDUIRE CONSIDERABLEMENT SES CHARGES BUDGETAIRES QUI DEVENAIENT DE PLUS EN PLUS ELEVEES.

CELA ETANT, QUEL PEUT ETRE LE ROLE DU SECTEUR PRIVE DANS L'IMPORTATION ET LA DISTRIBUTION D'UN PRODUIT PAS TOUJOURS TRES BIEN CONNU, MEME DES UTILISATEURS, ET DONT LES CONDITIONS DE TRANSPORT, DE STOCKAGE ET DE DISTRIBUTION NE SONT PAS AUSSI FACILES QU'ON LE CROIT ? JE VEUX PARLER DES ENGRAIS MINERAUX.

LES ENGRAIS MINERAUX, QUOI QU'ON DISE, CONSTITUENT LE PRINCIPAL FACTEUR DE PRODUCTION DANS UNE AGRICULTURE QUI DOIT NON SEULEMENT PERMETTRE DE

NOURRIR UNE POPULATION A FORT TAUX D'ACCROISSEMENT, MAIS AUSSI DEGAGER UN SURPLUS POUR L'EXPORTATION.

LE ROLE DU SECTEUR PRIVE APPELE A PRENDRE LE RELAIS DE L'ETAT DANS UNE ECONOMIE QUI DE SURCROIT CONNAIT UNE CRISE AIGUE DEVRAIT PORTER SUR LES PRINCIPAUX VOLETS SUIVANTS :

- ASSURER L'INFORMATION ET LA FORMATION DES CONSOMMATEURS ;
- ASSURER UN APPROVISIONNEMENT CONSTANT, A MOINDRE COUT, EN PRODUITS ADEQUATS ;
- ASSURER DES CREDITS SAISONNIERS COMPTE TENU DE L'ABSENCE D'UN SYSTME DE CREDIT RURAL ADAPTE ET DU DECALAGE ENTRE LA PERIODE DE VENTE DES PRODUITS ET CELLE D'ACHATS DES INTRANTS.

LE SEMINAIRE QUI S'OUVRE CE JOUR PARTICIPE A CE SOUCI MAJEUR DE DONNER AUX OPERATEURS UNE FORMATION ADEQUATE QUI COUVRE TOUS LES ASPECTS TECHNIQUES, COMMERCIAUX ET FINANCIERS LIES A CE SOUS-SECTEUR.

QUEL VA DONC ETRE LE ROLE DE L'ETAT, CAR D'AUCUNS POURRAIENT DIRE QUE CELUI-CI DEMISSIONNE EN QUELQUE SORTE ?

IL N'EN EST RIEN, ET LE ROLE DE L'ETAT VA PORTER SUR L'ASSISTANCE AU SECTEUR PRIVE PAR :

- LA DETERMINATION DES BESOINS EN VUE D'ORIENTER LES IMPORTATIONS ;
- LE RENFORCEMENT DES STRUCTURES DE LA RECHERCHE ET DE LA VULGARISATION QUI CONSTITUENT UN MAILLON ESSENTIEL DANS LE COMMERCE DES ENGRAIS ;
- LE CONTROLE DE LA QUALITE AFIN DE PRESERVER LES INTERETS DES PAYSANS ET ASSURER LA PROTECTION DE L'ENVIRONNEMENT, ETC ;

- LA MISE EN PLACE DE MESURES FINANCIERES INCITATIVES;
- LA DETAXATION DES IMPORTATIONS ET L'ALLEGEMENT DES PROCEDURES LIEES AUX OPERATIONS D'IMPORTATION ET DE DEDOUANEMENT,
- ETC.

LE ROLE DE L'ETAT VA AUSSI CONSISTER A DES SPONSORS QUI PUISSENT APPUYER LES ACTIONS ET LES TRAVAUX DE LA RECHERCHE ET DE LA VULGARISATION DANS LE SECTEUR DES ENGRAIS, CES SPONSORS POUVANT REVETIR DES FORMES DIVERSES TELLES QUE :

- L'EXECUTION DE PROGRAMME DE DEMONSTRATION DANS UNE APPROCHE SEQUENTIELLE (PROGRAMME DE COURTE DUREE DANS UNE ZONE LIMITEE) OU GENERALE ;
- DES AIDES ET DONS EN ENGRAIS ;
- LA FORMATION DES OPERATEURS ECONOMIQUES ET AUTRES, ETC.

A CE TITRE, JE CONTINUE A PENSER AUSSI QUE LES ORGANISATIONS TELLES QUE LA FAO, L'ONUDI, LA BIRD, IFDC, ETC ONT ENCORE UN ROLE A JOUER DANS LA MISE EN OEUVRE D'UNE STRATEGIE ADAPTEE A LA CONJONCTURE ACTUELLE, L'APPUI AUX OPERATEURS ECONOMIQUES QUI DOIVENT FAIRE FACE A UNE PENURIE FINANCIERE DE PLUS EN PLUS DRASTIQUE, L'AIDE AUX PAYSANS DONT LES REVENUS SE SONT COMPLETEMENT ERODES.

QUE DIRE DE FEMMES DONT DEPEND A PLUS DE 90 % LA PRODUCTION ET LA COMMERCIALISATION. DES PRODUITS VIVRIERS ? C'EST LE MOMENT DE LES IMPLIQUER DAVANTAGE COMPTE TENU DE LEUR DYNAMISME DEBORDANT.

POUR TERMINER, JE DOIS DIRE QUE DEUX ENJEUX MAJEURS SE POSENT A NOUS, A SAVOIR :

- ACCROITRE LA PRODUCTION ALIMENTAIRE POUR FAIRE FACE A UNE DEMOGRAPHIE GALOPANTE ET SUBVENIR A NOS DEPENSES D'IMPORTATION ;
- PROMOUVOIR LA CONSOMMATION, ET PARTANT LE COMMERCE DES ENGRAIS.

A CET EFFET, LES EXIGENCES DE LA NOUVELLE POLITIQUE AGRICOLE DONT LES PRINCIPAUX AXES PORTENT SUR :

- LA RESPONSABILISATION DES OPERATEURS AGRICOLES DANS LE CADRE D'UNE LIBERALISATION DE L'ACTIVITE AGRICOLE;
- LA DIVERSIFICATION DES PRODUCTIONS AGRICOLES ;
- LA PROMOTION DES EXPORTATIONS, ETC, LES EXIGENCES DE LA NPA, DIS-JE, QUI SONT AUSSI CELLES DU MARCHE, NOUS CONDAMNENT A MIEUX NOUS ORGANISER, A NOUS GROUPER POUR MIEUX GERER NOS FAIBLES MOYENS ET MIEUX AFFRONTER LES MARCHES EXTERIEURS CE QUI, DANS LE CADRE DU COMMERCE DES ENGRAIS QUI NOUS CONCERNE, DOIT PERMETTRE DE REDUIRE CERTAINS COUTS.

JE NE SAURAIS TERMINER MON PROPOS SANS REMERCIER LES AUTORITES DE LA BELLE CITE DE BAMENDA QUI ONT BIEN VOULU ACCEPTER D'ABRITER CE SEMINAIRE.

JE TIENS A ADRESSER LA RECONNAISSANCE DU GOUVERNEMENT AU DIRECTEUR DU CENTRE INTERNATIONAL POUR LE DEVELOPPEMENT DES ENGRAIS (IFDC) QUI A BIEN VOULU ORGANISER CE SEMINAIRE AU CAMEROUN.

NOTRE RECONNAISSANCE S'ADRESSE TOUT PARTICULIEREMENT A L'USAID, NOTRE PARTENAIRE DE TOUJOURS, GRACE A QUI LE PROGRAMME DE REFORME DU SOUS-SECTEUR ENGRAIS A ETE MIS EN OEUVRE, ET QUI A ASSURE LE FINANCEMENT DE CE SEMINAIRE.

JE REMERCIE TOUTES LES PERSONNALITES SCIENTIFIQUES QUI ONT ACCEPTE DE PRENDRE PART A CE SEMINAIRE, ET DONT LA PRESENCE CONTRIBUE A LUI DONNER UN ECLAT PARTICULIER, EN MEME TEMPS QU'ELLE MONTRE L'INTERET PORTE AU ROLE DES ENGRAIS DANS L'ACCROISSEMENT DES RENDEMENTS ET DANS LA PRODUCTION AGRICOLE.

JE PENSE QUE LA FORMATION QUE LES UNS ET LES AUTRES VONT RECEVOIR ICI, ET L'EXPERIENCE QU'ILS VONT TIRER DES

VISITES DE TERRAIN, LEUR PERMETTRONT D'ETRE MIEUX OUTILLES POUR AFFRONTER LES DIFFERENTS DEFIS QUE NOUS AVONS EVOQUES.

JE SOUHAITE A TOUS UN AGREABLE SEJOUR A BAMENDA ET FRUCTUEUSE FORMATION.

JE DECLARE OUVERT LE SEMINAIRE DE BAMENDA SUR LA COMMERCIALISATION EFFICIENTE DES ENGRAIS.

VIVE LA REPUBLIQUE DU CAMEROUN

VIVE LA COOPERATION INTERNATIONALE

Workshop on

Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994

Bamenda, Cameroon

IFDC Story

Organized by

International Fertilizer Development Center
P.O. Box 2040
Muscle Shoals, Alabama 35662, U.S.A.

Sponsored by

The Fertilizer Sub-Sector Reform Program
(Technical Supervisory Committee and USAID/Cameroon)

"IFDC: TOWARD 2000"--SLIDE PRESENTATION

"IFDC: Toward 2000" (Special effects slide) Slide 1	"International Fertilizer Development Center: Toward 2000"
Series of 6 slides of developing-country scenes Slides 2-7	As we approach the 21st Century, the International Fertilizer Development Center is refocusing its efforts to meet the changing needs of the developing countries--its mandate area.
Fading into developing-country scene Slide 8	The Center is addressing a new set of issues that these tropical and sub-tropical countries are now confronting.
Series of 3 (rapidly changing) slides depicting change --<u>Age of Transition</u> (Swirls of colored water) Slides 9-11	A state of transition is pervading the fertilizer sectors and agriculture, in general. This phenomenon has been brought on by economic and political change agents over the past few decades.
(3 slides) Stylized trend lines of Fertilizer Production and Consumption Against Backdrop of Developing-Country Scenes Slides 12-14	The current trends occurring in the fertilizer sector are reshaping the composition of the fertilizer picture in Africa, Asia, and Latin America.

Map of Region With Bangladesh Highlighted Slide 15	Looking first at Asia, let's examine the agricultural scene in developing countries. Our Asian example is Bangladesh bounded on either side by India.
Slide showing field of wheat or rice ready for harvest Slide 16	Here we see fields of golden grain, ripened and ready for harvest...Or is it an illusion?
Art slide showing inputs needed for increased agricultural production Slide 17	It is reality, created through the perfect mix of good seeds, adequate rainfall, and soil enriched with appropriate fertilizers.
Slide showing gypsum being loaded onto truck Slide 18	Bangladesh is making remarkable strides in agricultural development by using its agromineral resources to produce fertilizers...
Bangladesh farmers buying fertilizer at a dealer's shop Slide 19	then marketing these products to its farmers...

Slide	Visual	Narration
Slide 20	Bangladesh farmer uses machine fertilizer applicator	who are applying fertilizer to their fields...
Slide 21	Bangladesh farmer preparing to harvest rice	and seeing the results in increased yields per acre of cropped land.
Slide 22	"If high-yielding varieties were the catalyst for the Green Revolution, fertilizers were the fuel.--" Dr. Norman Borlaug (Superimposed over rice or wheat field)	The adoption of high-yielding fertilizer-responsive varieties of rice and wheat and an abundant and low-cost supply of fertilizer created the Green Revolution in Asia and Latin America during the past two decades.
Slide 23	Photo of Indian women transplanting rice and applying fertilizer.	As a result, South Asia increased by more than fourfold its food production over the past 20 years.
Slide 24	Bangladesh workers cultivating a vegetable crop	Because some developing countries have achieved self-sufficiency in many of the basic food crops like rice, wheat and maize, they are now diversifying their crop mix to include crops such as groundnuts, fruits, and vegetables. Each country has to choose the crops that provide it with a comparative advantage in exports or where growing domestic demand is unsatisfied.

Bangladesh women winnowing wheat Slide 25	Sustaining the bountiful harvests in developing countries that are plagued by uncertain climates and growing populations and removing economic and geographic constraints so that food will be accessible to all developing-country people--These are two of the challenges that...
Map showing locations of IARCs Slide 26	IFDC and other international agricultural research centers are confronting during the last two decades of the 20th Century.
(Stylized graph with 1 Asian, 1 African, and 1 Latin American Child) (Graph) Slide 27	By the year 2000 the United Nations predicts that world population will reach 6.1 billion, up from 4.8 billion in 1985. Ninety percent of this increase will occur in developing countries.
Stack of Rice Bags--"3% Annual Increase in Food for Developing Countries" Slide 28	Feeding the additional population of developing countries will require a 3 percent annual increase in food, which must result from increased fertilizer use since additional arable land is severely limited.
Field scenes of Asia, Africa, and Latin America Slides 29-31	In Asia 80 percent of arable land area is now under cultivation. Although land expansion is possible in Africa and Latin America, the soils in these areas are often poor in quality and expansion may endanger ecologically fragile areas, such as tropical forests. Therefore, intensive agriculture is necessary to provide increased food requirements of developing countries.

"IFDC: TOWARD 2000"--SLIDE PRESENTATION

Latin American field scenes Slides 32-33	In spite of the advances made in the last two decades, food grain production in Asia and Latin America has stagnated. What is needed now in these regions is a balanced nutrition for the soil, including not only nitrogen but also phosphorus, potassium, magnesium, calcium and sulfur fertilizers. A variety of multinutrient fertilizers will provide the means to achieve a "Second Green Revolution."
Photo of Dr. McCune (with quote super-imposed) Slide 34	In his "Twelfth Francis New Memorial Lecture," presented before the Fertiliser Society of London, IFDC's founder and first Managing Director Dr. Donald L. McCune pointed out that fertilizers accounted for at least 50% of the rice yield increases recorded during the first Green Revolution.
1 ton of fertilizer nutrients = 10 or more tons of grain Source: FAO. Slide 35	In fact, one ton of fertilizer nutrients often translates into 10 or more tons of grain.
From 25.8 M tons — Graph — To 56.0 M tons Fertilizer Use in Developing Countries Source: FAO. Slide 36	To achieve the necessary food increases to feed the expanding population, fertilizer use in developing countries is expected to double by the year 2000.
Photo of field with fertilizer being applied Simplified graph with dollar marks super-imposed over photo Slide 37	The benefits of fertilizer use are many. Besides increasing food production, fertilizer use raises income levels through higher profits for farmers, extra wages on other farms, and lower prices paid for agricultural products.

Slide	Narration
$100 worth of fertilizer (bags of fertilizer) = $200 added profits to farmers (bags of money) V:C = 3 Slide 38	A farm survey conducted in Bangladesh by IFDC has shown that on the average $100 worth of applied fertilizers increased the incomes of farmers by more than $200 in the form of added profits; this translates into a value:cost ratio of 3. In some other countries, profitability has been as high as $300 to $500 per $100 invested for a value: cost ratio of 4 to 6.
$100 worth of fertilizer applied (fertilizer bags) = 45 extra work days of farm labor employment (stick men over calendar) Slide 39	Another benefit of fertilizer use is employment generation. Fertilizer use generates employment because of the additional manpower needed in the production, marketing, and use of fertilizers.
$100 worth of fertilizer — Saves — $200-$400 of foreign exchange bags of fertilizer — (bags of grain) Slide 40	The use of fertilizers provides developing countries an opportunity to earn foreign exchange when the increased production of agricultural products is exported or to save foreign exchange when such production reduces imports; $100 worth of fertilizer saves or earns $200-$400 of foreign exchange.
Photo of field showing results of fertilizer versus no fertilizer Slide 41	In addition, fertilizers are necessary to sustain food crop production. The best results are obtained by combining organic and chemical fertilizers. But, attempts to increase productivity without adding fertilizer nutrients to the soil will ultimately fail.
Indonesian market scene Slide 42	The challenge for IFDC and other international agricultural research centers is to transfer the types of successes recorded in Asia

Field scene in Colombia

and Latin America

Slide 43

Field scene in Africa

to Africa, so that the countries of that continent can achieve food self-sufficiency by the year 2000.

Slide 44

Photo of African street scene

At present Africa's population is increasing at a rate of 3 percent per year. Approximately 75 percent of the people of tropical Africa live in rural areas and are dependent on agriculture for their livelihood.

Slide 45

Graph

Food:Fertilizer Equation

On the other hand, food production is increasing at a rate of only 2 percent per year. Therefore, this results in a decline of 1 percent in per capita food production. If these trends continue, tropical Africa could be producing only 75 percent of its food requirements by the year 2000.

Slide 46

African field scene

The challenges facing African farmers are varied and numerous. Not only must they battle against harsh environmental conditions such as drought, but also they have to contend with diseases and insects that attack their food crops.

Slide 47

Madagascar slide showing erosion

Slide 48

Most of Africa's soils are highly weathered and leached and low in organic matter and plant nutrients. As a result, the desert is rapidly encroaching and erosion has accelerated.

(Bar Chart)
With plants inserted in bars

Slide 49

Compounding these problems is a low level of fertilizer use. Tropical Africa uses only 7 kilograms per hectare of fertilizer; Latin America uses almost 5 times as much; and Asia uses more than 11 times as much.

Slide of building in Togo

Slide 50

To help improve the fertility of the soils and, thus, to help get agriculture moving in tropical Africa, IFDC in 1987 established a regional base in Togo, West Africa.

P Resources	K Resources
Nat. Gas & Oil	S Resources

Maps

Slides 51-54

Accomplishing the goals of the West Africa Division will be made much easier due to the existence of a wealth of agromineral resources. About 20 sub-Saharan countries have phosphate deposits, 10 have natural gas, and others have potash and sulfur that can be used to produce a range of fertilizers

"Compass Headings" Slide

Slide 55

As the African people chart a new course for their agriculture sectors, they realize that necessary advances will require investments in irrigation, fertilizer, improved seeds, research, training, and extension services.

"IFDC: TOWARD 2000"--SLIDE PRESENTATION

IFDC aerial view

Slide 56

While IFDC continues to pursue its goal of developing a greater presence in the developing countries, the Headquarters facilities will serve as the "hub" of activity for a network of fertilizer research centers.

"Modus Operandi" slide

Slide 57

At Headquarters, the "modus operandi" for developing new products and practices begins with identifying the route to increased fertilizer efficiency and expanding food production. Engineers, soil scientists, chemists, agronomists, economists, and sociologists are all involved in this search.

Lab scene

Slide 58

In laboratories, work is conducted to determine the technical and economic feasibility of manufacturing and handling fertilizer products.

Pilot plant scene

Slide 59

IFDC's pilot plants, or miniature fertilizer plants, are used extensively for producing a wide range of fertilizer materials.

Greenhouse scene

Slide 60

In our greenhouses, experiments are then conducted to determine the agronomic effectiveness of these products.

Latin American
Field scene
(IFDC personnel)

Slide 61

The most promising fertilizer products and practices are then field tested in developing countries to determine their agronomic effectiveness under diverse agroclimatic conditions. Before newly developed fertilizer technology can be effectively transferred to developing country, there must be established a fertilizer sector, composed of efficiently functioning supply, marketing, and distribution systems.

Cover of <u>Services Booklet</u>

Slide 62

IFDC is unique in that it can draw upon a multidisciplinary, multilingual staff to provide an unbiased opinion across the entire fertilizer sector. Besides carrying out research to develop new products and practices, IFDC offers to its developing-country clients a myriad of services in the production, marketing, and use of fertilizers.

Technical assistance in
developing countries

Slides 63-65

Specific services may include feasibility studies, technical and basic process design, agromineral resource evaluations, bench-scale laboratory processing, policy development and evaluation, environmental and industrial hygiene studies, to name a few.

Training scene

Slide 66

As we approach the next century, the Center's training component is becoming more diverse, individualized, innovative, and more sharply focused in transferring agromineral technology to the developing world. Among the multitude of offerings available are programs on fertilizer production, marketing, and use.

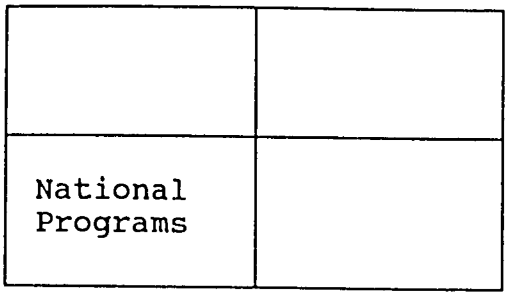
Training scene
(Headquarters or Asia)

Slide 67

Special programs on quality control of products, process economics, investment analysis and decisionmaking, and fertilization and irrigation practices are materializing to assist developing-country personnel in meeting their changing needs.

"IFDC: TOWARD 2000"--SLIDE PRESENTATION

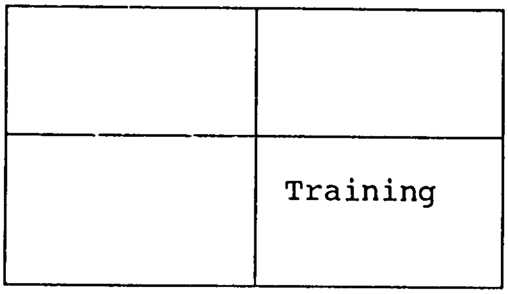
Slide	Narration
Slide of Publication Covers Slide 68	Another effective means of transferring technology is through publications. The Center holds firm to its commitment to communicate its research results and fertilizer production technology through a wide range of publications.
Training Booklet Publications List Newsletter Annual Report IFDC Story Services Booklet Slide 69	If you would like to know more about the Center and its programs, you may request our Publications List, Newsletter, Annual Report, and other general information booklets.
Research Slide / Technical Assistance National Programs / Training Slide 70	No voice, only music.
Research Slide Slides 71-72	Music. (Zeroing in on "research" plus enlarged view)
Technical Assistance Slides 73-74	Music. (Zeroing in on "technical assistance" plus enlarged view)



Slides 75-76

Music.

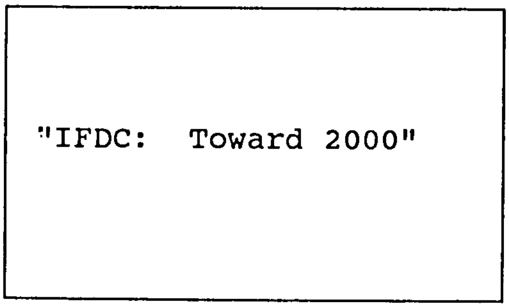
(Zeroing in on "national programs" plus enlarged view)



Slides 77-78

Music.

(Zeroing in on "training" plus enlarged view)



Slide 79

An era of exciting challenges in the developing world.

Module B: Cameroon Agricultural Sector

SEMINAIRE IFDC/PRSSE

28 Mars - 8 Avril 1994

Bamenda

Nami

L'AGRICULTURE AU CAMEROUN

Introduction

. Durant les années 60, la contribution de l'agriculture au PIB était de 40 %. Cette contribution a baissé jusqu'à 25 % en 1985/1987. Néanmoins, elle occupe 75 % de camerounais, procure 25 % de devises, et apporte 15 à 20 % des recettes de l'Etat. Malgré la baisse des cours des produits de base, l'agriculture demeure à l'avant-plan de l'économie. La diversité écologique du pays offre un potentiel important de relance de la production de l'agriculture et de l'élevage. Le Cameroun à ce jour jouit de l'autosuffisance alimentaire. A cause de l'importance que l'Etat camerounais a toujours accordé au dé veloppement de son agriculture, l'administration du secteur agricole connaît à ce jour une décentralisation des plus poussées qui se rationnalise toujours davantage.

- des Postes Agricoles et des Agents de Vulgarisation des Villages au niveau des grandes agglomérations ; avec pour objectif d'atteindre 200 exploitants agricoles paysans pour un Agent de Vulgarisation.
- Plus de 500 ingénieurs agronomes,
- Des cadres techniques qui sont presque tous passés par une institution de formation agricole primaire et moyenne,
- Des budgets de fonctionnement en croissance : 2.366.381 en 1972/73
  17.200.513 en 1988/89
- Des projets de développement agricole dans presque toutes les provinces, jusqu'à une date récente où la crise économique inspire d'autres orientations notamment celle de la libéralisation, et de développement agricole par filière.

Rappel historique

Depuis le milieu des années 60, le secteur agricole connait une croissance moyenne de 4,4 %, et il y a eu des années où le taux de croissance de ce secteur a dépassé 6 %. De 1970 à 1975, ce taux est descendu à 3,4 %, soit moins que les 4,2 % du PIB/an. Entre 1986 et 1988, le secteur a connu une croissance de 4 %, en raison des récoltes exceptionnelles de 85/87, alors que l'économie nationale voyait sa croissance annuelle tomber à 1 %.

Dans le 6e Plan 1985/1990, le Gouvernement s'est donné des objectifs ambitieux : élargir et moderniser le secteur agricole afin d'assurer la sécurité alimentaire, encourager et diversifier les exportations, et relever les revenus ruraux, à travers la création des exploitations de moyenne Importance (EAMI) et d'intensifier l'emploi et la transformation des produits agricoles du pays.

La Banque Mondiale a effectué une étude du secteur agricole en Mars 1989 (Rapport No 7486-CM), dont les principales recommandations sont reprises dans le P.A.S qui donne une place importante aux incitations qui agissent par le biais des prix ou autrement. Le Gouvernement réduit sa participation à la production et à la commercialisation des produits de base des entreprises publiques (riz-sucre- huile de palme). A terme, ces fonctions doivent être privatistes. Le Gouvernement a également pris de récentes mesures pour réduire les coûts intermédiaires pour le café, le cacao, le coton, (La Nouvelle Loi coopérative).

La production agricole

Les données sur les productions vivrières varient énormément. La production alimentaire par personne a atteint un maximum vers le milieu des années 70. L'accroissement des superficies expliquent pour une large part les progrès des cultures vivrières, même si les principaux centres de production alimentaire des provinces de l'Ouest et du Nord-Ouest où les terres se font rares n'aient plus guère de possibilités d'augmenter leurs superficies.

Les cultures d'exportation quant à elles, n'ont donné que des résultats mitigés depuis plus de 25 ans.

Le cacao, par exemple souffre d'absence d'infrastructures, de carence de main-d'oeuvre, de l'irrégularité des approvisionnements en intrants (fongicides notamment).

Le Cameroun a la chance de posséder encore de vastes terres arables dans de nombreuses provinces, mais la médiocrité du développement des infrastructures en limite l'accès. En l'absence d'un meilleur réseau de désenclavement des régions, la seule option viable pourrait être l'intensification de l'agriculture. En effet, la superficie cultivée durant une année n'atteint qu'environ 30 % du total des terres cultivables.

Caractéristiques des exploitations agricoles

- 1.000.000 de petites exploitations ont en moyenne 1,8 ha,
- 70 % des exploitations ont moins de 2ha et travaillent 40 % de leurs terres,
- 5 % des exploitations cultivent 5 ha,
- Depuis 20 ans, l'agriculture traditionnelle fournit 90 % de l'ensemble de la production agricole, 89 % de la production commercialisée et plus de 75 % de tous les emplois. Elle produit tout le cacao, le café et le coton.

La production est fonction de la diversité écologique et des densités des populations, mais des habitudes alimentaires aussi

Coton - mil - sorgho - arachides - oignons dans le Nord, et récemment le maïs.

Cafés - cacao - maïs - banane - palmier à huile dans le Sud.

Le potentiel d'accroissement des rendements des cultures est fonction de la diffusion de messages de vulgarisation appropriées, des semences de qualité, de la capacité de transformation qui constitue la plus grande chance d'élargissement du marché de placement de la production agricole, et bien entendu, de l'accessibilité des intrants incontournables.

Rôle des femmes

Les femmes sont les principaux producteurs des produits alimentaires au Cameroun.

Semences

La semence, avec le sol constituent la base de l'agriculture. A travers la MIDEVIV, puis PIONEER, toutes les deux en liquidation, le Gouvernement voulait se doter d'un puissant réseau de production et de distribution des semences.

A l'heure actuelle, un Programme National Semencier nouveau est en cours d'élaboration, car un instrument de nise en oeuvre du Conseil Semencier National. La figuration en bonne place du volet semence dans le nouvel organigramme du Ministère de l'Agriculture confirme l'importance que le Gouvernement attache au développement d'un secteur semencier porteur/rémunérateur. Il se développera à travers un réseau de producteurs privés formés en conséquence. Un noyau pilote formé par la FAO se développe à Ntui, à Ndop.

Le Crédit Agricole

Il est de création récente, mais se développe dans le style de banque commerciale. Des négociations sont en cours pour la mise en place d'un système véritable de prêt agricole.

Pour le moment, le FIMAC dans une certaine mesure peut être considéré comme palliatif. A ce jour, ce Projet a octroyé à 704 groupes près de 500 millions de francs. Le nombre de membres bénéficiaires est d'environ 6.153.

La vulgarisation agricole

Trois principales approches assurent la vulgarisation agricole sur le terrain :

- La formation et visite (T & V) 6 provinces (PNVFA dans 6 provinces)
- Le groupement (SODECOTON-SODECAO)
- L'approche diffuse de masse dans les zones non couvertes par les deux premières approches.

Le Crédit Agricole

La Banque Crédit Agricole du Cameroun (CAC) est de création récente sur financement allemand et camerounais. Ses modalités de prêt sont les mêmes que celles des banques commerciales de la place. On peut donc dire qu'en dehors du nom, le CAC n'a encore rien d'agricole. Toutefois, le Gouvernement est entrain de négocier la mise en place d'un fonds destiné spécialement au financement des prêts agricoles à des taux compararbles à ceux des institutions financières similaires dans les autres pays (taux d'intérêt bonifiés).

Pour pallier à cette carence du CAC, le Gouvernement a mis en place le FIMAC (Fonds d'Investissement de Micro-projets Communautaires), qui prête des montants relativement modestes, jusqu'à hauteur de 6 millions de francs cfa à des groupes de paysans au taux d'intérêts très bas. A ce jour, 704 groupes pour 6.153 membres ont déjà obtenu des financements d'un montant global de plus de 500 millions.

La vulgarisation agricole

L'appropriation des objectifs des politiques agricoles successives du pays depuis l'indépendance s'est opéré et s'opère encore à travers de nombreuses approches de vulgarisation des techniques agricoles éprouvées en milieu paysan, par les services traditionnels de l'agriculture, les ONG, l'Université, les projets spécifiques comportant un volet vulgarisation :

- Le système Formation et Visites, (Training and Visits) en anglais met l'accent sur la liaison permanente Recherche, Vulgarisation, les parcelles de démonstration en milieu paysan, la régularité des visites de terrain et la participation active du paysan à l'identification des thèmes de vulgarisation et à l'élaboration de la mise en place des démonstrations.

- Le groupement participatif vise à transmettre aux paysans regroupés par affinité variée. Trois fonctions essentielles qui affectent les revenus des membres du groupe, à savoir l'approvisionnement, la productin et la commercialisation des produits. La SODECAO et la SODECOTON qui utilisent cette approche ont permis aux paysans de réaliser d'importants gains qui jusque-là allaient dans les poches des intermédiaires,en plus de la maîtrise de ces fonctions.

- Les services traditionnels utilisent un mélange d'approche par groupe, ou par paysans individuels, sans un planning de travail précis.

- La multiplication des approches au gré des organismes de financement pose sur le terrain des problèmes de chevauchement et de duplication de rôles anti-économiques. De plus, cette constellation de chacune d'elles, repousse toujours davantage la gestation et l'éclosion d'une approche authentiquement endogène, adaptée aux conditions sociales, économiques et culturelles locales, et qui intègre les objectifs essentiels d'une approche acceptable que sont :

- l'institutionnalisation de la liaison Recherche/Vulgarisation,
- la participation active et la responsabilisation des paysans dans la recherche des solutions qui sont les leurs,
- la formation et la démonstration permanentes,
- la supervision,
- la comptabilisation des résultats des démonstrations par les

bénéficiaires,

- la professionnalisation des encadreurs.

Conclusion

L'agriculture occupe une place de choix dans la préoccupation des pouvoirs publics du Cameroun. La situation alimentaire et nutritionnelle à partir des ressources locales est satisfaisante. L'agriculture camerounaise recèle d'énormes potentialités pour l'induction d;uns industrie alimentaire locale prospère, et très bien variée. Les promoteurs économiques avisés devraient déjà le savoir, et engager des actions dans le sens de l'exploitation de ces chances.

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The Use and Supply of Fertilizers in sub-Saharan Africa

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The use and supply of fertilizers in Sub-Saharan Africa

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Summary

In 1990, fertilizer use in Sub-Saharan Africa (SSA) amounted to 8.4 kg per ha. Within SSA great differences exist, ranging from 1.1 kg per ha in Central Africa to 14.6 kg in southern Africa. Six countries (Nigeria, Zimbabwe, Kenya, Sudan, Ethiopia and Zambia) account for about three-quarters of total fertilizer use in SSA.
Annual fertilizer consumption in SSA increased 3.4% over the period 1975-1990 but in the second half of the 1980s growth stagnated. In many countries, subsidies on fertilizers have been abolished through the implementation of structural adjustment programmes. Farmers often complain that fertilizers have become too expensive for use in food crop production. Slightly more than half of the fertilizer consumption in SSA is used on cereals, particularly on maize.
Fertilizer production in Africa is located in regions where raw materials and/or sources of energy are locally available. The main fertilizer-producing countries in SSA are Nigeria, Zimbabwe and Senegal. Whereas fertilizer production increased in the late 1980s, fertilizer imports decreased to 80% of the total consumption. Many countries rely on aid support to finance their fertilizer imports but the part of aid-financed fertilizer imports diminished to one-third in 1990. Therefore, many countries depend more and more on their own foreign exchange for fertilizer imports. There is a need to develop national procurement and marketing structures.

Introduction

This paper gives an overview of the fertilizer sector in Sub-Saharan Africa (SSA), including the demand (growth levels, fertilizer use by crop, and returns to farmers from fertilizer use), the supply (developments in fertilizer production, and reforms in fertilizer marketing systems) and finance, with special emphasis on the share of fertilizers procured with donor assistance *vis-à-vis* commercial imports.
SSA is defined as Africa minus North Africa (region 1) and South Africa (region 7). In this paper we have used the FAO classification of African countries in agro-ecological regions [5], as shown in Table 1.

TABLE 1. Classification of African countries in agro-ecological regions.

Region nr.	FAO name	Name in this paper
1.	Mediterranean and arid North Africa	North Africa
2.	Sudano-Sahelian Africa	Sudano-Sahel
3.	Humid and sub humid West Africa	Coastal West Africa
4.	Humid Central Africa	Central Africa
5.	Sub humid and mountain East Africa	East Africa
6.	Sub humid and semi arid Southern Africa	Southern Africa
7.	South Africa	South Africa

Most of the data used in this paper was collected through the 20 national correspondents of the African Fertilizer Trade and Marketing Information Network (AFTMIN), a network coordinated by International Fertilizer Development Center-Africa (IFDC), Lomé, Togo.
In this paper, fertilizers relate to mineral fertilizers, and fertilizer nutrients are defined as $N+P_2O_5+K_2O$, where N = nitrogen, P_2O_5 = phosphate, and K_2O = potassium. Fertilizer statistics reported in a fertilizer year are attributed to the first year: 1990/91 data is attributed to 1990.

Fertilizer use in SSA

Worldwide, the average use in 1990 was 93 kg of fertilizer nutrients per ha arable land and land under permanent crops. In developing countries, the 1990 average was 81 kg per ha in 1990. In that same year fertilizer use in SSA amounted to 8.4 kg of fertilizer nutrients per hectare of arable land and land under permanent crops, as against 59.6 kg per ha in North Africa, 59.3 kg in South Africa, and 19.1 kg in Africa.
Total fertilizer consumption in SSA was less than one third of Africa's consumption, and amounted to 1,230 thousand t of fertilizer nutrients in 1990, equivalent to around 75,000-80,000 truckloads of 35 t each. Coastal West Africa consumed 460 thousand t, Southern Africa 354 thousand t, and East Africa 230 thousand t. Fertilizer consumption in the Sudano-Sahel region amounted to 167 thousand t in 1990, much higher than the consumption in the humid zones of Central Africa, 19 thousand t (Table 2).

Fertilizer consumption is highly concentrated in a few countries. Nigeria, Zimbabwe, Kenya, Sudan, Ethiopia, and Zambia account for about three-quarters of total fertilizer use in SSA (Appendix 1). Nigeria consumed 400,000 t of fertilizers in 1990, which is more

TABLE 2. Fertilizer use and trends in fertilizer consumption 1975-1990 per region in Africa.

Region	Fert. use 1990	Fertilizer consumption in Africa from 1975-1990 1975	1980	1985	1990	Annual growth	
	kg ha⁻¹*	'000 t				%**	'000 t
2. Sudano-Sahel	5.3	158.1	128.1	173.1	167.5	0.9	1.6
3 Coastal West Africa	10.4	129.9	251.0	397.3	460.0	4.9	22.8
4 Central Africa	1.1	27.6	45.6	73.7	19.1	2.6	0.5
5. East Africa	8.0	108.5	142.3	216.7	229.8	4.8	11.1
6 Southern Africa	14.6	268.5	391.4	359.6	353.6	1.7	6.1
Sub-Saharan Africa	8.4	692.6	958.5	1220.4	1230.0	3.4	42.0
1. North Africa	59.6	878.3	1273.4	1598.8	1566.0	4.0	62.0
2. South Africa	59.3	772.7	1064.3	865.3	780.6	-1.1	8.6
Africa	19.1	2343.6	3296.2	3684.6	3576.6	2.7	95.4

* Use per hectare is calculated by dividing fertilizer consumption in 1990 in nutrients tonnes by hectares of arable land and land under permanent crop in 1989 (these are both latest statistics available)
** Growth calculated over 1990 consumption level

than 80% of consumption in Coastal West Africa. Zimbabwe's consumption amounted to 170,500 t, which is around 50% of consumption in Southern Africa. Kenya and Ethiopia consumed just over 100,000 t in 1990, together accounting for more than 80% of consumption in East Africa. Sudan consumes more than 50% in the Sudano-Sahel.
Fertilizer use was 5.3 kg per ha in the Sudano-Sahelian region in 1990, and 1.1 kg per ha in Central Africa. With the exception of Senegal there is no production of fertilizers in these regions. The majority of the countries in these regions are clearly in the introduction stage of fertilizer use, when fertilizers are being introduced to farmers, but farmers do not know the benefits and the proper use. Extension services and infrastructure are weak and underdeveloped. At this stage fertilizer use is low, generally below 10 kg per ha. There are often regions within a country that consume much higher levels of fertilizer, i.e. those where cash crops are abundant, and there are also regions which use virtually no fertilizer.
Coastal West Africa and Southern Africa are in the beginning of the take-off stage, when an awareness of the benefits of fertilizer use has been created and commitments to the development of the required physical and institutional infrastructure have been made.

In these two regions 90% of fertilizer production in SSA takes place. Nigeria, following 10 years of intensive campaigning to increase fertilizer consumption and local production, has now entered the take-off stage. Malawi is also moving in that direction.

Trends in fertilizer use in SSA

Fertilizer use continues to increase in some countries, such as Burkina Faso, Ethiopia, Nigeria and Malawi. Other countries, with a relatively high fertilizer consumption, seem to have already reached a plateau, and fertilizer use has remained constant since 1985: e.g. Kenya (44 kg per ha), Zimbabwe (60 kg per ha).
Future levels of fertilizer consumption can be estimated by extrapolating historical growth levels. Fertilizer consumption data from 1975 to 1990 for each of the regions, is analyzed in the IFDC-Africa Fertilizer Information Data base by means of a linear regression model (Table 2 and Appendix 1). The correlation between the calculated and real data is indicated by the correlation coefficient (R^2). A high value means that the model calculates the values well. In some countries, one notices a linear trend in fertilizer use. The model shows high R^2 for these countries.
Fertilizer use trends in other countries in SSA show wide annual fluctuations, and the model shows a low R^2. Economic, political, institutional, and climatic changes appear to be the cause of these fluctuations.
The annual consumption of fertilizers in SSA increased 3.4% over the period 1975-1990, representing an average of 42,000 t per year, but in the second half of the 1980s growth ceased. Annual growth was almost 5% in Coastal West Africa and East Africa. There was no growth in the Sudano-Sahelian region and in Central Africa, and annual growth in Southern Africa was about 2.0%.
Nigeria's fertilizer consumption increased by 23,500 t annually between 1975-1990, i.e. 5.9% per year calculated over 1990 consumption level. Nigeria's fertilizer use level increased from 0.5 kg per ha in 1973 to 10 kg per ha in 1988, and 12.8 kg per ha in 1990. The average annual increase in fertilizer consumption in Kenya was 5,400 t and in Ethiopia 4,300 t. Fertilizer use in Malawi increased from 7 kg per ha in 1971 to 12 kg per ha in 1976, and to 19.9 kg per ha in 1990.
Fertilizer consumption in Central Africa almost tripled (from 28,000 t to 74,000 t) over the period 1975-1985, but decreased in the late eighties to 19,000 t in 1990, mainly because of a drop in coffee prices in Cameroon. Fertilizer consumption in Cameroon depends primarily on international coffee prices: 60% of fertilizers is used on coffee. In 1989 official producer prices for coffee dropped by 50%. These low producer prices, coupled with the non-payment of arrears owed to coffee producers by the National Produce

Marketing Board, negatively affected the demand for fertilizers. Because of farmers' cash flow problems, much less fertilizer was purchased for use on food crops [7].

Fertilizer use by crop

International Fertilizer Association (IFA), IFDC and FAO have recently conducted surveys on fertilizer use by crop in countries throughout the world. The results for approximately 80 countries were published in October 1992 in a joint report entitled Fertilizer Use by Crop [6]. Unfortunately, participation by SSA countries was low, but results from the 14 countries that did participate give an indication of fertilizer use in SSA. Total fertilizer use in these countries represented about 550,000 t (Table 3) or about 43% of the actual usage in SSA. However, because the countries included were not randomly selected, these figures give only a rough indication of usage patterns. It should also be pointed out that official data on use by crops is not available so data for each country is based on knowledgeable estimates. However, despite these limitations, it is the most complete information available on fertilizer use by crop in Sub-Saharan Africa.

TABLE 3. Fertilizer use by crop in 14 countries representing about 43% of SSA.

	% of area planted that received			Application rates kg ha⁻¹			Quantity used '000 t			Total	
	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	'000 t	%
Maize	17	18	16	74	30	16	86	31	15	131	24
Millet	13	13	13	20	11	3	9	5	1	14	3
Sorghum	16	22	22	35	11	4	34	8	3	45	8
Rice	11	12	12	45	19	12	14	6	4	24	4
Wheat	51	50	14	117	17	57	64	11	4	78	14
Groundnuts	4	4	4	10	26	26	1	1	1	3	1
Vegetables	35	35	26	66	32	40	6	[illegible]	2	12	2
Cotton	63	62	81	56	28	20	56	22	16	93	17
Oil Palm	NA*	NA	NA	24	41	50	1	1	2	4	1
Soybeans	60	60	60	20	55	49	1	2	2	4	1
Sugarcane	100	100	100	113	39	115	27	9	23	59	11
Tobacco	96	94	96	59	100	88	7	11	10	28	5
Other crops	NA	NA	NA	NA	NA	NA	23	13	19	55	100
Total				NA	NA	NA	326	124	100	550	100

* NA - No data available

IFDC-Africa statistics show that, compared to the amount of nitrogen sold, only 57% as much phosphate and 30% as much potash were sold in SSA in 1990/91. The same statistics, based on estimates for these 14 countries, indicated that 38% as much phosphate and 31% as much potash were applied compared to nitrogen. This indicates that the consumption ratios in the sample of 14 countries may include crops that are low phosphate users relative to nitrogen. Slightly more than half of the fertilizer used in these 14 countries is applied to cereals, and maize receives almost one-half of that amount. Although the area of millet and sorghum is also large, very little is fertilized and application rates are low. These statistics indicate that the crops which have the highest percentage of their area fertilized include sugarcane, tobacco and cotton. A high percentage of maize, sorghum, groundnuts, millet and rice is not fertilized.

Returns to farmers from fertilizer use

Many governments in SSA are implementing structural adjustment programmes, and have phased out fertilizer subsidies [11]. As a consequence, many farmers complain that fertilizers are too expensive for intensifying the agricultural system, and in particular the food crop areas.
Often it is stated that the Value Cost Ratio (VCR), defined as the incremental value of production divided by the incremental costs of fertilizer use, should be at least 2 in order to interest farmers in fertilizer use. The VCR depends on the quantity of fertilizer used, the price of the fertilizers, the expected incremental output of the crop and the price of the crop. In other words, the VCR is just the crop response (kg output/kg fertilizer nutrients) multiplied by the price ratio (price of crop/price of fertilizers).
The physical crop response at farmer level (how much extra output a farmer gets per unit of fertilizer) is often not measured, because it depends on many environmental (soil type, climatic, other inputs) and crop management factors. Crop responses are normally provided by research stations in data ranges. For instance the maize response to 15-15-15 on station X in a given year ranges from 5-10, and such crop responses are often used for fertilizer recommendations.

The fertilizer/crop price ratio is much easier to calculate. Fertilizer retail prices are often uniform throughout the country and determined at the beginning of the agricultural season. Whereas cotton prices are fixed throughout the country and the year, cereal prices vary considerably during the year, with the lowest trough just after harvest. We have used average cereal prices in our analysis. Table 4 shows the fertilizer/crop price ratio (in local currency) for

the major crops in some countries in SSA: Burkina Faso, Mali, Rwanda, Senegal, Sudan, Togo, and Zambia. (These data were obtained from the AFTMIN correspondents in 1991). A value of 2.9 (Burkina Faso, maize, 14-23-14+6S+1B) means that 1 kg of major nutrients supplied (N+P2O5+K2O) in this fertilizer is almost 3 times as expensive as 1 kg of maize.
The VCR is the crop response multiplied with the price of the crop and divided by the costs of fertilizers applied, or the crop response is the VCR multiplied by the price of fertilizers and divided by the price of the crop. Hence, if a farmer wants to have a minimum VCR of 2, then he needs at least to obtain a crop response which is twice the fertilizer/crop price ratio. An important assumption is necessary in order to estimate the profitability of fertilizers: a physical crop response of 6 kg of crop output per kg of nutrient is

TABLE 4. Fertilizer crop price-ratio in 1991 in local currency per kg crop output/nutrients ($N+P_2O_5+K_2O$) [Source: AFTMIN].

	Burkina	Mali	Rwanda	Senegal	Sudan	Togo	Zambia
Urea							
Maize		8.5	2.8	2.8		2.4	2.2
Millet				2.8			2.6
Sorghum	3.0		3.5	2.8	1.1	2.2	3.7
Cotton		2.6		2.0		1.5	2.0
Rice		3.0	3.5	2.4		2.2	2.6
Groundnut			1.1				1.5
Wheat			2.2				
15-15-15							
Maize		4.2					
Millet		4.2					
Sorghum		4.2	3.6			2.2	
Rice		3.3				2.2	
Cotton formulae	**14-23-14+ 6S+1B**	**14-22-12+ 7S+1B**				**12-22-12+ 5S+1B**	
Maize	2.9					3.3	
Millet	2.9						
Sorghum	2.9						
Cotton	2.0	3.0				2.0	
Rice	2.4						
Groundnut	2.9						

not easy to obtain under farming conditions. This means that fertilizer nutrients cannot be more than 3 times as expensive as the crop if the farmer wants a VCR of 2. A fertilizer/crop price ratio of 3 is considered here as the critical limit.

Some conclusions can be drawn from Table 4:
- Fertilizer prices are lowest in relation to cotton prices in SSA, generally below 3 (except Mali).
- Because of high logistical costs, the returns from fertilizer use in Mali are marginal as fertilizer is more than three times as expensive when compared to crop output.
- In Burkina Faso, relative cost of fertilizers is critical with values approaching 3, but still much lower than in Mali.
- In Senegal, where fertilizers are locally produced, almost all fertilizers are three times as expensive as crop prices.
- In Togo relative fertilizer prices are lower than in other countries in the region. However, the cotton fertilizer used on maize is expensive.
- In Rwanda relative fertilizer prices are high for maize, sorghum and rice, but low for groundnuts, wheat and beans.
- In Zambia, relative fertilizer prices are not very high.

Supply of finished fertilizers in SSA

Only 13 of 50 countries in Africa produced fertilizers in 1990. South Africa, and five countries in North Africa, account for 78% of the continental production. In these regions raw materials and/or sources of energy are locally available. North Africa (Algeria, Morocco, and Tunisia) produces large quantities of P fertilizer (DAP) for exports outside Africa, and N fertilizer (urea) in Egypt and Libya (Table 5).

Whereas SSA consumed only one-third of fertilizers used in Africa, it imported almost two-thirds of Africa's imports. Imports in SSA were almost 80% of total consumption. This does not mean that production was only 20% of consumption levels, because some of the imports were used for manufacturing fertilizers. Fertilizer consumption in SSA almost doubled from 1975 to 1985, but remained static in the late 1980s (Figure 1). Fertilizer imports increased to 90% in 1985, but since then have gradually decreased to around 80%. Local fertilizer production decreased to 15-16% in 1985, but tripled to 46% in 1990! Exports (including trade in the region) increased in the late 1980s to around 10-20%.

Which of the macro-elements are responsible for this effect? The changes in consumption, imports, production and exports of nitrogen fertilizers, phosphate fertilizers, and potassium fertilizers

are shown in Figures 2, 3 and 4. Relative stagnation in consumption in the late 1980s is observed for nitrogen, phosphate and potassium. SSA already produces two-thirds of its 1990 nitrogen consumption. The gap between production and use of phosphate fertilizers has narrowed because phosphate production doubled in the late 1980s while demands remained static. Imports of both nitrogen and phosphate fertilizers decreased in the second half of the 1980s.
All countries in SSA depend on the importation of fertilizer (raw materials). Although at least 29 countries in SSA have phosphate sources [9], only 3 countries use these phosphates for local fertilizer production. Senegal and Zimbabwe still need to import nitrogen and potassium. Nigeria produces a large quantity of nitrogen, and imports potassium and phosphates, as local production of phosphates cannot meet the demand. There is no production of potassium in SSA, nor has the use of potassium for the production of complex fertilizers been considered.
The production of fertilizers in SSA increased considerably in 1988 with a new ammonia-urea plant in Nigeria: nitrogen-production increased from an average of 24 thousand t in 1986-88 to 284 thousand t in 1990. Before 1987 most fertilizers in Nigeria were imported (Box and Table 6).

Fertilizer trade and aid

Many countries in SSA depend on fertilizer imports to meet their domestic fertilizer requirements. Although a country-level analysis of imports might throw some light on the annual fluctuations in fertilizer imports, the general slow down in imports in the 1980s compared with the 1970s would suggest that foreign exchange shortages and debt crises played a more important role in this deceleration than world fertilizer prices because fertilizer prices were generally lower in the 1980s than in the 1970s [1].
To the extent that fertilizer imports are constrained by foreign exchange shortages, aid-financed fertilizer and other kinds of aid can play an important role in relieving this constraint in the short run. However, the long-run solution may be either to improve the production base or to increase foreign exchange availability or both [1].
Furthermore, many countries were able to use mineral fertilizers in the mid-1980s simply because these were made available through aid. Even an oil-exporting country like Nigeria had to rely on a World Bank loan in 1983 to finance its fertilizer imports during the 1983-86 period.
The ratio of aid-financed fertilizers to total imports is calculated from data provided by Fertilizer Economic Studies, Limited, Fertecon (Table 7). Almost two-third of imports in SSA were

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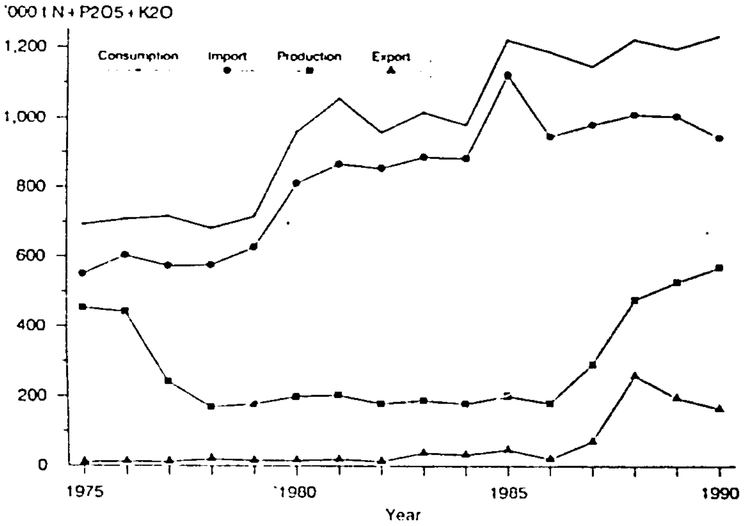


financed by aid in 1985. The ratio dropped to one-third in 1987, regained a little in 1988 and 1989, but dropped again to around one-third of fertilizer imports in 1990. The statistics for the larger

TABLE 5. Consumption, exports, imports and production of fertilizers in '000 nutrient t ($N+P_2O_5+K_2O$) per region in Africa 1990* [Source: data from FAO and AFTMIN obtained from IFDC-Africa Fertilizer Information Database].

Region	Production	Imports	Consumption	Exports**
2. Sudano-Sahel	67	180	167	36
3 Coastal West Africa	350	251	460	122
4 Central Africa	0	33	19	0
5. East Africa	14	242	230	3
6. Southern Africa	139	236	354	4
Sub-Saharan Africa	570	942	1230	165
% Africa	12	63	34	6
1. North Africa	3562	409	1566	2338
2. South Africa	810	132	781	174
Africa	4942	1484	3577	2677

* Production and imports is not the same as availability, since stock levels in the beginning and at end of the year are not taken into consideration

** Exports includes trade between African countries

importing countries are relatively accurate, and determine to a large extent the reliability of the SSA ratio. Most of the smaller fertilizer consuming countries do not report all their imports, and their ratio of aid-financed fertilizers should only be considered as indicative.

Although the ratio of fertilizer aid to fertilizer imports for SSA decreased from 1985 to 1990, dependence on fertilizer aid remained high for many countries. For 21 of these countries all fertilizer imports were financed through donor programs. Another five small consuming countries received donor funding for more than 50% of fertilizer imports. Some of these countries were Burkina Faso, Chad, Gambia, Ghana, Madagascar, Sudan, Tanzania, Togo, and Zaire [1].

Of the larger fertilizer consuming countries, only the three countries without a fertilizer production capacity (Sudan, Kenya, and Ethiopia) received more than 50% of imports in aid. Ethiopia in particular received much more aid in 1989 and 1990 than in the period 1985-1988. The other large countries received less than 10% of their imports in aid. These fertilizer producing countries (Nigeria, Zimbabwe, Senegal, Côte d'Ivoire, and Zambia) hardly benefited from fertilizer aid at the end of the 1980s. Nigeria received all its fertilizers as aid in 1985 and 1986, but since the establishment of the NAFCON plant has to find its own foreign exchange for the importation of raw materials (mainly potassium) and spare parts for the fertilizer production plant. Although NAFCON cannot yet satisfy the local market, it is obliged to export fertilizers in order to obtain hard currency.
A major problem in connection with loans and grants for fertilizer has been the different procedures adopted by some bilateral and multilateral donors and agencies. Conditions imposed by fertilizer aid donors (e.g. limitations to origins, transporters, and certain fertilizer products) may lead to excessive marketing costs and margins [4].

A future perspective

Fertilizers contribute to increased food security in SSA, as more than half of the 75,000-80,000 truckloads of fertilizers is used on cereals. After a period of steady growth from 1975 to 1985, fertilizer use in SSA stagnated at 8-9 kg of fertilizer nutrients per ha. This level is largely insufficient to replenish soils with the nutrients taken away by plants, erosion and other factors. Regional comparison demonstrates, however, that Coastal West Africa and East Africa performed better than the Sudano-Sahelian region, Central Africa and Southern Africa.

FIGURE 2. Evolution of nitrogen flows in Sub Saharan Africa [Source: FAO and AFTMIN]

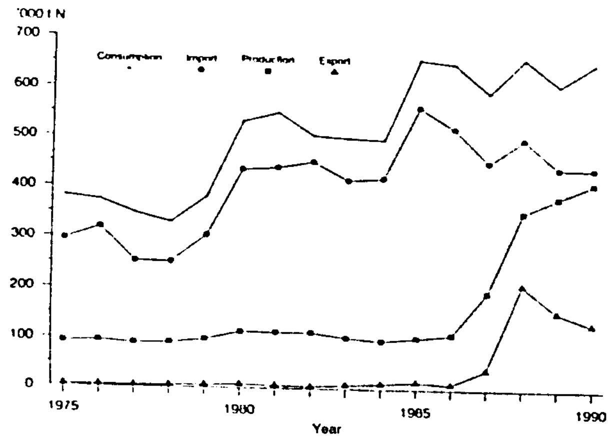


FIGURE 3. Evolution of phosphorus flows in Sub Saharan Africa [Source: FAO and AFTMIN]

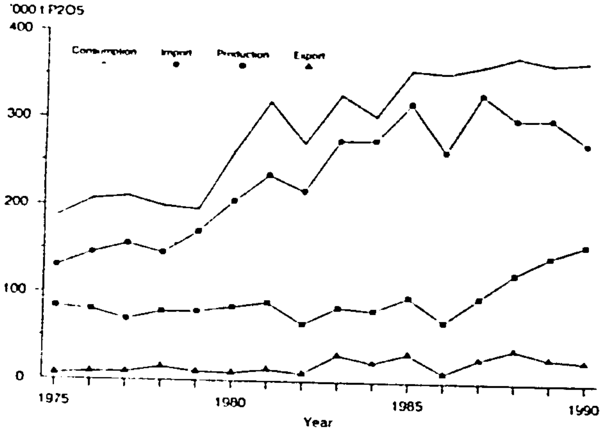


FIGURE 4. Evolution of potassium flows in Sub Saharan Africa [Source: FAO and AFTMIN]

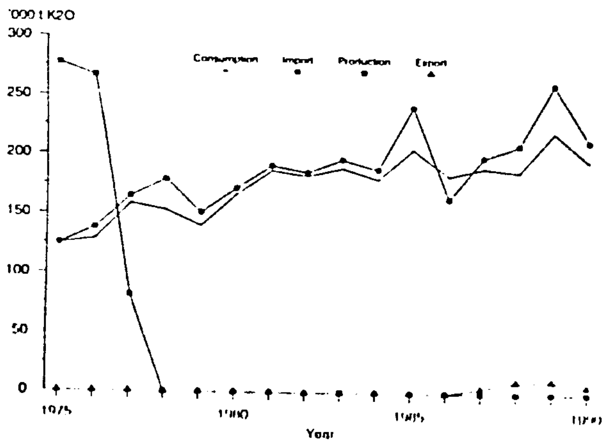


TABLE 6. Fertilizer production ('000 nutrient t) in seven African countries, 1986-1988 average and 1990. [Source: data from FAO and AFTMIN obtained from IFDC-Africa Fertilizer Information Database].

Country	N		P_2O_5		Total	
	1986-1988	1990	1986-1988	1990	1986-1988	1990
Côte d'Ivoire	1.7	6.1	2.1	9.9	3.8	16.0
Mauritius	10.2	12.0	-	-	10.2	12.0
Nigeria	24.3	284.0	5.0	50.2	29.3	334.2
Senegal	11.2	20.7	34.2	43.1	45.4	63.8
Tanzania	4.3	1.1	-	1.5	4.3	2.6
Zambia	9.9	3.8	-	7.9	9.9	11.7
Zimbabwe	71.7	83.3	45.8	41.1	117.5	124.7
Total	133.3	411.0	87.1	154.0	220.4	565.0

The fertilizer production capacity of SSA increased considerably in the late 1980s, with the establishment of a granulation plant and several bulk blending units in Nigeria. The scope for more world-class fertilizer plants in other countries is rather limited, since the

BOX

There were two chemical fertilizer plants (Port Harcourt and Kaduna) and 5 bulk blending units in 1991 in **Nigeria**. The Federal Superphosphate Fertilizer Company (FSFC), Kaduna and the National Fertilizer Company of Nigeria (NAFCON), Onne, Port-Harcourt, constitute the two main fertilizer producing plants in Nigeria and have combined capacity for 800,000 t of product. NAFCON has the capacity to produce 450,000 t of urea, 100,000 t of DAP and 250,000 t of compound fertilizers. Kaduna chemical plant has a capacity of 100,000 t of SSP. Around 610,000 t of compound fertilizers are bulk blended in Kaduna (200,000 t), Minna (200,000 t), Kano (100,000 t), Maiduguri (100,000 t), and a second unit in Kano (10 000 t) [12]. It is remarkable that NAFCON (Nigeria) exports a lot of urea to Europe, and that other West African countries import a lot of urea from Europe.

Zimbabwe is the major fertilizer producer in the Sourthern Africa region ... 83 thousand t of N, and 41 thousand t of P_2O_5 in 1990. It mainly supplies the domestic market.

Senegal's phosphate deposits are mined for the production of phosphoric acid, and the production of a large variety of custom made cotton fertilizers (NPKSB's) for export to other West African countries, e.g. Mali, Burkina Faso, Togo, and Benin. Around 30% of fertilizers produced is consumend locally.

Côte d'Ivoire has a granulation plant with a capacity of 300-400 t per day and a bulk-blending plant with a capacity of 500 t per day. The plants use imported raw material and produce during the fertilizer campaign (September-April) approximately 160,000 t. About 50% of the fertilizer is sold nationally and 50% is exported to West Africa. The bulk-blending products are usually slightly less expensive than the granulated products.

TABLE 7. Sub Saharan Africa: % aid financed fertilizers in total imports 1985-1990 [Source: Fertilizer Economic Studies, Limited (Fertecon)].

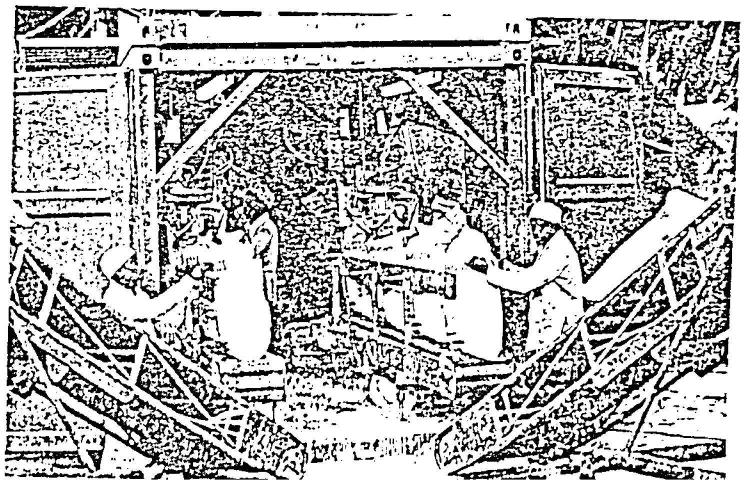
Country	1985	1986	1987	1988	1989	1990
Angola	50	24	8	38	100	23
Benin	100	54	26	1	100	100
Botswana	0	0	0	NA	NA	100
Burkina Faso	100	100	100	94	47	100
Burundi	100	97	70	100	40	100
Cameroon	2	0	0	44	64	34
Central Afric. Rep.	100	100	100	100	26	100
Chad	100	64	100	100	100	100
Congo	100	100	100	100	85	100
Côte d'Ivoire	0	0	0	18	0	11
Equatorial Guinea	100	100	100	100	NA	NA
Ethiopia	27	6	13	21	100	60
Gabon	100	100	100	100	100	100
Gambia	100	64	82	100	100	100
Ghana	67	100	91	82	100	100
Guinea Bissau	100	100	100	100	100	100
Guinea	100	100	100	100	100	NA
Kenya	32	17	53	56	78	52
esotho	0	0	77	0	NA	NA
iberia	13	100	66	100	95	100
Madagascar	100	100	100	47	50	66
Malawi	16	38		36	62	57
Mali	100	100	100	77	100	100
Mauritania	100	100	100	100	100	78
Mauritius	0	0	0	0	20	0
Mozambique	91	100	100	100	100	100
iger	100	100	100	67	100	100
igeria	100	100	0	0	0	0
wanda	100	100	100	100	100	100
enegal	0	0	0	0	0	6
ierra Leone	100	100	100	00	100	100
omalia	100	100	100	100	100	100
udan	100	100	100	100	100	61
waziland	0	0	0	0	0	NA
anzania	80	97	C8	100	97	79
ogo	100	100	100	82	54	100
ganda	100	100	100	100	100	100
ire	100	100	100	100	99	100
ambia	0	0	0	43	61	12
imbabwe	57	80	55	10	0	0
b Saharan Africa	65	49	30	44	54	35

NA = No data available

domestic demand for fertilizer is currently too small, and the oversupply of fertilizers on the world market has led to corresponding low prices. Notwithstanding low world market prices, returns to farmers from fertilizer use at current prices is a bottleneck restricting the widespread use of fertilizers in SSA.

Sub-Saharan importers in Coastal, West and Central Africa mainly import tailor-made and expensive granulated fertilizers in small quantities from the region, Europe and North Africa. Small quantities mean higher per unit transport costs. Fertilizer plants in SSA face severe competition from suppliers outside the region, especially for larger transactions. Currently, several countries are experimenting with the cheaper bulk blended NPKs. Fertilizer plants producing NPKs based on bulk blending as their final products, cost much less to build and are easier to operate than comparably sized granulation plants. Local bulk blending has a comparative advantage for small transactions, because blending plants offer more flexibility than granulation plants, both in changing formulations and in the number of grades they can produce [14].

All countries in SSA depend on the importation of fertilizers and/or raw materials. The ratio of aid-financed fertilizer imports reduced from two-third in 1985 to one-third in 1990. Countries that started fertilizer production in SSA did not benefit from aid for the importation of raw materials. Special government structures were set up in the 1970s and 1980s for the distribution of mostly aid-financed fertilizers (and other agri-inputs) to target areas, in order



Bagging of mineral fertilizers in the port of Dar es Salaam, Tanzania.
Photo: Norsk Hydro, Oslo.

Application of mineral fertilizer on a rice field in Zambia
Photo R Gilling LINEAIR, Arnhem

to raise food production. These structures are primarily responsible for the timely distribution of these fertilizers, and for transmitting the level of demands for fertilizer aid to the donor community. Government involvement often resulted in fertilizer sectors that were subjected to excessive regulation, including import and foreign exchange allocation, licensing, price controls and import monopolies [10]. Few incentives are provided to improve the management, accountability, and cost-efficiency of these distribution systems.

The challenge of the 1990s is to make fertilizer use for farmers in SSA more attractive. This can be achieved by alleviating constraints regarding education, supply, pricing, marketing and distribution. The call for a more entrepreneurial approach has therefore become stronger. More and more countries in SSA are committed to creating open and competitive fertilizer marketing systems which respond efficiently to market signals and ensure that the right kind of fertilizer is available to the farmer in the right quantity, at the right time, at the right price (and minimum costs).

and in the right place (i.e., as close to the farmgate as possible) [Restructuring the fertilizer marketing system is a difficult process that cannot be achieved overnight. If this process is not carefully planned and supported there is a risk that fertilizer trade will be conducted in a vacuum, resulting in decreased fertilizer use and disruption and irregularity of supply. Fertilizer is a politically sensitive commodity; any serious reduction in consumption durin the transition from a state controlled to a privatized marketing system can be politically and economically unacceptable, particularly if it tends to impair food security. Therefore, the management of transition becomes a crucial issue, and needs to be accompanied by institutional orientation and training to enable both the state and private sectors to cope more effectively with th changes in the market place. This orientation and training should cover areas such as the legal environment, business planning, finance and marketing, particularly in economies which are just beginning to adopt economic reforms. In the fertilizer subsector, short training programs for private dealers have proved extremely useful in several developing countries [13].

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APPENDIX 1. Fertilizer use in 1990 and trends in fertilizer consumption 1975-1990 per country in SSA.

Country	Fert. use	Fertilizer consumption in Africa 1975-1990							
	1990	1975	1980	1985	1990	Annual growth			
	kg ha⁻¹*	'000 t				%**	'000 t	STD***	R2
2 Sudano Sahel	5.3	158.1	128.1	173.1	167.5	0.9	1.6	1.5	0.07
Burkina Faso	5.9	1.2	4.3	12.1	21.2	5.4	1.1	0.1	0.89
Cape Verde	0.0	0.1	0.1	0.1	0.0	NA	0.0	0.0	0.23
Chad	1.8	5.9	0.9	7.1	5.8	-1.7	0.1	0.1	0.08
Djibouti		0.0	1.2	0.0	0.0	NA	-0.1	0.0	0.38
Gambia	3.4	0.8	2.0	3.9	0.6	8.7	0.1	0.1	0.06
Mali	13.1	2.2	14.2	26.7	27.5	5.0	1.4	0.3	0.59
Mauritania	9.5	1.2	1.3	2.0	1.9	2.4	0.0	0.1	0.06
Niger	0.3	0.6	2.7	3.6	1.0	5.2	0.1	0.1	0.04
Senegal	3.3	47.4	19.4	20.5	17.5	-11.5	-2.0	0.3	0.72
Somalia	2.6	3.6	1.2	3.8	2.7	3.4	0.1	0.1	0.10
Sudan	7.1	95.1	80.7	93.4	89.3	1.0	0.9	1.5	0.03
3 Coastal West Africa	10.4	129.9	251.0	397.3	460.0	4.9	22.8	1.6	0.94
Benin	6.3	2.4	0.9	11.5	11.7	6.3	0.7	0.1	0.75
Côte d'Ivoire	5.7	37.7	53.1	41.5	21.0	-4.0	-0.8	0.4	0.24
Ghana	4.2	24.5	12.0	12.5	11.5	-9.3	-1.1	0.3	0.45
Guinea	0.7	1.5	0.3	0.4	0.5	-10.6	-0.1	0.0	0.26
Guinea Bissau	1.5	0.3	0.2	0.5	0.5	4.2	0.0	0.0	0.08
Liberia	0.8	4.9	3.1	1.5	0.3	-86.0	-0.3	0.1	0.44
Nigeria	12.8	54.3	173.9	316.0	400.3	5.9	23.5	1.4	0.95
Sierra Leone	0.7	2.9	1.8	3.6	1.3	-4.4	-0.1	0.1	0.05
Togo	8.9	1.4	5.8	10.3	12.8	6.3	0.8	0.0	0.97
4 Central Africa	1.1	27.6	45.6	73.7	19.1	2.6	0.5	0.9	0.02
Cameroon	1.3	12.5	35.7	56.5	8.9	7.6	0.7	0.8	0.05
Congo	11.9	2.3	0.5	4.7	2.0	3.5	0.1	0.1	0.05
Gabon	2.4	0.4	0.1	2.8	1.1	7.9	0.1	0.0	0.22
Zaire	0.8	10.7	7.9	6.8	6.2	4.7	0.3	0.1	0.34
Central African Republic	0.4	1.7	1.5	2.9	0.9	5.6	0.1	0.0	0.12
5 East Africa	8.0	108.5	142.3	216.7	229.8	4.6	11.1	1.2	0.86
Burundi	1.6	0.7	1.1	2.3	2.1	9.3	0.2	0.0	0.69
Ethiopia	5.0	31.2	43.2	66.0	70.1	6.1	4.3	0.7	0.75
Kenya	44.1	44.5	61.6	109.1	107.0	5.0	5.4	0.7	0.82
Madagascar	6.4	5.9	8.8	9.7	19.7	3.4	0.7	0.3	0.32
Mauritius	262.3	24.1	26.7	28.0	27.8	1.7	0.5	0.1	0.46
Rwanda	2.6	0.3	0.1	1.4	3.0	4.3	0.1	0.0	0.56
Seychelles	0.0	0.0	0.0	0.4	0.0	NA	0.0	0.0	0.24
Uganda	0.0	1.7	0.8	0.2	0.2	-32.5	0.1	0.0	0.39
6 Southern Africa	14.6	268.5	391.4	359.6	353.6	1.7	6.1	2.0	0.39
Angola	2.6	4.1	16.8	20.3	9.5	1.6	0.2	0.5	0.01
Botswana	0.7	2.4	1.4	0.5	0.9	11.3	0.1	0.0	0.71
Lesotho	14.4	1.5	4.5	3.5	4.6	3.3	0.2	0.1	0.40
Malawi	19.9	15.0	33.3	34.0	48.0	4.4	2.1	0.3	0.78
Mozambique	0.8	5.9	27.6	3.8	2.6	46.2	1.2	0.7	0.19
Swaziland	45.7	9.4	20.3	8.2	7.5	5.9	0.4	0.2	0.23
Tanzania	9.2	29.7	35.5	38.9	48.4	[illegible]	1.4	0.3	0.58
Zambia	11.7	51.3	78.6	80.2	61.6	1.3	0.8	1.2	0.03
Zimbabwe	60.7	147.2	173.5	170.1	170.5	1.9	3.2	1.1	0.39
Sub Saharan Africa	8.4	692.6	958.5	1220.4	1230.0	3.4	42.0	4.3	0.87
1 North Africa	59.6	878.3	1273.4	1598.8	1566.0	4.0	62.0	5.1	0.91
2 South Africa	59.3	772.7	1064.3	865.3	780.6	-1.1	8.6	7.7	0.08
Africa	19.1	2343.6	3296.2	3684.6	3576.6	2.7	95.4	11.9	0.82

* Use per hectare is calculated by dividing fertilizer consumption in 1990 in nutrients t by hectares of arable land and land under permanent cro[illegible] in 1989 (these are both latest statistics available)
** Growth calculated over 1990 consumption level
*** STD = Standard deviation, R^2 = R square
Note: 0.0 means lower than 0.05. NA = No data available

LE SOUS-SECTEUR ENGRAIS AU CAMEROUN: BILAN DE 20 ANNEES D'EXISTENCE.

par

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1 - Bref historique du sous-secteur engrais

Le sous-secteur engrais existe au Cameroun depuis l'époque coloniale. Avant l'indépendance, il servait les seuls intérêts des colons qui tiraient le maximum de profit de leurs investissements dans les cultures tropicales de rente tournées vers le marché de la métropole.

Dès l'accession du pays à l'indépendance en 1960, il s'est doté d'un Programme National d'Engrais avec l'assistance de l'Organisation des Nations Unies pour l'Alimentation et l'Agriculture (FAO). Le but de ce programme était de faire connaître les bienfaits de l'engrais aux agriculteurs nationaux, en particulier ceux du secteur dit moderne qui pratiquaient les cultures d'exportation. Son évolution a débouché sur la tentative de production locale des engrais chimiques par la création de la Société Camerounaise de Manufacture d'Engrais (SOCAME) à partir de 1975. La SOCAME était pratiquement mort-née. En effet, elle a disparu dès 1980 parce qu'elle a occasionné des investissements trop coûteux et non-rentables en rapport avec la taille du marché.

Le sous-secteur engrais était placé sous le monopole de l'Etat dès la mise en place du Programme National d'Engrais. Celui-ci contrôlait les types d'engrais importés dans le pays et subventionnait les frais de distribution afin de le rendre plus accessible au plus grand nombre possible de planteurs nationaux. Cette tendance s'est accentuée en 1980 avec la création du Fonds National de Développement Rural. La lourde et coûteuse bureaucratie qui a été mise en place à cet effet a sonné le glas du FONADER en 1988.

Dans la logique de la libéralisation de l'économie nationale adoptée par le Gouvernement depuis 1986/87, ce dernier a décidé de se désengager du sous-secteur engrais. Des structures de transition dans cette direction ont vu le jour en 1987/88 en remplacement du FONADER. Il s'agit du Programme de Réforme du Sous-Secteur Engrais (PRSSE) opérationnel dans les provinces au Sud du Plateau de l'Adamaoua et le Programme Spécial d'Importation d'Engrais (PSIE) présent dans les trois provinces septentrionales du pays. La période de transition touchait déjà à sa fin quand la dévaluation du FCFA est intervenue en Janvier 1994 avec le risque de compromettre le processus engagé.

2 - Les réalisations du sous-secteur engrais

a) Les importations

La vulgarisation de l'engrais sous le Programme National de l'Engrais et sous la SOCAME avait favorisé sa large diffusion dans les campagnes camerounaises. Les importations annuelles d'engrais dans le pays avaient augmenté de 185% entre 1974/75 et 1978/79. Les engrais subventionnés et non-subventionnés étaient presque d'égale proportion atteignant le niveau de consommation totale de 93.685 tonnes en 1978/79.

Le FONADER a contribué à monter la barre de la consommation d'engrais au niveau de 153.602 tonnes en 1983/84. La libéralisation du sous-secteur engrais qui a entraîné la suppression progressive de la subvention par l'Etat a ramené le niveau en dessous de 100.000 tonnes par an. Au total 180.974 tonnes d'engrais subventionnés ont été importées dans le circuit PRSSE entre 1988/89 et 1991/92 avec une valeur CAF de 10,2 milliards de FCFA. Les sociétés qui s'étaient intéressées aux importations d'engrais par ce circuit se sont retrouvées avec des stocks invendus atteignant 39.000 tonnes en 1989/90 devant la chute brutale de la demande d'engrais dans le pays de 61% pendant la même année. Cependant, la consommation d'engrais subventionnés est en nette progression dans la zone PSIE allant de 12.143 tonnes en 1989/90 à 18.100 tonnes en 1993/94.

Face à la baisse du cours des matières premières sur le marché mondial, les agriculteurs se sont résolus à abandonner les cultures d'exportation au profit des cultures vivrières qui sont désormais fertilisées en priorité. Ceci est vrai aussi bien dans la zone PRSSE que dans la zone PSIE.

b) La subvention

Les frais de subvention couverts par l'Etat pour soutenir le sous-secteur engrais sont énormes, particulièrement sous le FONADER. Le montant annuel a augmenté très rapidement de 2 milliards de FCFA en 1980/81 à 6,5 milliards de FCFA en 19884/85 soit un accroissement de 225%, correspondant à 48% de la hausse de la consommation d'engrais subventionnés. Le niveau moyen de subvention des engrais sous le PRSSE a diminué, conformément au principe de libéralisation du sous-secteur engrais, de 36,25% en 1988/89 à 19,4% en 1991/92 dans la zone PRSSE. Les frais annuels de la subvention dans ces conditions se sont élevés à 1,25 milliard de FCFA. La subvention de l'engrais s'est faite plutôt de manière indirecte dans la zone PSIE sous forme d'exonération totale des droits de douane et de minimisation des frais de distribution par la limitation du nombre des intermédiaires.

Le circuit parallèle d'importation d'engrais en dehors du système de subvention a toujours existé. Sous la période du monopole public sur le sous-secteur engrais, les grandes plantations commerciales importaient les engrais par voie directe pour leur propre consommation. Celles qui le désiraient pouvaient demander et obtenir des remboursements à titre de subvention. Le cercle des importateurs d'engrais non-subventionnés s'est même élargi sous la période de libéralisation. Dans la zone PRSSE, à côté des grandes plantations traditionnelles de ce circuit telles que CAMSUCO, SOSUCAM et CDC, l'on retrouve désormais des sociétés de négoce telles que SCPA qui importent et commercialisent elles-mêmes leurs commandes d'engrais sans recours à l'assistance des services publics.

c) La distribution

Sous le monopole public, les engrais subventionnés étaient distribués par les sociétés de Développement, les Délégations Provinciales de l'Agriculture et les coopératives. Cette pratique a disparu avec la réforme du sous-secteur engrais dans la zone PRSSE. Seules les coopératives gérées désormais de manière autonome assurent encore la distribution des engrais chimiques à leurs membres. L'Etat est encore impliqué mais de manière limitée dans la zone PSIE. En effet, dans cette zone, la SODECOTON importe les engrais avec l'aide du fonds renouvelable du PSIE et les répartit entre la SEMRY, le Projet Nord-Est Benoué et les Délégations Provinciales de l'Agriculture de l'Adamaoua, du Nord et de l'Extrême-Nord pour la distribution aux paysans. La SODECOTON participe également à cette activité.

d) Les contraintes du sous-secteur engrais

Des contraintes d'ordre administratives et techniques ont été relevées dans le sous-secteur engrais. Les frais administratifs excessifs, la lenteur de la procédure de subvention et d'octroi de visa et ainsi que le manque d'intérêt pour la fertilisation des cultures vivrières sont souvent cités comme contraintes majeures du sous-secteur engrais sous la période du monopole public. Les contraintes d'ordre générales qui persistent encore actuellement sont: les mauvaises conditions des routes déplorées particulièrement dans lès provinces du Centre, du Sud-Ouest et du Nord-Ouest, l'insuffisance d'infrastructures de stockage et les frais de transport élevés. Les contraintes majeures spécifiques à la zone PRSSE sont: les conditions draconiennes de financement, les frais financiers élevés et la longue procédure d'établissement de la lettre de crédit et de consignation des fonds de subvention. Les difficultés de recouvrement des crédits d'engrais aux paysans, le conflit potentiel entre les intérêts de la SODECOTON et ceux du PSIE, et l'implication même limitée de l'Etat dans la distribution des engrais sont les principaux points faibles du Programme Spécial d'Importation d'Engrais.

3 - Importance de l'engrais dans l'amélioration de la productivité agricole au Cameroun

L'engrais a été reconnu très tôt au Cameroun comme un facteur déterminant pour la production agricole. C'est ce qui explique l'augmentation rapide de la consommation moyenne annuelle de cet intrant de 183% entre 1974/75 et 1980. Grâce à l'emploi d'engrais, les rendements des cultures d'exportation ont été stabilisés à des niveaux satisfaisants. Parmi les cultures vivrières, le manioc et la banane ont connu des augmentations de leurs rendements de 4,5 T/ha et 2,6 T/ha à 12,7 T/ha et 16,2 T/ha, respectivement. Des paysans utilisant les engrais chimiques dans les conditions traditionnelles ont amélioré leurs rendements de maïs de 24% à 54% selon les variétés.

Cependant, pour tirer le meilleur bénéfice de l'engrais, son emploi doit être accompagné de techniques agricoles appropriées, de l'utilisation des variétés adaptées, de l'acquisition des équipements nécessaires et des facteurs non-contrôlables tels que la pluviométrie. On constate que les agriculteurs camerounais sont de moins en moins disposés à se procurer les équipements agricoles, les semences sélectionnées et les engrais chimiques. Cette situation compromet la politique du Gouvernement en faveur de l'amélioration de la compétitivité des produits agricoles camerounais sur le marché international.

4- Implications en matière de politique de réforme du sous-secteur engrais

Le Programme de Réforme du Sous-Secteur Engrais (PRSSE) et le Programme Spécial d'Importation d'Engrais représentent deux modes de gestion de la période de transition vers un système totalement libéral. Le PRSSE est appliqué dans un contexte déjà libéral et le PSIE se démarque par la présence limitée de l'Etat.

Le PRSSE a contribué à accélérer quelque peu la procédure de subvention des engrais, à assurer la gestion transparente des fonds de crédit et de subvention et à réduire les frais administratifs et le prix de l'engrais aux utilisateurs sous l'effet de la concurrence. Cependant, on lui reproche les conditions draconiennes de financement, la lenteur dans l'établissement des lettres de crédit et la pénalisation des consommateurs d'engrais par l'alourdissement des frais financiers.

Le PSIE a les mêmes avantages que le PRSSE. Son plus gros avantage est la réduction des frais monétaires par la limitation des intermédiaires financiers. Ce mécanisme peut être généralisé comme moyen de faire face à la flambée du prix des engrais après la dévaluation du FCFA. Pour ce faire et dans le souci d'encourager l'amélioration de la productivité de l'agriculture en vue de rendre les produits plus compétitifs, l'on peut envisager:

- la constitution d'un fonds renouvelable d'importation d'engrais à partir de capitaux étrangers octroyés dans le cadre des mesures d'accompagnement de la dévaluation du FCFA; et

- la gestion de ce fonds par les coopératives des planteurs, opérant déjà comme des entités autonomes, pour importer les engrais dont ils assureront la distribution à leurs membres à l'exemple du système de financement du PSIE.

Dans ces conditions, il semble approprié que l'Etat poursuive son programme actuel de libéralisation du sous-secteur engrais tout en limitant son rôle au contrôle de la gestion des fonds renouvelables par les coopératives et en assainissant l'environnement juridique en vue d'assurer un arbitrage rapide et juste des conflits qui pourraient naître d'un tel système.

5 - Conclusions et perspectives d'avenir

La libéralisation du sous-secteur engrais a été réalisée selon deux systèmes de gestion. Le premier, représenté par le Programme de Réforme du Sous-Secteur Engrais, est basé sur les principes de l'économie libérale. Le deuxième système se résume dans le Programme Spécial d'Importation d'Engrais caractérisé par la présence limitée de l'Etat dans son fonctionnement.

Le bilan de la gestion vers la libéralisation totale du sous-secteur engrais est globalement encourageant. Il a surtout permis une gestion transparente des fonds de crédits d'importation et de subvention et la réduction des frais financiers par la limitation du nombre des intermédiaires dans les circuits de financement et de distribution.

La dévaluation du FCFA semble objectivement favorable aux agriculteurs et laisse prévoir une augmentation de la consommation des engrais. Cette remarque permet de conclure que l'Etat peut poursuivre sa politique de désengagement du sous-secteur engrais. Les mesures susceptibles de renforcer ce sous-secteur et d'assurer l'amélioration de la productivité de l'agriculture et ainsi que la compétitivité des produits agricoles camerounais sur le marché international peuvent se résumer comme il suit:

a) à court et moyen termes

- la libéralisation totale du sous-secteur engrais avec la suppression de la subvention;

- l'encouragement des agriculteurs à s'organiser en coopératives pour mieux défendre leurs intérêts en matière d'acquisition des engrais chimiques;

- l'assainissement de l'environnement juridique pour permettre un arbitrage rapide et juste des conflits éventuels;

- la création d'un fonds renouvelable d'importation d'engrais géré par les coopératives afin d'éliminer les frais financiers qui les rendent chers et inaccessibles à la majorité des planteurs;

- l'analyse économique plus rigoureuse de l'effet de la dévaluation du FCFA sur le sous-secteur engrais;

b) à long terme

- la production locale des engrais sur la base de la coopération sous-régionale afin d'économiser en devises étrangères et de créer des emplois supplémentaires.

c

FERTILIZER SUB-SECTOR REFORM PROGRAM (FSSRP): SURVEY FOR THE IMPLEMENTATION OF A FERTILIZER MARKET INFORMATION SYSTEM IN CAMEROON

In order to efficiently perform its information dissemination function with regard to fertilizer marketing in Cameroon, the Technical Support Unit (TSU) wishes to strengthen its fertilizer market information system. To this end, the questionnaire hereunder will help the TSU appraise the information needs of the private sector.

The filled questionnaires should be returned to the following address:

Mr. Tel: Fax: P.O. Box......., Yaounde, Cameroon

We thank you in advance for your kind collaboration and understanding.

QUESTIONNAIRE

MODULE 1 : GENERAL INFORMATION ON THE FIRM

1.1 Position of individual interviewed: ____________________
(1) Proprietor, (2) Director, (3) Senior Staff Member, (4) Others (to be specified)

Survey Date: ____________________
Day/Month/Year

1.2 Where is the firm located? ____________________

1.3 P.O. Box ______ Town __________ Telephone __________ Fax __________

1.4 Main Activity: ____________________

1.5 How long has the firm been operating? __________ years

MODULE 2 : INFORMATION ON THE ROLE OF THE TECHNICAL SUPPORT UNIT

2.1 Do you know the Technical Support Unit (TSU)? __________
(1) Yes (2) No (if no, skip to question 2.4)

2.2 Have you ever received useful information from the TSU with regard to your activities? ________ (1) Yes (2) No (if no, skip to question 2.4)

2.3 Which information? ______________________________

____

____

2.4 Which type of information would you like to receive with regard to your activities?

____

____

____

____

____

____

2.5 Through which means would you like to receive such information? ________________ (1) Fax, (2) post, (3) telephone, (4) at the TSU, (5) others (to be specified)

2.6 Would you need specific documentation on fertilizer such as: (a) the TSU "Conjoncture" leaflet, (b) information pamphlets, (c) international fertilizer trade journals, (d) others (to be specified)? ________________ (1) Yes (2) No. If yes, specify which documents and the time intervals at which they should be sent to you.

____

____

2.7 Would you be interested by practical training sessions, seminars, workshops or conferences organized by the TSU to better inform the various fertilizer market participants? ____________ (1) Yes (2) No

MODULE 3 : INFORMATION ON THE FERTILIZER MARKET IN CAMEROON

3.1 What type of information do you need on the fertilizer types sold in Cameroon? ______________________________

____

____

3.2 Do you know some of the major world fertilizer suppliers? ____________ (1) Yes (2) No. If yes, how did you get to know them? ____

____

3.3 Do you know some fertilizer importers in Cameroon? ____________ (1) Yes (2) No. If yes, how did you get to know them? ______

____

____

3.4 Do you know some fertilizer distributors in Cameroon? __________ (1) Yes (2) No. If yes, how did you get to know them?

3.5 Are you familiar with the selling prices of all types of fertilizers on the world market? _______ (1) Yes (2) No

3.6 Are you familiar with the bulk and retail selling prices of all types of fertilizers on the local market? _______ (1) Yes (2) No

3.7 Have you ever participated in any farmer field day organized by the Ministry of Agriculture? _______ (1) Yes (2) No. If yes, which lessons thereof helped you most in the framework of your activities? ____

____

____

3.8 Do you know the doses to be used for each type of fertilizer, each soil and in each location? ___________ (1) Yes (2) No. If yes, how did you get to know?

____

____

If not, please answer the following question:

Do you think you could do with some training to acquire such knowledge? ____________ (1) Yes (2) No.

African Fertilizer Trade Summary Table

Date: March 25, 1994

Nbr	Product [1]	Mt	Country	Buyer	Destination		Price	Terms [2]			Funded	Supplier/Origin	Closed	
Nitrogenous Fertilizers														
114	Urea		Malawi	SFFRFM	?	USD	Unknown	CIP		bag	EC	ICH/South Africa	17-09-93	•
172	Urea		Malawi	Lonrho	?	USD	Unknown					Optichem/Malawi	15-12-93	
195	Urea	5,000	Malawi	SFFRFM	Mzuzu	USD	277.00	CIP		bag		ICH/South Africa	25-02-94	
195	Urea	5,000	Malawi	SFFRFM	Blantyre	USD	247.00	CIP		bag		ICH/South Africa	25-02-94	
195	Urea	5,000	Malawi	SFFRFM	Lilongwe	USD	257.00	CIP		bag		ICH/South Africa	25-02-94	
199	Urea	5,000	Malawi	Tea Association	?	USD	Request						25-02-94	
002	Urea	3,069	Mali	VIB	Koutiala	USD	279.89	CFR FOT		bag	Holland	Chemimex/Brazil	03-11-92	∘
002	Urea	7,191	Mali	VIB	Sikasso	USD	266.82	CFR FOT		bag	Holland	Chemimex/Brazil	03-11-92	•
124	Urea	17,100	Mali	CMDT	Different	USD	261.07	CFR LO	120day	bag		Norsk Hydro/	08-10-93	•
052	Urea	955	Mocambique	MoA	?	USD	Request				ADB		14-01-93	
196	Urea	1,000	Niger	MoA	?	USD	388.89				Japan	/Japan	15-11-93	
180	Urea	10,000	Nigeria	MoA	?	USD	Request						31-01-94	
106	Urea	2,000	Sierra Leone	Dep. of Agri &	?	USD	Request				IDA		24-05-93	
013	Urea	190,000	Sudan	Gezira Board	?	USD	Request						27-02-93	
115	Urea	30,000	Sudan	Private	Unknown	USD	Request						- -	
049	Urea	15,000	Tanzania	TFC	Dar el Salaam	USD	171.30	CIF LO		bag	Kalim-Ind	Toepfer/Kuwait	15-11-92	
080	Urea	71,460	Tanzania	Government	?	USD	Request						- -	
123	Urea	10,000	Tanzania	Private	?	USD	Request						- -	
134	Urea	3,000	Tanzania	TFC	Dar es Salaam/Tanga	USD	300.00	CIF		bag	Japan	Mitsubishi/Japan	24-08-93	
166	Urea	22,688	Tanzania	Sukita	?	USD	Unknown					One World Co /	01-10-93	
187	Urea	25,000	Tanzania	TFC	?	USD	Unknown						15-02-94	
081	Urea	800	Togo	SEMP	?	USD	Request						03-03-93	
162	Urea	2,700	Togo	SEMP	Lomé	USD	204.78	CIF LO		bag		SICREP (Interore)/	22-12-93	•
190	Urea	6,000	Togo	Sotoco	Lomé	USD	185.00	CIF LO		bag		Indian Ocean Fert./South Africa	15-01-94	
095	Urea	23,000	Zambia	Lima bank	?	USD	Request						15-05-93	
130	Urea	10,000	Zambia	Private	Lusaka	USD	215.00	CPT				Sulmark/	01-07-93	
141	Urea	35,000	Zambia		?	USD	Request				Japan		31-08-93	
165	Urea	15,000	Zambia		Lusaka	USD	262.00	CIF		bag	Norad	Hydro Agri/Zambia/South Africa	11-10-93	
Phosphate Fertilizers														
158	DAP	1,500	Burkina Faso	DIMA/VIB	Bobo-Dioulasso	USD	278.30	CFR FOT		bag	Holland	Chemimex/Sénégal	25-11-93	•
158	DAP	1,500	Burkina Faso	DIMA/VIB	Ouagadougou	USD	286.62	CFR FOR		bag	Holland	Chemimex/Sénégal	25-11-93	•
069	DAP	1,400	Bénin	SONAPRA	Cotonou	USD	257.50	CIF FO		bag	Own	STEPC/Côte d'Ivoire	10-12-92	•
011	DAP	50,000	Ethiopia	AISCO	Assab	USD	211.90	CIF LO		bag	ADB	Norsk Hydro/USA	15-02-93	
012	DAP	18,000	Ethiopia	AISCO	Assab	USD	204.70	CIF LO		bag	Italy	JPMC/Jordan	15-02-93	
027	DAP	48,200	Ethiopia	AISCO	Assab	USD	226.20	CFR LO		bag	EC	Senchim/Sénégal	09-02-93	

[1] (bb) - bulk blend

(Sources: FMB Weekly Telefax Report and sources of IFDC - Africa)

[2] cif - cost insurance and freight, cfr - cost and freight, cip - carriage & insurance paid to, cpt - carriage paid to, for - free on rail, fot - free on truck, fo - free out, lo - liner out

African Fertilizer Trade Summary Table

Date: March 25, 1994

Nitrogenous Fertilizers

Nbr	Product [1]	Mt	Country	Buyer	Destination		Price	Terms [2]		Funded	Supplier/Origin	Closed	
053	AN	40,000	Zimbabwe	MoA	Harare	USD	Request	CIF LO		WB		28-10-92	
089	AS	7,425	Ghana	Wienco	Tema	USD	161.45	CFR LO	bag	Japan	BASF/Belgium	14-09-92	•
088	AS	6,000	Kenya	Bell Chemicals	?	USD	Unknown					15-03-92	
099	AS	2,500	Malawi	SFFRFM	Blantyre	USD	174.61	CIP	bag		Cargo Chem/Sellers option	28-05-93	•
132	AS	3,000	Malawi	SFFRFM	Blantyre	USD	194.22	CIP	bag		ICH/South Africa	17-09-93	•
171	AS		Malawi		?	USD	Unknown				Optichem/Malawi	15-12-93	
079	AS	48,960	Tanzania	Government	?	USD	Request					- -	
120	AS	10,000	Tanzania	Mohammed	?	USD	Request					- -	
122	AS	10,000	Tanzania	Private	?	USD	Request					- -	
133	AS	21,904	Tanzania	TFC	Dar es Salaam/Tanga	USD	200.00	CIF	bag	Japan	Mitsubishi/Japan	24-08-93	
163	AS	9,000	Zambia		?	USD	189.12	CIF	180day bag		Cargochem/	06-10-93	
036	ASN	5,000	Kenya	MoA	Mombassa	USD	193.28	CIF LO	bag	Stabex	Transagro/Germany	04-03-93	•
034	CAN	30,000	Kenya	MoA	Mombassa	USD	172.18	CIF LO	bag	Stabex	Hydro Agri Belgium/Germany	04-03-93	•
050	CAN	5,000	Kenya	KGGCU	?	USD	Unknown					03-02-93	
086	CAN	5,000	Kenya	Chemagro	Mombassa	USD	162.00	CIF LO				15-03-93	
185	CAN	40,000	Kenya	MoA	Mombassa	USD	168.07			EU	Hydro Agri/Belgium	15-02-94	
046	CAN	30,000	Malawi	SFFRFM	Dar es Salaam	USD	137.00	CIF LO	120day bag		Hydro Agri/Holland	26-03-93	•
051	CAN	1,100	Mocambique	MoA	?	USD	Request			ADB		14-01-93	
078	CAN	55,550	Tanzania	Government	?	USD	Request					- -	
121	CAN	5,000	Tanzania	Mohammed	?	USD	Request					- -	
001	Urea	2,400	Burkina Faso	Dima VIB	Bobo Dioulasso	USD	246.20	CIF FOR	bag	Holland	Hydro Agri Sluiskil/Holland	23-10-92	•
001	Urea	2,400	Burkina Faso	Dima VIB	Ouagadougou	USD	262.57	CIF FOR	bag	Holland	Hydro Agri Sluiskil/Holland	23-10-92	•
154	Urea	8,500	Burkina Faso	Sofitex	Bobo-Dioulasso	USD	242.52	CIF FOT	bag		Hydrochem/Côte d'Ivoire	14-07-93	•
157	Urea	1,150	Burkina Faso	DIMA/VIB	Bobo-Dioulasso	USD	240.53	CFR FOT	bag	Holland	Hydro Agri/Holland	25-11-93	•
157	Urea	1,150	Burkina Faso	DIMA/VIB	Ouagadougou	USD	240.00	CFR FOR	bag	Holland	Hydro Agri/Holland	25-11-93	•
005	Urea	5,500	Bénin	Sonapra	Cotonou	USD	181.73	CIF FO	bag	Own	Hydrochem/Côte d'Ivoire	10-12-92	•
068	Urea	4,000	Bénin	SDI	Cotonou	USD	205.27	CIF LO	bag	Own	Hydrochem/Côte d'Ivoire	15-12-92	•
153	Urea	3,500	Bénin	SONAPRA	Cotonou	USD	179.49	CIF FO	bag		Hydrochem/Côte d'Ivoire	21-12-93	•
175	Urea	4,600	Bénin	SDI	Cotonou	USD	Unknown	CIF FO	bag		?/?	21-12-93	
176	Urea	1,000	Bénin	SAMAC	Cotonou	USD	Unknown	CIF FO	bag			21-12-93	
198	Urea	10,000	Côte d'Ivoire	?	Abidjan	USD	136.00	CFR	bulk		/Yuhnzy	15-02-94	
026	Urea	5,000	Kenya	Private	?	USD	Unknown					15-03-93	
035	Urea	10,000	Kenya	MoA	Mombassa	USD	Unknown				Transagro ?/Germany	- -	
177	Urea	400	Kenya	Amiran	Mombassa	USD	155.00	CFR FO	bag		Helm/E. Europe	01-12-93	
100	Urea	10,000	Malawi	SFFRFM	Blantyre	USD	229.07	CIP	180day bag		ICH/South Africa	28-06-93	•
114	Urea	25,000	Malawi	SFFRFM	Lilongwe	USD	236.28	CIP	bag	EC	ICH/South Africa	17-09-93	•

[1] (bb) = bulk blend

(Sources: FMB Weekly Telefax Report and sources of IFDC - Africa)

[2] cif = cost insurance and freight, cfr = cost and freight, cip = carriage & insurance paid to, cpt = carriage paid to, for = free on rail, fot = free on truck, fo = free out, lo = liner out

Phosphate Fertilizers

Nbr	Product [1]	Mt	Country	Buyer	Destination	Price	Terms [2]		Funded	Supplier/Origin	Closed	
028	DAP	25,000	Ethiopia	AISCO	Assab	USD 189.93	CIF LO	bag	USAID	Hydro Agri/	31-03-93	
039	DAP	13,300	Ethiopia	AISCO (VIB)	Assab	USD 190.43	CFR LO	bag	Holland	JPMC/Jordan	27-01-93	•
094	DAP	27,000	Ethiopia	AISCO	Assab	USD 190.63	CIF LO	bag	USAID	Allied Int./USA	31-03-93	
142	DAP	44,000	Ethiopia	AISCO	?	USD Request			EC		15-01-94	
159	DAP	16,300	Ethiopia		Assab	USD 224.84	CFR LO	bag	Holland	Ferrochem/Turkey	17-11-93	•
194	DAP	35,000	Ethiopia	AISCO	Assab	USD Request			EU		- -	
022	DAP	8,000	Kenya	Private	?	USD Unknown		bag			- -	
023	DAP	30,000	Kenya	PV Grain	?	USD 135.00	FOB	bulk		Phoschem/	15-10-92	
038	DAP	8,845	Kenya	Coop Bank	?	USD Unknown			Danida		- -	
048	DAP	30,000	Kenya	KNTC	?	USD Unknown					15-01-93	
054	DAP	31,450	Kenya	MEA Ltd.	Mombassa	USD 208.00	CIF LO				15-03-93	
084	DAP	20,500	Kenya	Chemagro	Mombassa	USD 230.00	CIF LO				15-03-93	
087	DAP	4,000	Kenya	Super Expo	Mombassa	USD 210.00	CIF LO				15-03-93	
097	DAP	30,000	Kenya	MoA	?	USD Request		bulk	Stabex		20-06-93	
152	DAP	10,000	Kenya	Private	?	USD Request					- -	
167	DAP	15,000	Kenya	Private/Transagr	?	USD Request					- -	
170	DAP	15,000	Kenya	KNTC	?	USD Request					- -	
178	DAP	1,500	Kenya	Tea Zone Dev.	?	USD Request		bag			08-03-94	
182	DAP		Kenya	MoA	?	USD Request			WB		31-01-94	
184	DAP	25,000	Kenya	Chemagro	?	USD Unknown				Hana-Farmland/USA	01-01-94	
045	DAP	20,000	Malawi	SFFRFM	Richards Bay	USD 177.16	CIF FOR 180day	bag		ICH/South Africa	26-03-93	•
131	DAP	15,000	Malawi	SFFRFM	Richards Bay	USD 177.16	CIF FOT			ICH/South Africa	17-09-93	•
193	DAP	5,000	Malawi	SFFRFM	Mzuzu	USD 331.00	CIP	bag		ICH/South Africa	25-02-94	
193	DAP	5,000	Malawi	SFFRFM	Blantyre	USD 303.00	CIP	bag		ICH/South Africa	25-02-94	
193	DAP	5,000	Malawi	SFFRFM	Lilongwe	USD 309.00	CIP	bag		ICH/South Africa	25-02-94	
058	DAP	7,000	Tanzania	TFC	?	USD Unknown			WB	Trammo/	15-10-92	
077	DAP	10,000	Tanzania	Government	?	USD Request					- -	
119	DAP	5,000	Tanzania	Mohammed	Unknown	USD Request					- -	
021	MAP	8,100	Kenya	MoA	Mombassa	USD Unknown	CIF LO	bag	Japan	Mitsui/	15-12-92	
055	MAP	3,200	Kenya	MEA Ltd.	Mombassa	USD 200.00	CIF LO				15-03-93	
057	MAP	3,700	Kenya	Breweries, Kenya	?	USD Unknown					15-10-92	
183	MAP	4,400	Kenya	Mitsui	?	USD Unknown			Japan	Mitsui/Japan	01-01-94	
186	MAP	25,000	Kenya	MoA	Mombassa	USD Unknown			Japan	Mitsui/Japan	01-01-94	
108	SSP	250	Sierra Leone	Dep. of Agri &	?	USD Request			IDA		24-05-93	
004	TSP	870	Burkina Faso	Dima/VIB	Bobo Dioulasso	USD 313.71	CFR FOR	bag	Holland	Chemimex/Morocco	23-10-92	•
004	TSP	580	Burkina Faso	Dima/VIB	Ouagadougou	USD 330.84	CFR FOR	bag	Holland	Chemimex/Morocco	23-10-92	•

[1] (bb) - bulk blend

(Sources: FMB Weekly Telefax Report and sources of IFDC - Africa)

[2] cif= cost insurance and freight, cfr= cost and freight, cip= carriage & insurance paid to, cpt= carriage paid to, for= free on rail, fot= free on truck, fo= free out, lo= liner out

African Fertilizer Trade Summary Table

Date: March 25, 1994

Nbr	Product [1]	Mt	Country	Buyer	Destination	Price		Terms [2]		Funded	Supplier/Origin	Closed	
Phosphate Fertilizers													
070	TSP	50	Bénin	SONAPRA	Cotonou	USD	322.82	CIF FO	bag	Own	STEPC/Côte d'Ivoire	10-12-92	•
029	TSP	4,000	Kenya	KGGCU	?	USD	Request					- -	
030	TSP	10,000	Kenya	MoA	Mombassa	USD	Request			Stabex	/ACP or EC Countries	08-02-93	
200	TSP	1,000	Mali	Tea Association	?	USD	Request					25-02-94	
015	TSP	47,000	Sudan	Gezira Board	?	USD	Request					27-02-93	
156	TSP	10,000	Sudan	Acfit	Port of Sudan	USD	110.00	FOB	bulk		/Tunisia	01-09-93	
076	TSP	5,000	Tanzania	Government	?	USD	Unknown	CFR LO	bag		Norks Hydro/	15-08-93	
118	TSP	10,000	Tanzania	Mohammed	Unknown	USD	Request					- -	
Potash Fertilizers													
071	MOP	650	Bénin	SONAPRA	Cotonou	USD	253.80	CIF FO	bag	Own	STEPC/Côte d'Ivoire	10-12-92	•
189	MOP	2,000	Malawi	Tea Association	?	USD	Request					- -	
107	MOP	800	Sierra Leone	Dep. of Agri &	?	USD	Request			IDA		24-05-93	
Compound Fertilizers													
104	0-20-20	250	Sierra Leone	Dep. of Agri &	?	USD	Unknown			IDA	Melchemie/	24-05-93	
161	10-20-10	1,400	Togo	SEMP	Lome	USD	273.04	CIF LO	bag		SICREP(Interore)/	22-12-93	•
064	10-20-10	12,500	Zambia	NCZ	?	USD	Unknown				ICH/	15-09-92	
065	10-20-10	12,500	Zambia	NCZ	?	USD	Unknown				Hydro Agri/	15-09-92	
096	10-20-10		Zambia	Lima Bank	?	USD	Request					15-05-93	
136	10-20-10	15,000	Zambia		Lusaka	USD	Unknown			USAID	ICH/South Africa	16-08-93	
082	10-20-20	1,400	Togo	SEMP	?	USD	Request					03-03-93	
128	10-30-10	1,000	Cameroun	Sodecoton	Douala	USD	221.20	CFR	bag		Hydrochem/Côte d'Ivoire	08-07-93	
191	12-22-12+5s+1b	10,700	Togo	Sotoco	Lomé	USD	225.50	CIF LO	bag		Indian Ocean Fert/South Africa	15-01-94	
063	12-22-12+s+b	12,000	Togo	SOTOCO/OTP	?	USD	Request					23-10-92	
009	14-22-12+7s+1b	2,235	Mali	CMDT	Others	USD	307.08	CFR FOR	bag		Senchim/Sénégal	15-07-92	•
009	14-22-12+7s+1b	2,950	Mali	CMDT	Karangana	USD	316.27	CFR FOR	bag		Senchim/Sénégal	15-07-92	•
009	14-22-12+7s+1b	4,650	Mali	CMDT	Sikasso	USD	335.30	CFR FOR	bag		Senchim/Sénégal	15-07-92	•
009	14-22-12+7s+1b	5,190	Mali	CMDT	Koulikoro	USD	318.05	CFR FOR	bag		Senchim/Sénégal	15-07-92	•
009	14-22-12+7s+1b	5,535	Mali	CMDT	Koumantou	USD	309.33	CFR FOR	bag		Senchim/Sénégal	15-07-92	•
009	14-22-12+7s+1b	7,130	Mali	CMDT	Koutiala	USD	302.18	CFR FOR	bag		Senchim/Sénégal	15-07-92	•
037	14-22-12+7s+1b (bb)	1,040	Mali	CMDT	Other	USD	344.76	CFR FOR	bag		Hydrochem/Côte d'Ivoire	15-07-92	•
037	14-22-12+7s+1b (bb)	460	Mali	CMDT	Sikasso	USD	337.35	CFR FOR	bag		Hydrochem/Côte d'Ivoire	15-07-92	•
037	14-22-12+7s+1b (bb)	480	Mali	CMDT	Fana	USD	357.43	CFR FOR	bag		Hydrochem/Côte d'Ivoire	15-07-92	•
125	14-22-12+7s+1b	15,920	Mali	CMDT	Different	USD	315.62	CFR FO	120day bag		Hydrochem/Côte d'Ivoire	08-10-93	•
147	14-22-12+7s+1b (bb)	2,940	Mali	CMDT	Different	USD	300.02	CFR FO	120day bag		Hydrochem/Côte d'Ivoire	08-10-93	•

[1] (bb) - bulk blend

(Sources: FMB Weekly Telefax Report and sources of IFDC - Africa)

[2] cif= cost insurance and freight, cfr= cost and freight, cip= carriage & insurance paid to, cpt= carriage paid to, for= free on rail, fot= free on truck, fo= free out, lo= liner out

Compound Fertilizers

Nbr	Product [1]		Mt	Country	Buyer	Destination		Price	Terms [2]			Funded	Supplier/Origin	Closed	
169	14-22-12+7s+1b		6,660	Mali	CMDT	Different	USD	273.70	CFR FO		bag		Senchim/Sénégal	08-10-93	•
003	14-23-14		5,400	Burkina Faso	Dima/VIB	Bobo Dioulasso	USD	282.72	CFR FOR		bag	Holland	Hydrochem/Côte d'Ivoire	23-10-92	•
003	14-23-14		2,700	Burkina Faso	Dima/VIB	Ouagadougou	USD	299.12	CFR FOR		bag	Holland	Hydrochem/Côte d'Ivoire	23-10-92	•
006	14-23-14+5s+1b		14,000	Benin	Sonapra	Cotonou	USD	244.63	CIF FO		bag	Own	Senchim/Sénégal	10-12-92	•
044	14-23-14+5s+1b		9,500	Bénin	SDI	Cotonou	USD	225.99	CIF LO		bag	Own	Senchim/Sénégal	15-12-92	•
146	14-23-14+5s+1b	(bb)	9,500	Benin	SONAPRA	Cotonou	USD	247.86	CIF FO		bag		Hydrochem/Côte d'Ivoire	21-12-93	•
164	14-23-14+5s+1b		12,000	Bénin	SDI/UNDP	Cotonou	USD	Unknown	CIF FO		bag	Japan	?/?	21-12-93	•
174	14-23-14+5s+1b		2,400	Benin	SAMAC	Cotonou	USD	Unknown	CIF FO		bag		?/?	21-12-93	
007	14-23-14+6s+1b		5,000	Burkina Faso	Sofitex	Koudougou	USD	303.21	CIF FOR		bag		Hydrochem/Côte d'Ivoire	15-08-92	
008	14-23-14+6s+1b		4,000	Burkina Faso	Sofitex	Koudougou	USD	309.04	CIF FOR		bag		STEPC/Côte d'Ivoire	15-08-92	
008	14-23-14+6s+1b		20,000	Burkina Faso	Sofitex	Bobo Dioulasso	USD	298.19	CIF FOR		bag		STEPC/Côte d'Ivoire	15-08-92	
008	14-23-14+6s+1b		1,000	Burkina Faso	Sofitex	Ouagadougou	USD	315.26	CIF FOR		bag		STEPC/Côte d'Ivoire	15-08-92	
113	14-23-14+6s+1b		4,000	Burkina Faso	Sofitex	Bobo-Dioulasso	USD	271.43	CIF FOT		bag		STEPC/Côte d'Ivoire	14-07-93	•
113	14-23-14+6s+1b		6,000	Burkina Faso	Sofitex	Bobo-Dioulasso	USD	257.14	CIF FOR		bag		STEPC/Côte d'Ivoire	14-07-93	•
150	14-23-14+6s+1b	(bb)	1,500	Burkina Faso	Sofitex	Koudougu	USD	264.63	CIF FOR		bag		Hydrochem/Côte d'Ivoire	14-07-93	•
155	14-23-14+6s+1b		2,500	Burkina Faso	Sofitex	Bobo-Dioulasso	USD	276.53	CIF LO		bag		Hydrochem/Côte d'Ivoire	14-07-93	•
155	14-23-14+6s+1b		1,000	Burkina Faso	Sofitex	Bobo-Dioulasso	USD	262.24	CIF LO		bag		Hydrochem/Côte d'Ivoire	14-07-93	•
010	15-15-15		2,458	Mali	CMDT	Others	USD	296.43	CFR FOR		bag		Senchim/Sénégal	15-07-92	•
010	15-15-15		1,530	Mali	CMDT	Koumantou	USD	277.78	CFR FOR		bag		Senchim/Sénégal	15-07-92	•
010	15-15-15		1,774	Mali	CMDT	Koutiala	USD	281.75	CFR FOR		bag		Senchim/Sénégal	15-07-92	•
010	15-15-15		1,938	Mali	CMDT	Sikasso	USD	314.66	CFR FOR		bag		Senchim/Sénégal	15-07-92	•
110	15-15-15	(bb)	608	Mali	CMDT	Others	USD	337.53	CFR FOR		bag		Hydrochem/Côte d'Ivoire	15-07-92	•
110	15-15-15	(bb)	192	Mali	CMDT	Sikasso	USD	321.69	CFR FOR		bag		Hydrochem/Côte d'Ivoire	15-07-92	•
148	15-15-15	(bb)	735	Mali	CMDT	Different	USD	290.47	CFR FO	120day	bag		Hydrochem/Côte d'Ivoire	08-10-93	•
149	15-15-15		5,115	Mali	CMDT	Different	USD	302.06	CFR FO	120day	bag		Hydrochem/Côte d'Ivoire	08-10-93	•
168	15-15-15		2,050	Mali	CMDT	Diff.	USD	264.48	CFR FO		bag		Senchim/Sénégal	08-10-93	•
197	15-15-15		678	Niger	MoA	?	USD	434.26				Japan	/Japan	15-11-93	
103	15-15-15		1,500	Sierra Leone	Dep. of Agri &	?	USD	Unknown				IDA	Melchemie/	24-05-93	
062	15-15-15		3,000	Togo	SOTOCO/OTP	?	USD	Request						20-10-92	
083	15-15-15		2,900	Togo	SEMP	?	USD	Request						03-03-93	
160	15-15-15		2,700	Togo	SEMP	Lomé	USD	269.62	CIF LO		bag		SICREP (Interore)/	22-12-93	•
192	15-15-15		2,700	Togo	Sotoco	Lomé	USD	224.50	CIF LO		bag		Indian Ocean Fert/South Africa	15-01-94	
140	15-15-15+6s+1b	(bb)	40,000	Côte d'Ivoire	CIDT	Abidjan	USD	250.85	CIF LO		bag		Hydrochem/Côte d'Ivoire	15-07-93	
105	15-15-6+4mgo		200	Sierra Leone	Dep. of Agri &	?	USD	Request				IDA		24-05-93	
127	15-20-15+6s+1b		7,500	Cameroun	Sodecoton	Douala	USD	221.74	CFR		bag		Hydrochem/Côte d'Ivoire	08-07-93	
144	15-30-15		2,085	Burkina Faso	DIMA/VIB	Bobo-Dioulasso	USD	277.63	CFR FOT		bag	Holland	Chemimex/Sénégal	25-11-93	•

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(Sources: FMB Weekly Telefax Report and sources of IFDC - Africa)

African Fertilizer Trade Summary Table

Date: March 25, 1994

Nbr	Product [1]	Mt	Country	Buyer	Destination		Price	Terms [2]		Funded	Supplier/Origin	Closed
Compound Fertilizers												
144	15-30-15	2,065	Burkina Faso	DIMA/VIB	Ouagadougou	USD	285.94	CFR FOR	bag	Holland	Chemimex/Sénégal	25-11-93
017	17-17-17	1,565	Kenya	Coop Bank	?	USD	Request					- -
151	19-12-19+5s+1b	11,702	Tchad	Cotton Growers	?	USD	Unknown			France	IPEP/	19-10-93
014	20-10-10	4,000	Burundi	Tea Authority	?	USD	Request					11-02-93
019	20-10-10	2,965	Kenya	Coop Bank	?	USD	Request					- -
032	20-10-10	30,000	Kenya	MoA	Mombassa	USD	128.00			EC	Transagro/	01-07-93
059	20-10-10		Rwanda		?	USD	Unknown				MCH/	15-11-92
073	20-10-10	8,505	Tanzania	Government	?	USD	Request					- -
025	20-20-0	10,000	Kenya	Private	?	USD	Request					- -
056	20-20-0	15,000	Kenya	MoA	Mombassa	USD	190.00	CIF LO	bag	IDA	Chemimex/	23-12-92
102	20-20-0	2,000	Sierra Leone	Dep. of Agri &	?	USD	Unknown			IDA	Melchemie/	24-05-93
018	20-20-10	2,350	Kenya	Coop Bank	?	USD	Request					- -
024	20-20-20	15,000	Kenya	Ministry	Mombassa	USD	190.00	CFR LO	bag	IDA	Chemimex/	23-12-92
126	22-10-15+5s+1b	7,500	Cameroun	Sodecoton	Douala	USD	230.43	CFR	bag		Hydrochem/Côte d'Ivoire	08-07-93
047	23-21-0+4s	15,000	Malawi	SFFRFM	Dar es Salaam	USD	217.05	CIF	120day bag		Kemira/Finland	26-03-93
098	23-21-0+4s	15,000	Malawi	SFFRFM	Johannesburg	USD	217.00	CIF FOR	180day bag		ICH/South Africa	26-03-93
135	23-21-0+4s	15,000	Malawi	SFFRFM	Blantyre/Lilongwe	USD	378.88	CPT	bag	Germany	Norks Hydro/Germany	07-09-93
188	23-21-0+4s	15,000	Malawi	SFFRFM	Lilongwe	USD	378.45	CPT	bag	Germany	Trans Agro/South Africa	07-09-93
145	23-23-0	10,000	Ethiopia	Aisco	?	USD	Request					- -
016	23-23-0	2,333	Kenya	Coop Bank	?	USD	Request					- -
020	23-23-0		Kenya		?	USD	Request			Japan		11-12-93
031	23-23-0	20,000	Kenya	MoA	Mombassa	USD	245.23	CIF LO	bag	Stabex	Hydro Agri Belgium/France	04-03-93
101	25-25-5	1,600	Uganda	Tea Assoc.	?	USD	Request		bag			- -
072	25-5-5	10,000	Tanzania	TFA	?	USD	207.00	CFR LO	bag		Hydro Agri/	15-08-93
051	25-5-5	2,800	Uganda		?	USD	Request		bag			- -
033	25-5-5+5s	5,000	Kenya	Moa	?	USD	Request			Stabex	/ACP or EC Countries	08-02-93
111	25-5-5+5s	41,250	Kenya	KTDA	?	USD	Request					- -
129	25-5-5+5s	41,240	Kenya	KTDA	?	USD	Request					30-06-93
179	25-5-5+5s	2,880	Kenya	Tea Zone Dev.	?	USD	Request					08-03-94
181	25-5-5+5s	48,000	Kenya	Tea Association	?	USD	Request					17-03-94
067	4-17-15	2,000	Tanzania	TFC	?	USD	Unknown				Kemira/	01-10-92
074	4-17-15	2,000	Tanzania	Government	?	USD	Request					- -
117	4-17-15	2,000	Tanzania	TFC	Unknown	USD	226.00	CFR LO			Kemira/	14-07-93
066	6-20-18	26,000	Tanzania	TFC	?	USD	Unknown				Kemira/	01-10-92
075	6-20-18	28,620	Tanzania	Government	?	USD	Request					- -
116	6-20-18	24,000	Tanzania	TFC	Unknown	USD	254.30	CFR LO			Kemira/	14-07-93

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(Sources: FMB Weekly Telefax Report and sources of IFDC - Africa)

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Nbr	Product [1]	Mt	Country	Buyer	Destination	Price		Terms [2]		Funded	Supplier/Origin	Closed
Compound Fertilizers												
041	8-14-7	20,000	Zimbabwe	Drought Relief	Harare	USD	172.00	CIF	LO	WB	ICH/	15-12-92
085	Npk	18,000	Kenya	Chemagro	Mombassa	USD	190.00	CIF	LO			15-03-93
109	Npk	200,000	Nigeria	UTEX	?	USD	Unknown				Kemira/BASF/Hydro/	- -
060	Npk	20,000	Tanzania	TFC	?	USD	Unknown			Norad	Hydro Agri/Norway	- -

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[2] cif= cost insurance and freight; cfr= cost and freight, cip= carriage & insurance paid to; cpt= carriage paid to; for= free on rail; fot= free on truck; fo= free out; lo= liner out

(Sources: FMB Weekly Telefax Report and sources of IFDC - Africa)

SEMINAIRE SUR LA COMMERCIALISATION DES ENGRAIS
INTERNATIONAL FERTILIZER DEVELOPMENT
Efficient Marketing of Fertilizers in Cameroon
Bamenda, Cameroon
March 28-April 8, 1994

THE NEW AGRICULTURAL POLICY

F. NKONABANG
Sous-Directeur de la
Production Agricole

I - INTRODUCTION

POURQUOI UNE NOUVELLE POLITIQUE AGRICOLE (NPA) ?

EN QUOI DIFFERE-T-ELLE DES POLITIQUES AGRICOLES ANTERIEURES (PAA) ?

POUR Y REPONDRE :

1) QUELLES SONT LES CARACTERISTIQUES DES POLITIQUES AGRICOLES ANTERIEURES,
2) CONTEXTE DU CHANGEMENT QUI A NECESSITE LA MISE EN PLACE D'UNE NOUVELLE POLITIQUE AGRICOLE
3) COMMENT SE POSITIONNE LA NPA ?
4) COMMENT SE DEFINISSENT LES MESURES D'ACCOMPAGNEMENT ?

5) PERSPECTIVES : ROLE DES PROGRAMMES SPECIFIQUES

PLAN DE L'EXPOSE

I - CARACTERISTIQUES DES POLITIQUES AGRICOLES ANTERIEURES (PAA) (1960-1985)

1 - ENGAGEMENT DE L'ETAT (Plans de Développement, Sociétés de Développement), SUBVENTIONS ETATIQUES

2 - MONOPOLE DE COMMERCIALISATION DE PRODUITS DE BASE. FIXATION DES PRIX. MONOPOLE SUR LE COMMERCE DES INPUTS

II - CRISE A PARTIR DE 1985 : EFFETS ET CONSEQUENCES

III - CARACTERISTIQUES DE LA NOUVELLE POLITIQUE AGRICOLE (NPA) 1990

1 - Désengagement de l'Etat (Libéralisation)
2 - Responsabilisation des Planteurs (Privatisation)
3 - Consolidation de l'Auto-Suffisance Alimentaire
4 - Restructuration des sous-secteurs et des filières de production

CARACTERISTIQUES DES POLITIQUES AGRICOLES ANTERIEURES

I.1 DEVELOPPEMENT DES CULTURES D'EXPORTATION

(Café, Cacao, Coton) AVEC MISE EN PLACE D'UN TRAIN DE MESURES D'ACCOMPAGNEMENT TEL QUE :

- PROMOTION ET UTILISATION DES INTRANTS
  . SUBVENTION DES ENGRAIS A 70 %
  . GRATUITE DES PESTICIDES
  . SUBVENTION DES APPAREILS DE TRAITEMENT A 50 %
- PRIME A LA CREATION DE PLANTATIONS NOUVELLES
- PRIMES A L'ARRACHAGE ET A LA REPLANTATION
- CREATION DE SOCIETES DE DEVELOPPEMENT AVEC DE FORTES SUBVENTIONS (SOCIETES BUDGETIVORES): SODECAO, ZAPI, SODENKAM, SODECOTON, SODEBLE, ETC)
- TENTATIVES DE DEVELOPPEMENT DE LA MECANISATION EN MILIEU RURAL (WADA, CENEEMA ...)
- CREDIT AGRICOLE (FONADER)
- SOUTIEN DES PRIX A LA COMMERCIALISATION (ONCPB)
- RECHERCHE AGRONOMIQUE (IRA)
- CREATION DE LA MIDEVIV, DU PROJET SEMENCIER CACAO CAFE ET DU PROJET SEMENCIER-NORD

I.2 MAINTIEN ET CONSOLIDATION DE L'AUTO-SUFFISANCE ALIMENTAIRE PAR LE DEVELOPPEMENT DE CULTURES DE FORTE CONSOMMATION, CE QUI ENTRAINE LA MISE EN PLACE DES SOCIETES DE DEVELOPPEMENT TELLES QUE : SEMRY, SODERIM, SOSUCAM, CAMSUCO, WADA, UNDVA, SODEBLE.

I.3 L'AMELIORATION DU NIVEAU ET DES CONDITIONS DE VIE EN MILIEU RURAL PAR

* LA CREATION DES STRUCTURES D'ENCADREMENT, POSTES AGRICOLES, FORESTIERS ET PHYTOSANITAIRES,
* LA CONSTRUCTION DES INFRASTRUCTURES DIVERSES : ROUTES, ECOLES, CENTRES DE SANTE, CENTRES DE FORMATION SOIT PAR L'ETAT, SOIT PAR LES SOCIETES DE DEVELOPPEMENT : SODECAO, SODENKAM, SODECOTON, ETC
* RESTRUCTURATION ET RENFORCEMENT DE L'ENCADREMENT (UNITE LOCALE D'ENCADREMENT RAPPROCHE (ULER)) ET LEUR EQUIPEMENT

II - CONTEXTE DU CHANGEMENT DE POLITIQUE

- EFFONDREMENT DES PRIX DES PRODUITS DE BASE AVEC :

* LA DENONCIATION DES ACCORDS INTERNATIONAUX FONDES SUR LES QUOTAS ET LES PRIX FOURCHETTE,

* LA FAILLITE DES STRUCTURES DE STABILISATION DES PRIX ET/OU DE CREDIT MISES EN PLACE PAR L'ETAT (ONCPB/ FONADER)

* FAILLITE DE LA POLITIQUE DE MONOPOLE D'UN ETAT SEUL PROMOTEUR DE L'ECONOMIE NATIONALE

* FAILLITE DES SOCIETES DE DEVELOPPEMENT BUDGETIVORES

* MEVENTE DES PRODUITS DE BASE (CAFE ROBUSTA SURTOUT)

* DIFFICULTES DE TRESORERIE DE L'ETAT

* ACCUMULATION DES ARRIERES DUS AUX PLANTEURS.

TOUT CECI ENTRAINE LE DESENGAGEMENT DE L'ETAT A TOUS LES NIVEAUX.

III - CARACTERISTIQUES DE LA NPA

LA NPA DU CAMEROUN VISE L'AMELIORATION DES PERFORMANCES DE L'AGRICULTURE PAR LES PRINCIPALES STRATEGIES SUIVANTES AXEES SUR :

III- RESPONSABILISATION DES PRINCIPAUX ACTEURS QUE SONT LES PAYSANS (CONSEQUENCE DU DESENGAMENT DE L'ETAT) ET LA FIN DE LA SUBVENTION ETATIQUE A TERME, AVEC COMME PRINCIPAUX COROLLAIRES :

LA LIBERALISATION ET LA PRIVATISATION DES ACTIVITES DE DEVELOPPEMENT DONT LES SOUS-PRODUITS SONT :

a) LA FIN DE LA SUBVENTION ETATIQUE A TERME

b) LA FIN DE LA FIXATION DES PRIX PAR L'ETAT (VERITE DES PRIX)

c)LA FIN DU MONOPOLE DE L'ETAT PAR LA :

. DETERMINATION DES TYPES DE CULTURES, QUI ENTRAINE LA DIVERSIFICATION DES SPECULATIONS SUIVANT LA LOI DE L'OFFRE ET DE LA DEMANDE,

. ACHAT ET DISTRIBUTION DES INTRANTS, CONSEQUENCE DE LA LIBERALISATION ET DE LA PRIVATISATION DU COMMERCE DE CES SOUS-SECTEURS,

. COMMERCIALISATION DES PRODUITS DE BASE: ONCPB ---- ONCC (AVEC POUR ROLE LE CONTROLE DE LA QUALITE A L'EXPORTATION ET LA STABILISATION DES PRIX)

III-2 LA FIXATION DES OBJECTIFS PRIORITAIRES SUIVANTS AXES SUR LA VALORISATION DES POTENTIELS DE PRODUCTION ET LES POSSIBILITES DE COMMERCIALISATION:

* LA MODERNISATION DE L'APPAREIL DE PRODUCTION
* LA MAITRISE DE LA SECURITE ALIMENTAIRE
* LA PROMOTION ET LA DIVERSIFICATION DES EXPORTATIONS
* LE DEVELOPPEMENT DE LA TRANSFORMATION DES PRODUITS AGRICOLES EN VUE D'UNE PLUS GRANDE VALEUR AJOUTEE
* L'EQUILIBRE DES FILIERES DE PRODUCTION (CAFE, CACAO, COTON).

MODERNISATION DE L'APPAREIL DE PRODUCTION

ELLE VISE A AUGMENTER LES RENDEMENTS PAR :

* L'ACCROISSEMENT DE LA PRODUCTIVITE DES EXPLOITATIONS,
* LA REDUCTION DES COUTS DE PRODUCTION ET LA COMPETITIVITE DES PRODUITS SUR LES MARCHES INTERNATIONAUX.

PARMI LES PRINCIPALES MESURES D'ACCOMPAGNEMENT, IL Y A :

* LA PROMOTION DE LA PRODUCTION DE MATERIEL VEGETAL SELECTIONNE AVEC LA CREATION D'UN CONSEIL NATIONAL SEMENCIER,

* LA DECENTRALISATION DE CETTE PRODUCTION,

* LA REORGANISATION DE L'IRA QUI ASSURE LES FONCTIONS DE PRODUCTION DES SOUCHES MERES, DES SEMENCES DE BASE, LE CONTROLE DE LA QUALITE ET LA CERTIFICATION DES SEMENCES,

* L'UTILISATION DES ENGRAIS ET PESTICIDES AVEC UNE SERIE DE REFORMES ENGAGEES DANS LE SENS DE LA LIBERALISATION ET DE LA PRIVATISATION.

* LA MECANISATION AGRICOLE AVEC COMME MAITRE D'OEUVRE LE CENEEMA QUI DOIT ASSURER DES PRESTATIONS DE SERVICES.

LA REUSSITE DE CE PROGRAMME IMPLIQUE :

- LA MISE EN PLACE D'UN SYSTEME DE CREDIT AGRICOLE DECENTRALISE ET ADAPTE QUI EST EN COURS,
- L'AMELIORATION DE LA LEGISLATION FONCIERE ET SON ADAPTATION A UNE AGRICULTURE DE MARCHE
- LA CREATION DES INFRASTRUCTURES SOCIO-ECONOMIQUES TELLES QUE LES ROUTES, LES MARCHES, LES MAGASINS DE STOCKAGE ET DE CONSERVATION, LES UNITES DE TRANSFORMATION,
- L'ORGANISATION DE LA COMMERCIALISATION,
- LA RECHERCHE DE SOLUTIONS A DES MAUX TELS QUE :

. LA MAUVAISE PLANIFICATION DES INVESTISSEMENTS PUBLICS,

. LA MAUVAISE GESTION DES PROJETS,

. LE MANQUE DE POLITIQUE D'INCITATION DES AGRICULTEURS (PRIX, TAXES, ORGANISATION),

. LA FAIBLE UTILISATION DES INPUTS AGRICOLES,

. ETC.

L'ENCADREMENT AGRICOLE QUI CONSTITUE LA PIERRE ANGULAIRE DE CETTE NPA DANS LA MESURE OU IL EST **L'INSTRUMENT D'EXECUTION ET LE RELAIS PAR LEQUEL PASSE TOUTE INNOVATION SUSCEPTIBLE D'ENGENDRER LE PROGRES EST LA BASE DE CETTE NOUVELLE POLITIQUE AGRICOLE.**

IV - OBJECTIFS DU PNVFA (PM)

AMELIORATION DES METHODES D'INTERVENTION PAR :

- UNIFORMISATION DES METHODES D'INTERVENTION,
- UNIFORMISATION DE LA LIGNE DE COMMANDE,
- FIN DES CHEVAUCHEMENTS ET DES METHODOLOGIES MULTIPLES D'INTERVENTION,
- RENFORCEMENT DE LA COMPETENCE DES SERVICES,
- AMELIORATION DU NIVEAU DES CADRES ET DES PERFORMANCES DU PERSONNEL,

- EFFICACITE DES SERVICES D'APPUI PAR LA MISE EN PLACE D'UN SYSTEME DE FORMATION-VISITES

IMPLICATION DE CES PRINCIPES : VOIR AUTRE EXPOSE.

V - ROLE ET PLACE DU PNVFA DANS LA NPA

V.1 NPA

- DESENGAGEMENT DE L'ETAT
- LIBERALISATION
- RENFORCEMENT DES ACQUIS
- PROMOTION DE NOUVELLES SPECULATION PLUS PORTEUSES ET PLUS COMPETITIVES
- EQUILIBRE DES FILIERES.

V.1 CONSEQUENCES

VULGARISATION : UNIFORMISATION DES METHODES D'INTERVENTION SUR LE TERRAIN SOUS LA RESPONSABILITE D'UNE STRUCTURE UNIQUE, LE PNVFA

FORMATION : (D'ORIENTATION ET CONTINUE) PERMANENTE POUR ACCROITRE LA PERFORMANCE DU PERSONNEL ET CELLE DES ACTEURS QUI DOIVENT DESORMAIS OPERER UN CHOIX JUDICIEUX DANS LE CADRE DE LA LIBERALISATION ET DE LA DIVERSIFICATION DES CULTURES.

REDEPLOIEMENT DES RESSOURCES HUMAINES ET MATERIELLES EN VUE DE L'ACCROISSEMENT DE LA PRODUCTIVITE A TOUS LES NIVEAUX.

V.3 CONCLUSION PERSPECTIVES - ROLE DES PROJETS SPECIFIQUES

AU REGARD DE CET EXPOSE SUR LA NPA DONT LES PRINCIPALES CARACTERISTIQUES SONT LE DESENGAGEMENT DE L'ETAT ET LA LIBERALISATION DE TOUS LES SECTEURS, IL Y A LIEU DE SE DEMANDER SI LE PAYSAN VA SURVIVRE FACE AUX GRANDS MAUX QUE SONT L'EFFONDREMENT DES PRIX ET LA MEVENTE DES PRODUITS DE BASE.

L'ETAT N'A CEPENDANT PAS ENTIEREMENT ABANDONNE LES PRODUCTEURS, TOUTES LES MESURES D'ACCOMPAGNEMENT ETANT DES FACTEURS PALLIATIFS QUI DOIVENT ATTENUER TOUS LES EFFETS REGRESSIFS.

LES PROJETS SPECIFIQUES TELS QUE LE PNVFA, LE PRSSE, LE PRESCA, LE PSIE, LES PROGRAMMES D'ASSISTANCE DIVERS SUR LESQUELS NOUS ALLONS REVENIR EN TRAVAIL EN COMMISSION PEUVENT ETRE CONSIDERES COMME AUTANT DE MESURES D'ACCOMPAGNEMENT QUI, AJOUTEES A L'INGENIOSITE DES PLANTEURS, DOIVENT PERMETTRE AU MONDE RURAL DE RELEVER LE DEFI QUE NOUS LANCE LA CRISE ECONOMIQUE.

JE VOUS REMERCIE

R 8?

SEMINAIRE IFDC / PRSSE
SUR LA COMMERCIALISATION EFFICACE DES ENGRAIS AU CAMEROUN

BAMANDA, (28 MARS - 8 AVRIL 1994)

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BILAN DU PROGRAMME SPECIAL D'IMPORTATION D'ENGRAIS (PSIE) APRES CINQ ANNEES D'EXECUTION

* -*-*-*

PRESENTE PAR :

FOTSO DOPNA Siméon

INGENIEUR STATISTICIEN ECONOMISTE

MINPAT / SG - YAOUNDE

BILAN DU PROGRAMME SPECIAL D'IMPORTATION D'ENGRAIS APRES 5 ANNEES D'EXECUTION

I - GENERALITES

le Programme Spécial d'Importation d'Engrais (PSIE) qui couvre les 3 provinces septentrionales du pays a démarré son exécution en 1989. Son coût initial était de 22 millions d'ECU (7,7 milliards de FCFA). Il est cofinancé par une subvention du FED (68 %) et le Cameroun (32 %) au moyen des fonds STABEX.

Le PSIE a pour objectifs :

- l'organisation de la gestion des approvisionnements en engrais

- de faciliter l'harmonisation de l'ensemble des approvisionnements en engrais au Cameroun (processus de libéralisation et de privatisation,...);

- la suppression à terme de la subvention aux engrais.

Dans la première phase de son exécution, le PSIE a couvert les campagnes agricoles 1989/90 et 1990/91 et a porté sur l'achat et la distribution de 53.400 tonnes d'engrais.

Dans la seconde phase du programme, la vente de ces engrais a permis la constitution d'un fonds de roulement pour renouveller les approvisionnements en engrais au cours des campagnes suivantes.

Le PSIE est exécuté avec le concours :

- d'un Comité de Supervision dudit programme (FED, Administration) ;

- des organismes de développement de la région concernée à savoir la SODECOTON, la SEMRY, la MEAVSB, ainsi que les délégations provinciales de l'Agriculture de l'Extrême-Nord, du Nord et de l'Adamaoua ;

- d'un seul importateur d'engrais (SODECOTON) ;

- des banques abritant le fonds de roulement.

S'agissant des procédures, il est à noter pour l'essentiel que la passation des marchés engrais se fait à l'issue des appels d'offres internationaux à la Commission Spéciales des Marchés SODECOTON, alors que les déboursements à partir du compte fonds de roulement se font sur la base d'un plan prévisionnel des besoins en trésorerie de l'importateur approuvé par le Comite de Supervision du PSIE.

La subvention aux engrais PSIE n'a pas concerné les zones SODECOTON et MEAVSB.

Les taux de subvention dégressifs appliqués aux ventes d'engrais PSIE ont été de 44 % en 1989/90 et de 33 % en 1990/91. Actuellement, les engrais sont vendus aux prix coûtants.

L'évaluation technique et financière du PSIE par des consultants a déjà eu lieu deux fois (en 1991 et en 1993).

II. EVALUATION TECHNIQUE DU PSIE

Après 5 années d'exécution du PSIE, une analyse récapitulative des données sur les réceptions, les consommations et les stocks d'engrais en mars 1994 (voir annexes 1, 2, et 3) fait ressortir pour l'essentiel les caractéristiques ci-après :

- a l'issue de six campagnes d'exécution du PSIE, pour des commandes de 121.800 tonnes d'engrais tous types confondus, au total 121.530 tonnes ont été livrés par les fournisseurs ;

- les pourcentages d'engrais reçus par les distributeurs après 5 campagnes sont les suivants : SODECOTON (87 %), SEMRY (9,1 %), MEAVSB (1,9 %), DPA (2 %) ;

- l'ensemble des consommations après 5 campagnes a été de 68.883 tonnes pour des livraisons de 96.630 tonnes, soit un taux de consommation de 71 % : les taux de consommation par distributeur sont les suivants : SODECOTON (70 %), SEMRY (95 %), MEAVSB (71 %), DPA (96 %)

- l'ensemble des stocks d'engrais au 20/5/93 s'est élevé à 27.000 tonnes. Les taux de stockage par distributeur sont les suivants : SODECOTON (90 %), SEMRY (3,2 %), MEAVSB (2,4 %), DPA (4,4 %) ;

- l'ensemble des avaries et pertes dans les magasins s'élèvent à 948 tonnes, soit environ 1 % des tonnages réceptionnés.

III. BILAN FINANCIER DU PSIE

Les prix de vente des engrais sont les prix de revient à la SODECOTON et à la MEAVSB. Les prix subventionnés ont été appliqués aux niveaux des Délégations provinciales de l'Agriculture et de la SEMRY au cours des 3 premières campagnes. Actuellement les ventes se font partout aux prix de revient des engrais.

Les prix d'achat et de revient des engrais ont connu généralement au cours des 5 années d'exécution du PSIE une évolution en dents de scie (voir annexes 5 et 6).

Au cours des 3 premières années du Programme, les ventes d'engrais à crédit ont été effectuées par tous les distributeurs à des proportions variables. Depuis 1982/83, les ventes d'engrais à crédit ne sont autorisées qu'à la SODECOTON et à la MEAVSB ; les autres distributeurs effectuent leurs ventes au comptant.

L'analyse récapitulative des données sur la gestion financière du PSIE (voir annexes 5,6,7, 8 et 9) permet de dégager pour l'essentiel les principales caractéristiques ci-après :

- En mars 1994, après 6 campagnes d'exécution du PSIE, le coût total d'achat de 121.530 tonnes d'engrais reçus par les distributeurs a été de 14.188.021.091 F.CFA. Le coût total d'achat des engrais a été de 10.021.997.490 FCFA. Le coût total des transits et transports a été de 4.166.023.600 FCFA.

- S'agissant de la présente campagne, le coût total de 24.900 tonnes d'engrais importés a été de 3.441.000.000 FCFA. Le prix CAF d'achat de ces engrais a été de 2.538.000.000 FCFA. Les frais de transits et transports se sont élevés à 903.000.000 FCFA.

- En ce qui concerne les ventes d'engrais et recouvrements de fonds, à l'issue des 5 premières campagnes du PSIE, les résultats annuels cumulés ci-après ont été enregistrés :

* valeur des engrais reçus (96.131 T)..		10.747.021.091 FCFA
* valeur des consommations (68.289 T)		8.059.125.884 FCFA
* valeur des stocks au 20/5/93 (27.000 T)		2.587.346.444 FCFA
* total des recouvrements		7.603.971.923 FCFA
* pertes et avaries		221.470.181 FCFA
* crédits à récupérer		580.734.842 FCFA
* taux global des recouvrements	94,35 %	
* taux global des pertes	2 %	

- S'agissant de la gestion du fonds de roulement du PSIE, la situation globale dudit fonds se présente à la date du 20/5/93 comme suit :

* total versements cumulé au compte fonds de roulement	7.930.989.891 FCFA
* total cumulé des intérêts des dépôts à terme	327.017.968 FCFA
* solde du compte fonds de roulement	3.355.428.082 FCFA
* valeur globale du fonds de roulement	6.523.000.000 FCFA

IV. OBSERVATIONS

D'une manière générale, l'exécution du PSIE se déroule convenablement au regard des performances enregistrées dans les opérations d'importations, de transports, de distribution, de ventes et de recouvrements du fonds qui se sont effectuées jusqu'alors sans entraves majeures susceptibles d'entraver la viabilité du programme.

Cependant, au cours des 6 campagnes du PSIE, on a enregistré les problèmes suivants :

- des lenteurs administratives dans le processus de passation des marchés d'engrais ;

- des difficultés dans la gestion des stocks d'engrais chez certains distributeurs

- des ruptures de stocks chez certains distributeurs en raison de leurs mauvaises performances dans les recouvrements de fonds ;

- des difficultés de recouvrements de crédits dans certaines structures ;

- du manque d'efficience dans la gestion des fonds issus des recouvrements ;

- le renchérissement du coût des engrais du fait de la dévaluation du FCFA.

Toutefois, depuis le début de la mise en application du protocole de fonctionnement du fonds de roulement du PSIE en janvier 1993, on observe des amélioration dans la gestion du compte fonds de roulement et dans les procédures de passation des marches des engrais à la Commission Spéciale des Marchés SODECOTON.

Globalement, l'exécution du PSIE a connu du succès jusqu'alors dans la mesure où ce programme a atteint ses principaux objectifs, à savoir :

- l'approvisionnement régulier de la région concernée en engrais et leur mise à disposition aux agriculteurs à des prix compétitifs, étant entendu que les crédits aux distributeurs sont octroyés sans intérêts ;

- la suppression de la subvention aux engrais ;

- la conservation du fonds de roulement qui permet d'assurer le financement des approvisionnements des campagnes ultérieures. En effet, le taux global des recouvrements est de 94,35 % et le taux global des pertes est de 2 % ; ainsi, les intérêts des dépôts à terme couvrent largement les pertes

- le maintient des productions et productivités agricoles à des niveaux relativement satisfaisants.

S'agissant des perspectives du PSIE, les distributeurs d'engrais regroupés autour de la SODECOTON qui est chef de file du projet continueront pendant un certain temps à solliciter des crédits du compte fonds de roulement du PSIE pour leurs approvisionnements en engrais. le Comité de Supervision du PSIE va continuer à superviser les différentes opérations de commandes d'engrais, de déboursements et de recouvrements de fonds./-

ANNEXE 1 ***: COMMANDES D'ENGRAIS PSIE DE 89/90 à 94/95 (en tonnes)***

TYPE ENGRAIS	89/90	90/91	91/92	92/93	93/94	94/95	TOTAL
UREE	2.200	6.800	3.500	5.000	7.000	6.000	30.500
22.10.15	7.500	8.100	3.200	6.000	2.400	8.400	35.600
15.20.15	11.000	11.600	2.500	7.500	6.000	9.000	47.600
PHOSPHATE	1.000						1.000
10.30.10	2.000	2.200				1.500	5.700
SULPHATE	1.000						1.000
20.10.10					400		400
TOTAL COMMANDES	24.700	28.700	9.200	18.500	15.800	24.900	121.800
TOTAL RECEPTIONS	24.655	28.575	9.123	18.474	15.803	24.900	121.530

ANNEXE 2 : COUTS ENGRAIS PSIE 94/95 (en FCFA)

TYPE D'ENGRAIS	PRIX DE REVIENT	PRIX CAF D'ACHAT	COUT TRANSIT & TRANSPORT	PRIX UNITAIRE CAF	PRIX DE REVIENT
UREE 6.000 T	517.000.000	440.000.000	77.000.000	73.333	86.167
22.10.15 8.400 T	1.314.000.000	933.000.000	381.000.000	111.071	156.428
15.20.15 9.000 T	1.348.000.000	1.003.000.000	345.000.000	111.444	149.778
10.30.10 1.500 T	262.000.000	162.000.000	100.000.000	108.000	174.666
TOTAL 24.900 T	3.441.000.000	2.538.000.000	903.000.000	101.928	138.193

ANNEXE 5 ***:PRIX D'ACHAT UNITAIRES CAF DOUALA***
PAR TYPE D'ENGRAIS (en FCFA/T)

TYPE ENGRAIS	89/90	90/91	91/92	92/93	93/94	94/95	PRIX MOYEN
UREE	70.550	62.000	82.598	92.357	66.082	73.333	74.486
22.10.15	78.514	85.202	96.913	78.300	71.492	111.071	86.916
15.20.15	82.500	80.000	77.866	75.094	66.488	111.444	82.232
PHOSPHATE	55.840						55.840
10.30.10	84.610	90.565				108.000	87.587
SULPHATE	42.670						42.670
20.10.10				65.000			65.000

***ANNEXE 6** : PRIX DE REVIENT UNITAIRE (EN FCFA/T)*

TYPE D'ENGRAIS	89/90	90/91	91/92	92/93	93/94	94/95	PRIX DE REVIENT MOYEN
UREE	108.381	98.090	84.563	96.045	73.191	86.167	91.072
22.10.15	121.276	122.523	130.601	118.647	104.304	156.428	125.630
15.20.15	118.762	109.923	102.771	109.497	97.856	149.778	114.764
PHOSPHATE	94.862						94.862
10.30.10	111.823	123.428				174.666	136.639
SULPHATE	111.573						111.573
20.10.10					88.061		88.061

<u>N.B</u> : *Il y a lieu de noter que les commandes d'engrais sont passées une année à l'avance par rapport à la campagne agricole concernée.*

ANNEXE 7 : PRIX D'ACHAT DES ENGRAIS DE 89/90 A 94/95 EN F CFA.

TYPE D'ENGRAIS	89/90	90/91	91/92	92/93	93/94	94/95	TOTAL
Urée	154 857 250	421 600 000	284 219 718	461 785 000	463 101 766	440 000 000	2 225 563 734
22.10.15	594 429 494	685 109 282	308 667 905	4[illegible]9 330 200	171 230 525	933 000 000	3 161 767 406
15.20.15	900 157 500	924 160 000	194 431 402	561 785 120	398 928 000	1 003 000 000	3 982 380 022
Phosphate	55 728 320						55 728 320
10.30.10	168 035 460	197 612 830				162 000 000	527 648 290
Sulphate	42 413 980						42 413 980
20.10.10				26 000 000			26 000 000
TOTAL	1 915 622 004	2 228 482 112	787 319 025	1 518 818 320	1 033 260 291	2 538 000 000	10 021 997 490

ANNEXE 8 : PRIX DE REVIENT DES ENGRAIS DE 89/90 A 94/95 EN F CFA

TYPES D'ENGRAIS	89/90	90/91	91/92	92/93	93/94	94/95	TOTAL
Urée	237 896 295	667 012 000	290 981 283	480 225 000	512 922 528	517 000 000	2 706 037 436
22.10.15	918 180 596	985 207 443	415 964 185	711 170 118	249 808 080	1 314 000 000	4 594 330 422
15.20.15	1 295 812 182	1 269 830 496	256 619 187	819 037 560	587 136 000	1 348 000 000	5 576 435 425
Phosphate	94 672 276						94 672 276
10.30.10	222 078 404	269 319 896				262 000 000	753 398 300
Sulphate	110 903 562						110 908 562
20.10.10					352 244 000		352 244 000
TOTAL	2 879 543 315	3 191 369 835	963 564 655	2 010 432 678	1 702 110 608	3 441 000 000	14 188 021 091

Annexe 9 : SITUATION DU PSIE DE 1989 AU 28/05/1993

Structure	Réception d'engrais (T)	Consommation d'engrais (T)	Stocks d'engrais (T)	Valeur stocks d'engrais FCFA	Recouvrements F CFA	Versements cumulés au fonds roulement	Reste à récupérer FCFA	Pertes diverses
SODECOTON	83.626	57.730	25.896	2.435.271.287	6.857.413.330	6.385.673.851	471.739.479	68.839.456
SEMRY	8.714	7.428	1.286	8.434.957	0	340.000.000	53.979.642	129.330.761
MEAVSB	1.861	1.744	117	140.484.064	144.478.084	144.478.084	47.499.600	13.821.396
DPA-EN	671	620	51	982.716	39.344.655	39.344.655	75.000	1.639.003
DPA-N	618	612	6	173.420	30.783.955	30.783.955	4.614.166	5.633.640
LPA-A	608	608	0	0	34.920.438	34.920.438	2.826.355	2.826.355
CRZ-Wakwa	32	32	0	0	0	0	0	1.650.935
Etat						484.050.000		
Total	96.131	67.485	27.359	2.585.346.444	7.106.939.891	7.930.989.891	580.734.242	221.470.181

Annexe 9 : SITUATION DU PSIE DE 1989 AU 28/05/1993

Structure	Réception d'engrais (T)	Consommation d'engrais (T)	Stocks d'engrais (T)	Valeur stocks d'engrais FCFA	Recouvrements F CFA	Versements cumulés au fonds roulement	Reste à récupérer FCFA	Pertes diverses
SODECOTON	83.626	57.730	25.896	2.435.271.287	6.857.413.330	6.385.673.851	471.739.479	68.839.456
SEMRY	8.714	7.428	1.286	8.434.957	. 0	340.000.000	53.979.642	129.330.761
MEAVSB	1.861	1.744	117	140.484.064	144.478.084	144.478.084	47.499.600	13.821.396
DPA-EN	671	620	51	982.716	39.344.655	39.344.655	75.000	1.639.003
DPA-N	618	609	9	173.420	30.783.955	30.783.955	4.614.166	5.633.640
DPA-A	608	608	0	0	34.920.438	34.920.438	2.826.355	2.826.355
CRZ-Wakwa	32	32	0	0	0	0	0	1.650.935
Etat						484.050.000		
Total	96.131	67.485	27.359	2.585.346.444	7.106.939.891	7.930.989.891	580.734.242	221.470.181

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NOTE SUR LA PRODUCTION DES SEMENCES AU CAMEROUN : LES ORIENTATION FUTURES

Août 1992

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INTRODUCTION

Une semence se définit comme tout ou partie d'un organisme animal ou végétal ayant une fonction de reproduction. En agriculture, la semence est classée comme le principal facteur de production car, sans elle, cette activité devient impossible. On comprend donc pourquoi la production des semences de bonne qualité est une condition sine qua none à tout développement du secteur agricole. Il est d'ailleurs prouvé que toutes choses égales par ailleurs, une bonne semence permet d'augmenter les rendements de l'ordre de 30 %. Au Cameroun où l'agriculture est considérée comme moteur de l'économie, l'organisation de la production semencière reste pourtant embryonnaire surtout en ce qui concerne les cultures vivrières. Quant aux spéculations de rente développées depuis la colonisation, la situation est bien meilleure.

Des efforts financiers louables ont été pourtant consentis par tous les gouvernements qui se sont succédés depuis l'indépendance en 1960 pour notamment dynamiser les différentes composantes de la chaîne semencière que sont la recherche, la multiplication et la vulgarisation des semences. Cette volonté gouvernementale qui s'est traduite par la création de structures spécialisées telles la MIDEVIV, l'IRA, la SODECOTON, la SEDECAO, le FONADER etc., la formation des cadres, la recherche des financements surtout extérieurs a eu un résultat plutôt mitigé dans la mesure où toute cette infrastructure n'a pas pu résister à la toute première crise économique.

La situation à l'heure actuelle est préoccupante dans la mesure où elle se caractérise par un désordre à tous les niveaux de la filière semencière : production, contrôle de la qualité et commercialisation des semences. Eu égard aux conséquences particulièrement graves qui peuvent en résulter, l'intervention du Gouvernement dans ce domaine revêt un caractère d'urgence. Pour être efficace, toute politique semencière doit s'inspirer de la Nouvelle Politique Agricole qui met un accent particulier sur la privatisation tout en préconisant une plus grande responsabilisation des agriculteurs.

L'objectif étant de mettre à la portée des utilisateurs des semences performantes et à moindre coût, la nouvelle stratégie sera de décentraliser la production semencière au niveau des villages et renforcer les structures de conditionnement et de contrôle de la qualité.

Afin de faire des propositions concrètes quant à la nouvelle organisation à mettre en place, [illegible] traits caractéristiques du paysage semencier [illegible]

II. SITUATION ACTUELLE DE LA PRODUCTION DES SEMENCES AU CAMEROUN

2.1 *Situation au niveau de la production des semences certifiées*

L'organisation de la production des semences au Cameroun reste médiocre et ne reflète pas le niveau de la production agricole qui place cependant le pays parmi les rares privilégiés jouissant de l'autosuffisance alimentaire. Cette situation s'explique en partie par le fait que d'une part, l'activité agricole est exercée par une population nombreuse et dynamique et d'autre part, parce que le potentiel est très élevé en raison d'une grande diversité des terres et de climats.

Cette assertion doit néanmoins être nuancée puisque dans la réalité, le tableau varie selon les types de spéculation et selon les régions du pays.

En ce qui concerne les cultures de rente pratiquées depuis la période coloniale, la production semencière est bien organisée et même maîtrisée : c'est le cas du cacaoyer, du caféier, du coton, de la banane, du thé, de l'ananas, du palmier à huile, de l'hévéa, du tabac, etc. Les semences de base proviennent généralement des structures de recherche et les semences certifiées sont produites soit en régie, soit en milieu paysan. Ces cultures sont menées généralement par les sociétés privées, publiques ou para-étatiques : dans ce cadre, on peut citer la C.D.C., la SOCAPALM, la SODECOTON, la SEMRY, l'HEVECAM, la MIDENO. Si la production, le conditionnement et la commercialisation des semences sont maîtrisés par ces structures qui, pour la plupart sont des filiales des multinationales, il reste néanmoins certain que l'Etat n'exerce pas ou peu de contrôle pour apprécier la qualité des semences achetées ou vendues par ces compagnies.

Pour ce qui est des cultures vivrières, la situation varie d'une spéculation à l'autre et d'une région à l'autre.

D'une manière générale, la production des semences des céréales est très en avance dans la partie septentrionale du pays grâce aux efforts conjugués de l'IRA, des structures de multiplication telles l'ex-Projet Semencier Nord, des sociétés privées dont le chef de fil est Pioneer et des organismes d'encadrement dont les principaux sont la SODECOTON, la Mission d'Etude et d'Aménagement de la vallée supérieure de la BENOUE, MAISCAM, SEMRY.

Les fonctions de production, de conditionnement, de commercialisation des semences sont assurées à la perfection par ces différents agents, mais, à l'instar des cultures de rente, l'Etat n'exerce aucun contrôle tant au niveau de la qualité des produits que des diverses transactions semencières à l'intérieur et à l'extérieur du pays.

Dans la partie Nord, les résultats issus de l'action synergique des organismes participants sont très encourageants : des semences de bonne qualité de maïs, d'arachide, de Niébé, d'oignon sont disponibles et à des prix raisonnables.

Au Sud du pays la situation est moins prospère et caractérisée par un cloisonnement des organismes pourtant conçus pour réaliser le même objectif, la promotion du monde rural. Par ailleurs, on assiste à une carence prononcée des variétés à haut rendement et adaptées à l'écologie. Si la MIDEVIV et d'autres partenaires impliqués dans la filière semencière n'ont pas atteint tous les résultats escomptés, ils ont eu néanmoins le mérite de sensibiliser les paysans sur l'importance des semences de bonne qualité comme premier facteur de production.

A l'heure actuelle, la demande en semences sélectionnées augmente très sensiblement alors que l'offre a tendance à baisser, ce qui favorise la prolifération des amateurs en technologie des semences. En effet plusieurs personnes s'improvisent en multiplicateurs de semences sans avoir reçu une formation adéquate. Ceci est particulièrement vrai dans le domaine des plants fruitiers et des cultures vivrières où l'on assiste à une émergence de producteurs sur le marché. Si cette initiative est à encourager et à organiser, elle doit être réprimée pour les néophites car, elle peut avoir des conséquences dramatiques parce que, source de propagation de parasites et autres micro et macro-organismes pathogènes.

Dans le domaine des tubercules et racines, tout reste à faire. La multiplication de ces espèces est handicapée par les facteurs pondéral et sanitaire. Un espoir pointe cependant à l'horizon avec la recherche menée à EKONA sur la micropropagation qui permettra de résoudre ces deux problèmes.

Quant aux cultures maraîchères, la quasi totalité des semences utilisée est importée, même si de timides efforts sont actuellement déployés pour la multiplication des semences de certaines variétés dans la plaine des MBOS et à KOUSSERI.

Enfin, en ce qui concerne les plants d'arbres fruitiers, les mêmes problèmes relevés pour les tubercules et les racines constituent encore un sérieux frein au développement de ces cultures. Le pays est cependant quadrillé de parcs à bois qui constituent un des éléments précieux du patrimoine national à préserver. On en retrouve à NTUI, Wakwa, Garoua, Maroua, Nsop, Foumbot. Les recherches menées par l'IRA à Kismatari, Nkolbisson, et Njombe sont porteuses d'espoir.

Il faut cependant noter que pour l'ensemble des cultures, la plus importante source d'approvisionnement reste les semences traditionnelles conservées après chaque récolte. Il n'est pas fallacieux d'estimer à moins de 5 % les superficies couvertes par les semences dites sélectionnées. Le marché des semences présente encore de grandes potentialités.

2.2 *Situation au niveau de la production de semences de base, de la règlementation et du contrôle de la qualité des semences*

Au Cameroun la fonction l'obtention est exclusivement exercée par la Recherche d'Etat. Cependant certaines sociétés privées ou étatiques importent directement leurs semences de l'étranger sans contrôle de l'Etat. Cette erreur doit être rapidement corrigée si nous voulons préserver notre faune et notre flore. Toute transaction semencière devrait faire l'objet d'une investigation sérieuse par les pouvoirs publics.

Depuis le 13 janvier 1990 le Gouvernement avait pris des mesures pour l'organisation de la filière semencière au Cameroun, en créant d'une part un Conseil Semencier National, organe consultatif chargé de la coordination, du contrôle et de la mise en oeuvre de la politique semencière nationale dont le rôle est d'appliquer les décisions du Conseil Semencier et, d'autre part, un Secrétariat permanent dont le rôle est d'appliquer les décisions du Conseil Semencier.

Ces structures devaient permettre à l'Etat de réglementer le secteur semencier aux fins de le légiférer et d'exercer un contrôle à tous les niveaux. Le fonctionnement de ces organes est temporairement entravé par des problèmes de coordination. D'une façon générale, le secteur semence au Cameroun présente les particularités suivantes :

1. Parfaite organisation dans la production des semences de base des cultures de rente.

2. Prolifération anarchique des producteurs de semences certifiées des cultures vivrières et des arbres fruitiers.

3. Prédominance absolue des semences traditionnelles (95 %).

4. Inexistence des circuits de commercialisation des semences et absence de contrôle à tous les niveaux.

5. Disparités profondes entre le Nord et le Sud dans la production des semences de bonne qualité.

6. Recherche très avancée pour les céréales par rapport aux tubercules et racines qui constituent pourtant l'aliment de base d'environ 3/5 de la population.

7. Absence d'un dispositif gouvernemental permettant de contrôler la qualité des semences et d'arbitrer d'éventuels conflits entre producteurs et utilisateurs de semences.

III. PROPOSITIONS POUR UNE ORGANISATION RATIONNELLE DE LA FILIÈRE

L'objectif poursuivi par la nouvelle approche est de mettre des semences performantes et peu onéreuses à la disposition des agriculteurs. Une telle politique plutôt pragmatique doit intégrer certains paramètres qui en conditionnent le succès :

- La Nouvelle Politique Agricole du Gouvernement qui préconise la privatisation progressive des activités agricoles, la responsabilisation plus accrue des agriculteurs et la diversification culturale.

- Le paysage semencier actuel qui favorise davantage les cultures de rente au détriment des cultures vivrières.

- La nouvelle donne de l'environnement économique caractérisée par la dégradation des termes de l'échange et les exigences du marché extérieur.

- La situation actuelle de l'organisation de la filière semencière qui se résume en un désordre tant au niveau de la production qu'à celui de la commercialisation des semences.

- La spécificité de l'activité semencière qui, non seulement intègre d'autres volets de [illegible] mais aussi requiert des moyens adéquats en ressources humaines et [illegible] lui permettre de réaliser sa mission qui est celle de présenter un produit d'excellente qualité.

Ces bases étant posées, l'orientation de la nouvelle politique semencière peut être définie à partir des termes de référence suivantes, prescrits comme tâche à entreprendre sans délai au niveau de chaque délégation provinciale :

1°) Recensement de toutes les superficies cultivées.

2°) Ouverture d'un catalogue pour toutes les espèces et variétés cultivées dans chaque province.

3°) Identification de tous les producteurs de semences (Sociétés, Privés, Etat etc.).

4°) Création au niveau de chaque province d'une commission régionale d'homologation des semences composée comme suit :

- Le Délégué provincial de l'agriculture : Président
- Le Chef service provincial de l'Agriculture : Secrétaire
- Le Chef centre IRA (ou Chef station) de la localité : Membre
- L'obtenteur de la variété :
- Les représentants des sociétés d'encadrement de la région cultivée : Membre
- Un représentant des agriculteurs : Membre

5°) Formation et information des encadreurs, des utilisateurs et même des autorités administratives et politiques qui peuvent jouer un rôle déterminant dans la diffusion et la commercialisation des semences.

6°) Encouragement des meilleurs agriculteurs à la profession de multiplicateur de semences.

7°) Décentralisation de la production des semences à l'échelon du village.

Là où les sociétés d'Etat ou privées n'interviennent pas, la production semencière peut être organisée localement.

Au niveau de chaque canton comprenant un ou plusieurs villages, les agriculteurs ou groupes d'agriculteurs choisis parr [illegible] peuvent être convertis en producteurs de semences [illegible]

Ceux-ci, regroupés autour d'un périmètre isolé et présentant d'excellentes potentialités en agriculture, se verront confier sous l'encadrement des techniciens de l'agriculture, la production des semences des principales cultures de la région dans le souci de réaliser des "villages saturés" pour éviter le mélange des variétés. Ces agriculteurs recevront leurs semences de base des organismes de Recherche agréés par le Gouvernement (IRA, UTA etc.). Dans le même ordre d'idées, les techniciens d'agriculture peuvent aussi avantageusement se reconvertir en multiplicateurs de semences, seuls ou regroupés au sein des coopératives. L'encadrement des agriculteurs en général et leur formation permanente en particulier est un facteur déterminant du succès. Le contrôle de la qualité par les services compétents, en plein champ et au laboratoire doivent être instaurés. En attendant le fonctionnement effectif des structures mises en place à cet effet, les anciens cadres de la MIDEVIV, rompus à ces techniques peuvent être associés à ce programme.

Les opérations de conditionnement constituent un véritable goulot d'étranglement en milieu rural. Mais la difficulté peut être contournée par l'utilisation d'un matériel simple commercialisé par diverses compagnies privées. Dans certains cas, la sélection massale peut donner des résultats acceptables. Le stockage, le traitement et l'ensachage doivent être conduits dans des locaux très propres, aérés et périodiquement traités.

IV. CONCLUSION

En dépit d'une agriculture florissante et des efforts du Gouvernement, l'organisation de la production semencière reste encore embryonnaire. Cependant, toutes les composantes de la chaîne semencière existent. Il reste à les dynamiser et à coordonner leurs actions grâce à la mise en fonctionnement du Conseil National Semencier et du Secrétariat permanent. De toute évidence, l'environnement économique commande à l'heure actuelle que les opérations de multiplication de semences soient privatisées et transférées aux mains des paysans que le Gouvernement, à travers sa Nouvelle Politique Agricole souhaiterait être plus impliqués dans le processus décisionnel. La production des semences par les paysans trouve tout son intérêt dans les zones non couvertes par les sociétés privées ou les organismes d'Etat. A ce niveau, les coopératives, les multiplicateurs isolés ou en groupes, les professionnels peuvent prendre le relais, à condition d'être encadrés et suivis.

Pour éviter les contamination [illegible] multiplicateurs travaillent dans des casiers [illegible] deviendra un périmètre saturé où [illegible]

LE SOUS-SECTEUR PESTICIDE AU CAMEROUN.

par S. NJOUMGUE

S/DPV.

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L'économie camerounaise repose essentiellement sur le secteur agricole dominé par de petits exploitants qui assurent la production de 94 % des produits de base destinés à l'exportation et la presque totalité des produits destinés à la consommation.

Si la production de l'huile de palme, de la canne à sucre, de la banane, du caoutchouc est assurée par de larges plantations industrielles, en revanche celle du cacao, du café, du tabac coton et du riz est essentiellement dominée par les paysans. De même, le secteur vivrier constitué de plantin, de manioc, de maïs, de mils et sorgho, d'ignames, de macabo, de haricots et légumes divers est exclusivement pris en charge par les paysans qui couvrent l'essentiel des besoins alimentaires de la population.

Pendant longtemps, les cultures destinées à l'exploitation ont bénéficié d'une attention toute particulière des pouvoirs publics alors que les paysans, jusque dans les années 1990 veillaient sur le secteur vivrier.

I). LES PROBLEMES PHYTOSANITAIRES.

La diversité climatique et écologique du Cameroun est tout aussi favorable au développement de plantes diverses qu'à la multiplication des insectes nuisibles et parasites divers. En fonction de l'importance des dégâts sur les productions agricoles, certains insectes et maladies ont retenu toute l'attention des pouvoirs publics et classés comme fléaux nationaux. Le tableau 1 ci-dessous donne par culture, les divers fléaux nationaux.

Table n°1. Fléaux nationaux.

CULTURES	INSECTES	MALADIES
Cacao	Capsides	Pourriture brune
Café	Scolytes - Antestia	Anthracnose
Café+Cacao	Chenilles - défolatrices	-
Mil et Sorgho	Acridiens et oiseaux granivores	-

2). CONSOMMATION DES PESTICIDES.

Les produits agricoles destinés à l'exploitation, constituant la principale source de devises nécessaires au développement du pays, les pouvoirs publics ont jusqu'en 1989 subventionné à 100 % l'acquisiton, la distribution voire l'utilisation des pesticides destinés à la lutte phytosanitaire contre le fléaux nationaux.

Le tableau ci-dessous donne l'évolution de la consommation des pesticides en générale pendant les années 1984 à 1994.

Tableau n°2. Importation de pesticides au Cameroun, de 1984-1991.

Années	1984	1985	1986	1987	1988	1989	1990	1991	1992
Volume (milliers tonnes)	7,6	11,9	3,1	5,5	3,5	3,6	2,0	2,0	2,0
Estimation Coût milliard FCFA	8,9	9,4	11,0	9,6	6,6	10,1	3,6	4,2	

Source : Union Phytosanitaire Afrique Centrale (UPAC)

La chute drastigue de la consommation des pesticides est largement tributaire des cours du cacao et du café sur le marché international et surtout du désengagement de l'Etat de l'acquisition des pesticides. Le chiffre d'affaire des principales firmes phytosanitaires largement affectées par cette conjonction est passé de 11,9 milliards en 1985 à 4,2 milliards FCFA en 1991.

Pendant le même temps, on assiste à une variation notable de pesticides en fonction des cultures. Alors que jusqu'en 1989, 40% des pesticides importés au Cameroun étaient utilisés sur le cacao, aujourd'hui, la consommation des pesticides sur le cacao ou le café est presque négligeable. Et à partir de 1991 les principaux domaines d'utilisation de pesticides sont constitués par les grandes exploitations de bananes, les cultures maraîchers, le coton, le palmier à huile, les plantations de canne à sucre.

***Tableau 3** : Consommation par culture des pesticides dans les années 1981-1987-1989 et 1992.*
(milliard FCFA).

CULTURES	1981	1987	1989	1991	1992
Cacao	1,6	4,1	4,0	-	-
Coton	1,5	2,1	2,0	1,2	0,4
Café	2,3	1,5	1,9	0,5	0,1
Banane	1,0	0,6	0,9	1,3	1,5
Canne à Sucre	-	0,3	0,3	0,2	0,2
Palmier à Huile	0,1	0,3	-	-	-
Hévéa	0,3	0,2	0,5	0,3	0,2
Cult. viv. (1)	-	0,3	0,5	0,6	0,7
Divers (2)	-	0,2	-	0,1	0,1

(1) cultures vivrières : lutte notamment sur maïs, culture maraîchère.
(2) Divers : notamment semences, conservation des grains et protection ~~protection des grames~~ des grumes.
Source : Heureux (1987) Firmes membres UPAC.

Le tableau ci-dessous donne pour 1991, la répartition par culture des Insecticides, Fongicides et Herbicides.

***Tableau 4** : Répartition par culture des types de pesticides pour 1991*
(Milliards FCFA)

CULTURES	TYPE DE PESTICIDE			TOTAL	%
	INSECTICIDE	FONGICIDE	HERBICIDE		
Banane	0,8	0,3	0,2	1,3	30,9
Coton	1,1	-	0,1	1,2	28,5
Cult. vivrières	0,1	0,3	0,2	0,6	14,3
Café	0,1	-	0,4	0,5	11,9
Hévéa et Palm. à H.	-	-	0,2	0,2	4,8
Canne à Sucre	-	-	0,2	0,2	4,8
Cacao	-	-	-	-	-
Divers	0,2	-	-	0,2	4,8
Total	2,3	0,6	1,3	4,2	100,0
%	54,8	14,3	30,9		

***Source** : Firmes membres UPAC.*

Les secteurs bananiers et cotoniers sont les principaux consommateurs d'insecticides. les herbicides sont surtout utilisés dans les plantations de canne à sucre, d'hévéa, de jeunes palmiers à huiles. Enfin, les fongicides sont surtout utilisés sur la bananes et les cultures maraîchères.

Jusqu'en 1989, la consommation des différents types de pesticides se présentaient de la manière suivante :

- FONGICIDE : 42 %
- INSECTICIDE : 38 %
- HERBICIDE : 14 %
- AUTRES : 6 %

3). REFORME DU SOUS-SECTEUR PESTICIDES.

Pendant longtemps, l'acquisition, la distribution voire l'utilisation des pesticides destinés à la lutte phytosanitaire contre les Fléaux nationaux étaient entièrement prises en charge par les pouvoirs publics. L'effondrement sur le marché international des cours des produits agricoles traditionnels destinés à l'exploitation a suscité et précité la libération et la privation de l'acquisition et de la distribution des pesticides.

Le programme envisageait la privatisation en quatre années du sous-secteur pesticides suivant le schéma ci-après.

ANNEE	% SUBVENTION DE L'ETAT	% CONTRIBUTION DES AGRICULTEURS
I	75	25
II	50	50
III	25	75
IV	0	10

Les fléaux revêtant un caractère épidémique et pour lesquels tout effort du pays est nul, demeure dans le portefeuille de l'Etat. Il s'agit notamment des acridiens, des oiseaux granivores et des chenilles défoliatrices.

Au cours du programme, le paysan prenait progressivement la responsabilité de la couverture phytosanitaire de sous-exploitation. Et à terme, le rôle du personnel de l'Etat se limitait à l'encadrement du paysan pour une meilleure utilisation des pesticides suivant les bonnes pratiques agricoles.

La recession économique s'est installée très rapidement et la réforme du sous-secteur des pesticides sur le plan réglementaire est devenue une préocupation majeure dans la mise en oeuvre du programme. Cette réglementation basée sur le code international de distribution et d'utilisation des pesticides vise essentiellement la protection des utilisateurs, des consommateurs et de l'environnement contre l'usage abusif des pesticides.

4). PERSPECTIFS DE LA CONSOMMATION DES PESTICIDES AU CAMEROUN.

Le marché des pesticides au Cameroun est aujourd'hui très limité.

C'est bien le fondement du retrait observé depuis 1990 des principales firmes phytosanitaires installées au Cameroun depuis les années 1960. Les firmes qui se maintiennent encore ont réduit leur personnel au stricte minimum : le responsable et une secrétaire.

La tendance future du marché des pesticides au Cameroun dépendra essentiellement du prix sur le marché international des produits agricoles destinés à l'exploitation. Comme déjà relevé ci-dessus, la banane, le coton et surtout le secteur vivrier constituent pour l'heure les principaux domaines de consommation des pesticides.

La mise en application progressive de la nouvelle réglementation phytosanitaire permettra également de régler la distribution et l'utilisation des pesticides sur le territoire national.

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3/29 Richard [illegible]

IMPORTATIONS D'ENGRAIS PAR TYPE ET COÛT MOYEN
1988/89 - 1992/93

TYPE	ANNEE	TONNES (T)	PCT (T/TOTAL)	COUT CAF MOYEN (FCFA)
NPK 20-10-10	1988/89	26.300	41,75 %	63.257
	1989/90	23.230	36,20 %	63.853
	1990/91	12.051	54,77 %	64.776
	1991/92	21.050	66,19 %	59.355
	1992/93	4.000	5,3 %	64.500
Total 5 années		86.631	41,84 %	
NPK 12-6-20	1988/89	12.000	19,05 %	61.350
	1989/90	2.000	3,12 %	66.500
	1990/91	1.492	6,78 %	64.000
	1991/92	4.200	13,21 %	55.083
	1992/93	2.500	13,20 %	64.000
Total 5 années		22.192	11,10 %	
Urée 46-0-0	1988/89	15.200	24,13 %	54.046
	1989/90	24.942	38,87 %	56.168
	1990/91	6.885	31,29 %	46.222
	1991/92	5.250	16,51 %	56.360
	1992/93	10.604,978	56,10 %	54.875
Total 5 années		62.881,978	31,46 %	
Sulf. Amm. 21-0-0	1988/89	9.500	15,08 %	39.300
	1989/90	14.000	21,82 %	39.586
	1990/91	1.575	7,16 %	40.000
	1991/92	1.300	4,09 %	35.497
	1992/93	5.565	25,40 %	35.125
Total 5 années		31.940	15,60 %	
Total tous types par an	1988/89	63.000	100,00 %	56.897
	1989/90	64.172	100,00 %	58.384
	1990/91	22.003	100,00 %	55.721
	1991/92	31.800	100,00 %	54.548
	1992/93	22.670	100,00 %	
		203.645		

Module C: Fertilizer--Technical Aspects

ESSENTIAL NUTRIENTS AND THEIR ROLE IN CROP PRODUCTION[1]

1. INTRODUCTION:

In the fertilizer marketing, the dealer and farmer or field representative will need to know the composition of products being sold. Most of those marketed products content essential nutrients for plant growth of which we will intend to know their role in crop production. It is not possible to have an idea on all of them in one workshop, learning about essential nutrients in crops is a never-ending process.

2. ESSENTIALITY OF ELEMENTS IN PLANT NUTRITION

A mineral element is considered essential to plant growth and development if the element is involved in plant metabolic functions and the plant cannot complete its cycle without the element.

Visual nutrient deficiency symptoms in a specific nutrient is usually exhibited by the plant, which normally can be corrected or prevented by supplying that nutrient. But visual nutrient deficiency symptoms can be caused by many other plants stress factors; therefore caution should be exercised when diagnosing deficiency symptoms.

2.1 Terms commonly used to describe levels of nutrients in plants

Deficient - An essential element is at a low concentration that severely limits yield and produces more or less a distinct visible deficiency symptom. Extreme deficiencies can result in plant death. With moderate or slight deficiencies/symptoms may not be visible, but yields will still be reduced.

Critical Range - The nutrient concentration in the plant below which a yield response to added nutrient occurs. Critical ranges or levels occurs somewhere in the transition between nutrient deficiency and sufficiency.

Sufficient - The nutrient concentration range in which added nutrient will not increase yield but can increase nutrient concentration. i.e. nutrition absorption by the plant doesn't influence yield. Luxury consumption is common in most plants. Insufficient when the essential nutrient is below that required for optimum yields.

Excessive or Toxic - When the concentration of essential or other elements is high enough to reduce plant growth and yield severely. Exclusive nutrient concentration can cause an imbalance in other essential nutrients, which also can reduce yield.

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[1] Prepared by F. MELPS, Soil/Systems Agronomist (Researcher), Inst. of Agronomic Research, Bambui Station, B.P. 80, Bamenda - Cameroon.

2.2 ELEMENTS REQUIRED IN PLANT NUTRITION AND GROWTH

Twenty elements are considered essential to plant growth: of this total 17 are soil-derived nutrients and 3 are derived from air and water (Carbon, Hydrogen and Oxygen). C, H, O are the most abundant elements in plants. They are not considered mineral nutrients.

$$CO_2 + H_2O \xrightarrow[\text{Process}]{\text{Photosynthetic}} \text{Amino acids, Sugars, Proteins, nucleic acids + other organic compounds.}$$

The classification of nutrients is based on their relative abundance in plants.

The primary or macronutrients are:

- Nitrogen (N)
- Phosphorus (P)
- Potassium (K)

The secondary nutrients are:

- Magnesium (Mg)
- Calcium (Ca)
- Sulfur (S)

The minor elements (micronutrient):

- Iron (Fe)
- Manganese (Mn)
- Molybdenum (Mo)
- Copper (Cu)
- Boron (Bo)
- Zinc (Zn)
- Chlorine (Cl)
- Sodium (Na)
- Cobalt (Co)
- Vanadium (Va)
- Silicon (Si)

These latters are referred to as minor elements, but it doesn't mean that they are less important than macronutrients. Their deficiency or toxicity can reduce plant yield similar to macronutrient deficiency or toxicity. All have not been found to be required for all plant but all have been found to be essential to some.

3 FUNCTION OF NUTRIENTS

1) Nitrogen (N)

- Gives dark green color to plants
- Promotes rapid growth
- Increases yields of leaf
- Improves quality of leaf crops
- Increases protein content of food and feed crops
- Feeds soil micro - organisms during their composition of low - nitrogen organic materials.

  Nitrogen is an integral part of chlorophyll, which is the primary absorber of light energy needed for photosynthesis.

An excess of N in relation to other nutrients, such as P, K, and S, can delay crop maturity. Plants normally contain between 1% and 5% N by weight. N deficiency: Lower leaves of plant are yellow.

2. Phosphorus (P)

In fertilizer, it is stated in terms of available phosphate (P_2O_5).
Range in plants: 0.1% - 0.4% (lower)

- Stimulates early root formation growth;
- Gives rapid and vigorous start to plant;
- Hastens maturity (mostly grain crops) and can improve quality of certain fruits, forages, grains and vegetables.
- Stimulates blooming and aids in seed formation.
- Gives winter - hardiness to fall- seeded grains & forage crops.
- Is involved in energy storage and transfer (ATP & ADP). Phosphate compounds act as "energy currency" within the plant.

P is mobile in plants, so any defiency symptoms would be observed on lower leaves. P occurs in most plants in concentrations between 0.1% to o.4%, a range considerably lower than that typically found for N and K.

P is readily mobilized in plants, and when a deficiency occurs, the element contained, in the older tissues is transferred to the active meristematic regions. However, because of the marked effect that a deficiency of this element has on retarding overall growth, the striking foliar symptoms that are evident of a deficiency in one of other nutrients, such as N or K, and seldom observed.

3) **Potassium (k)**

The concentration in vegetative tissue usually ranges from 1 to 4% on dry matter basis. Stated in form of Potagh (K_2O) in fertilizer.

- Imparts increased vigor and disease resistance to plants.
- Aids in proteins production in plants.
- Stiffens straw and stalk parts thus reducing lodging.
- Increases plumpness of grain and seed.
- Beneficial effect in symbiotic N_2 fixation by legumes.
- Required in synthesis [illegible] (translocation of assimilates).
- Energy relation. Plants require K for the production of high - energy phosphate molecules (ATP), which are produced in both photosynthesis and respiration.

Potassium is a mobile element which is translocated to the younger, meristematic tissues if a shortage occurs. As a result, the deficiency symptoms usually appear first on the lower leaves of annual plants, progressing toward the top as the severity of the deficiency increases.

K exists in mobile ionic form and its function appears to be primarily catalytic in nature.

4) **Calcium (Ca)**

It is immobile in plant, concentration in crops : 0.1 -0.4%

- Main component of cell wall
- Cell elongation and division
- Regulate structure and permeability of cell membrane
- Deficiency: - Disorders in the storage tissues in fruits and vegetables.
  - Failure of terminal buds of shoots and tips of roots.

5) **Magnesium (Mg)**

Mg is mobile in plants.

- Constituent of chlorophyll molecule
- Structural component in ribosomes
- Decrease of proportion of protein N in case of deficiency.
- Involved in physiological and biochemical functions (ATP and ADP --> through chelation).
- Enzymes cofactor
- Oil synthesis
- Acts as a carrier of phosphorus in the plant
- In certain forms (lime), corrects soil acidity.

6) **Sulfur (S)**

S-containing amino acids which is 90% of the plant's acids protein.

- Synthesizing of other metabolites vitamins, coenzyme, etc.
- Component of S-containing substances --> lipids --> oil formulation.
- Vital part of ferredoxins (nonheme) Fe S-protein-electron transfer in chloroplast, NO_3^- and SO_4^{-2} reductions.
- Required in synthesis of chlorophyll
- Responsible for taste and smell
- Helps maintain dark green color
- In certain forms, corrects soil alkalinity.

7. Boron (B)

Not mobile
Required in processes.

- Growth and development of new cells in meristem
- Pollination and fruit or seed set.
- Translocation of sugar, starch, N, and P
- Synthesis of protein and amino acids
- Module formation
- Regulation of carbohydrate metabolism
- To prevent dieback (as in tea).

8) Iron (Fe)

Relatively mobile but not translocated.
Oxidation-reduction reactions.
Chelation

Functions.

- Structural component of porphyrin molecules, i.e., cytochrome, hemes, hematine, ferrichrome leghaemoglobine --> oxidation-reduction.
- Structural component of nonheme molecules, i.e., ferredoxin
- Enzyme system.

Partial substitution for Mo --> metal cofactor.

9) Manganese (Mn)

Relative immobile
Evolution of O_2 in photosynthetic
Oxidation-reduction, decarboxylation, and hydrolysis
Activates of enzymes in citric acid cycle.

Functional roles.

- Electron transport in photosystem II
- Maintenance of chloroplast membrane structure
- Manganin (enzyme system)
- Increases availability of calcium, magnesium, and phosphorus
- Accelerates germination and maturity.

10) Copper (Cu)

Similar properties with Fe
Not translocated
Important in reclaiming and utilizing peat and muck soils
Functional roles

- Oxidase enzyme
- Terminal oxidation
- Electron transport
- Nodule formation, (indirectly).

11) Zinc (Zn)

Functional roles

- Auxin metabolism
- Dehydrogenese enzymes
- Phosphodiesterase
- Superoxide dismutase
- Promote synthesis of cytochrome C
- Stabilizes ribosomal fractions
- Necessary for normal chlorophyll production.

12) Molybdenum (Mo)

Essential Component of nitrate reductase enzyme
Structural component of nitrogenase --> N fixation.
Essential in Fe absorption.

13) **Chlorine (Cl)**

Biochemical inert
Osmotic and cation neutralization
Mobile
Counterion of K^+ --> turgor
Evolution of O_2 in photosystem II
Indirect disease control.

14) **Cobalt (Co)**

Formation of Vitamin B_{12} N-fixing bacteria
Enzyme activities.

15) **Vanadium (V)**

Partially substitute for Mo in N fixation
Oxidation-reduction.

16) **Sodium (Na)**

Halophytic plant --> turgor and growth
Succulence.
Activate PEP Carboxylase

<u>Other functions</u>

- Oxalic acid accumulation
- K-sparing action
- Stomatal opening
- Regulation of NO_3 - reductase

17) **Silicon (Si)**

Contributes in cell wall structure
Enzyme-silicon complexes as regulator/protector of photosynthesis and enzyme activity.
Correction toxicities
Disease and lodging resistance
Filter out harmful ultraviolet
Provide "window" in epidermal --> more light penetration
CO_2 fixation
Leaf erectness

Workshop on

Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994

Bamenda, Cameroon

Product Decision

by

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Product Decision

One of the many functions involved in fertilizer marketing is product selection. Fertilizer products were developed to meet a need or want of consumers, and a marketing strategy has to be designed and implemented to ensure their success in the marketplace. Throughout history, farmers have been keenly interested in improving crop yields. Their initial efforts were based upon the trial and error application of various materials (manure, bones, wood ash, etc.) to the soil to promote crop growth. Today, some of the earlier fertilizer materials are still used by farmers. However, the majority of farmers prefer chemical fertilizer products as the most efficient means of increasing crop yields.

The world chemical fertilizer market is a huge market. In 1988 farmers throughout the world applied an estimated 400 million mt of fertilizer products to their soils and crops. These fertilizer products were in a variety of forms – liquids and solids; granules, prills, and fines; bulk and bagged; single and multinutrient grades, etc. The fertilizer package, which is classified under the product decision area, often ranges from a 10-kg bag to a 1-mt bag to various-sized liquid fertilizer containers. Branding is another key decision area relative to product and is often employed in the strategy of targeting products to specific market segments. The purpose of this paper is to provide an overview of the role of product in the marketing mix and to identify some of the factors involved in making the product decision. Since other discussions during this seminar will focus on the agronomic suitability of various products for specific soils and crops and product quality control matters, these topics have been omitted.

Product

Product, along with price, place and promotion, comprise the 4-P's of marketing (Figure 1). It is the "P" that is intended to satisfy a consumer's want or demand. The fertilizer product per se is not what the farmer is seeking; rather it is the benefit which may be derived from its use in terms of increased crop production and improved profitability. Herein lies the most important, fundamental requirement of effective product decisionmaking. The product should be developed and marketed with the basic question in mind, "What is the consumer really buying?" The basic needs of the consumer must be identified and the ability of the product to satisfy those needs must be sold. A farmer's acceptance of a fertilizer product for continued use will be based upon its performance in the field. In the factory, the National Fertilizer Company of Nigeria (NAFCON) makes fertilizer; but in the marketplace the marketer's goal is to sell the hope that the efficient use of the fertilizer product will result in increased crop production and improved profitability.

A simple way to examine the product decision is to view a product as having three different levels – core product, tangible product, and augmented product (Figure 2). The core product is the end benefit or service which a product offers to the consumer. The tangible product is the physical product along with the characteristics and features necessary to satisfy the core product benefits. The augmented product includes the additional services and/or benefits related to the product to ensure its success.

Core Product

Fertilizer Product Choice

As marketers, how is the decision made regarding which products to market? Ideally, the decision should be directed to selecting products that will satisfy at the lowest possible cost the crop production needs of farmers in a specific target market; this, in turn, should be based upon the technically sound soil and crop-specific fertilization recommendation of researchers. However, in reality we know that this may or may not be the case, depending upon a number of factors including the following: (a) the efficiency of the research efforts, (b) the effectiveness of communicating these research findings to marketers and farmers, (c) the success of the marketing system in creating and satisfying the demand for specific products, (d) market specific conditions which allow or restrict the marketing of certain products, (e) the influence of traditional fertilization practices, (f) the product mix strategy followed by competitors, (g) profitability to the company or manufacturing organization, and (h) the fertilizer supply system.

The selection of the appropriate types and quantities of fertilizers to apply under specific soil, climate, and cropping conditions is a highly technical question and one which requires extensive research to develop accurate recommendations. National and international research organizations and universities often engage in this type of activity. Further, growers' associations and large estates often conduct crop-specific fertilizer trials to determine appropriate fertilizer recommendations. Brooke Bond, Ltd., the major tea producer in Kenya, maintains an extensive research facility to evaluate alternative fertilizer products and to develop fertilizer recommendations for the company's 7,000 plus hectare tea estate. Similarly, the Coffee Research Foundation in Kenya conducts extensive research on coffee fertilization, and the results are published for growers and extension staff. In Malawi many of the large estates, including tobacco and sugar estates, maintain research programs directed to increasing crop production efficiency (in terms of achieving and maintaining long-term goals in terms of production quantity and output quality). Fertilizer nutrient recommendations and the most suitable products from which the nutrient needs can be supplied are then identified.

For marketers the product selection decision should be based on technically correct fertilizers for the crops grown in a particular agroclimatic zone. However, in order to encourage farmers to adopt the use of fertilizers or to change their purchasing habits to buy more appropriate fertilizers, a substantial marketing effort may be required (see Appendix).

Once reliable fertilizer recommendations have been developed, this information must be communicated to appropriate parties if it is to be of value. Research findings that remain only with the research organization are of little value. Such information should be disseminated to marketers, extension staff, and ultimately, to farmers. Many organizations throughout the world have successful systems by which research results are effectively disseminated to marketers, extension staff, and subsequently to farmers. One excellent example of this is in Zambia where the Commercial Farmers Bureau publishes and provides to member farmers, a crop production guide which includes recommended fertilization practices. Unfortunately, the booklet is available to only farmer members. Nonmembers rely on the Extension Service which offers advice during visits to individual farmers.

Making sure that the proper types of fertilizer are available to farmers in the marketplace is a function of the marketing system. The success of marketing systems in performing this function varies considerably. In Kenya, for example, marketing organizations specify the particular quantity of each product that they would like to import (to meet their expected market demand). However, a government decisionmaking body determines the actual import allowance of each company, which may or may not agree with the company's product strategy. Mea, Ltd., a private firm in Nakuru, Kenya, is in a particularly precarious position regarding its product strategy. The company has invested in a soil-testing laboratory for analyzing fertilization needs of specific crops and a bulk-blending plant for tailoring fertilizer grades to meet individual farmer needs. Given its physical facilities and extensive technical and marketing expertise, Mea, Ltd., should be in an excellent position to fully develop its product strategy of tailoring fertilizer products to the specific needs of farmers. However, since Mea is not allowed a free hand at importing its raw material requirements, the blending facility is used only intermittently, thereby negating Mea's strategic advantage of being able to (1) focus its product strategy toward specific market segments and (2) fully utilize its facilities in product differentiation.

Indonesia is an example of a country where the product strategy is basically dictated by its fertilizer production system. Indonesia is fortunate to have vast reserves of natural gas and since the early 1960s has invested heavily in the production of urea to meet its nitrogen fertilizer requirements. The fertilizer marketing system is government controlled as are the production units. Therefore, urea, which is agronomically an excellent fertilizer for rice (the staple crop in Indonesia), is the dominant fertilizer product, leaving little decisionmaking relative to the product line. Further, because of the nature of the

Indonesian fertilizer market, virtually all of the fertilizer sold at the retail level is in bags, again leaving little room for product decisionmaking.

The fertilizer market in the United States offers a contrast to most fertilizer markets. It is an example of a market with a range of product forms and fertilizer grades. In 1988, U.S. farmers used 42.4 million tons of fertilizer. As indicated in Figure 3, three major fertilizer product classifications are used in the United States – bulk (52%), fluid (39%), and bagged (9%) of the total market. Bulk blends[1] usually account for about 50% of all dry bulk fertilizers used by U.S. farmers. The product strategy employed by fertilizer marketers in the United States is influenced by (1) the availability and use of soil testing facilities and cropping history information thus allowing tailoring of fertilizer products for specific crops, (2) an extensive infrastructure which permits handling of liquids and bulk shipments, (3) large, highly mechanized farms which encourage large quantity purchases of liquid and dry bulk materials and often custom application, (4) a marketing system which delivers required products to middlemen and/or farmers on a timely basis, and (5) the desire to carry a complete fertilizer product line to satisfy the varied needs of customers.

Often it is necessary to carry certain products in order to provide a full range of services to farmers or to meet the competition. It is much easier for the consumer to obtain all of his agricultural input needs from one source. If competing companies carry a full line of inputs, then you may be required to do the same; otherwise, a declining customer base will likely be the result. Of course, all decisions on the product mix require monitoring to ensure each product line is adding to the company's profitability or is critical to the company's overall product mix.

Product Cost Consideration

A key consideration in deciding upon which products to market is the cost per unit of nutrient. High-analysis products, such as urea and DAP, are in most countries replacing

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[1]A bulk blend is a physical mixture of solid fertilizer products (preferably of granular fertilizer products) usually on a custom basis to achieve a desired grade.

lower analysis products because of their generally lower price per unit of nutrient on a delivered cost basis. For example, today the cost of delivering a metric ton of bagged urea (46% N) to India is about $145. The cost of delivering a metric ton of bagged ammonium sulfate (21% N) to the same destination is about $100. Excluding the value of sulfur, the nutrient values contained in urea and ammonium sulfate are $0.31/kg of N and $0.48/kg of N, respectively. Clearly, urea is the lowest cost source of N, and its cost advantage is further magnified when in-country marketing costs are considered. However, rather than embarking on a policy of importing only high-analysis products, consideration should be given to the importance of the secondary nutrient (e.g., sulfur) requirements of crops.

Tangible Product Characteristics

Tangible product characteristics offer marketers an opportunity to fully develop their product strategy through decisions concerning branding, packaging, physical characteristics, and product quality.

Brand

A *brand* is a name, term, symbol, or design (or some combination of them) which is intended to identify the product with a marketing organization or to differentiate the product from those of competitors. The brand is usually indicated on the fertilizer bag; however, sometimes the product is merely advertised as a specific brand. For example, a fertilizer retailer may advertise various fertilizer grades by brand names such as "fast grow," "super grow," or "rapid grow." IMC's product, potassium magnesium sulfate, normally trades by its brand name "Sul-po-mag," whereas Western Ag-Minerals Company markets a competing brand known in the market as "K-Mag." Both products contain 22% K_2O, 11% Mg, and 22% sulfur.

The branding decision offers marketers several potential benefits, including the following:

- Indicates product quality and reliability.
- Makes it easier for marketers to process orders.
- Promotes development of a loyal customer base.
- Helps to segment the market; i.e., coffee fertilizers, home gardeners, cotton grade, etc.
- Helps to develop a corporate image.
- Makes the purchase decision easier for farmers.

While branding does offer several potential advantages, the brand name decision requires considerable study to ensure that appropriate brand names are selected. The brand name should:

- Suggest something about the product's benefits.
- Indicate product quality.
- Be distinctive and appealing to consumers.
- Be easy to pronounce, recognize, and remember.

Once selected, efforts should be made to protect the brand name through legal channels. If successful, the brand name may eventually become identified with the product category. This offers a company a unique advantage over competitors.

The changing marketing environment has created opportunities for new fertilizer products and, of course, potential threats to some existing products. For example, environmental concerns associated with nitrogen loss have contributed to more emphasis on research to increase the amount of nitrogen used by plants. In an effort to capitalize on this new marketing opportunity Agrico Chemical Company is now marketing a fertilizer solution with the brand name Super N, which includes dicyandiamide (DCD) which acts to stabilize nitrogen in the ammonium form which is less susceptible to loss. Agrico bases its promotion campaign on the product's ability to provide more complete nitrogen feeding with less nitrogen loss than straight UAN. Research trials conducted by various U.S. universities and other research centers are often quoted to substantiate the increased yields obtained by using Super N versus straight UAN, a 28-0-0 product without DCD. Super N is a nonpressure, 28% nitrogen solution which may include up to 4% sulfur (i.e., Super N plus S).

While increasing environmental concerns have created marketing opportunities in terms of expanded product lines, the market share of some existing products is being threatened. In the United States, direct application of ammonia has long been regarded as the cheapest method for applying nitrogen; its low cost has contributed to the fact that today anhydrous ammonia accounts for about 30% of the U.S. market. However, market intelligence sources indicate that farmers and fertilizer dealers are shifting to upgraded products such as nitrogen solutions which are more versatile, safer to handle, and are cheaper to transport and store. From the dealer's standpoint, costs associated with handling ammonia have increased sharply in recent years; subsequent price adjustments have rendered anhydrous ammonia less attractive for both buyers and sellers.

Packaging

In most developing countries, fertilizers are packaged in 50-kg bags. However, depending upon various market characteristics, different package (bag) sizes may be common in specific market segments. The main reasons for placing fertilizers in bags are as follows:

- To allow convenient purchase quantities for farmers.
- To facilitate storage, transport, and handling.
- To provide product protection.
- To provide information on the bag's contents.
- To serve as a means of sales promotion.
- To ensure a guaranteed unit weight.

It is apparent that the bag is an important part of the product strategy decision. The bag is normally printed with such technical information as the name of the fertilizer, the nutrient content (guaranteed analysis), the quantity of fertilizer, instructional information on proper use and handling practices, and the producer's name. Kemira Oy, the Finnish fertilizer producer, includes instructional information on the proper use of fertilizer on every bag produced for its markets in Finland and Sweden. The message is printed in both Finnish and Swedish on the back of the polyethylene bags. In Zambia, where all bags are of polypropylene, instructional information is included on a card attached to each bag of locally produced fertilizer.

Company logos and different bag colors are also used to differentiate products of various marketing organizations. On a recent visit to Nigeria, urea that had been sold to Zambia was being bagged in bags which were printed with the logo of that country's fertilizer marketing organization (NAMBOARD). In recent years USAID donor fertilizer (diammonium phosphate) for Kenya was imported in bulk and bagged in-country. Mea, Ltd., received the bagging contract and placed their logo on the bags even though the product was actually marketed by over 20 different marketing organizations. Thereby, enhancing Mea's image as a reputable supplier of high-quality fertilizers. This was a clever marketing strategy by Mea Ltd.

Packaging may also play a strategic role in fertilizer market development efforts. In many situations, the traditional 50-kg bag is viewed as being too burdensome for farmers to transport long distances and requires farmers to make too large a cash outlay when not fully convinced of the benefits of fertilizers. In such conditions smaller (25 kg) bags may be a more appropriate bag size. An even smaller sized bag (10 kg) has proven effective in selected market areas to hasten the fertilizer adoption process. In the Kissii area of Western Kenya, cropped areas are very small and the market for fertilizers has developed slowly. In an effort to tap this potential, marketing strategies included the offering of a 10-kg bag, a strategy which has proved successful.

Of course, small bags are not needed in, nor are they suitable for, all markets. For example, in Malawi there are two distinct market segments; one for smallholder farmers and the other for estate farmers. Because of the perceived need for small bags to encourage use in the smallholder segment, small bags emerged. However, the strategy was not properly planned and implemented, resulting in the emergence of six different bag sizes, from 5 kg to 50 kg in size. Not only has this excessive number of bags contributed to a tremendous administrative burden but also has caused logistical problems with channel members in areas comprised of large farmers receiving small bags and vice versa.

Product Form

The form in which fertilizer is marketed is usually dictated by farm size, the level of agricultural mechanization and infrastructure development in an area. As previously indicated, U.S. farmers rely on extensive use of heavy equipment to cultivate large areas. Fertilizer application is normally done with tractor-driven mechanical applicators or self-contained spreaders or applicators. Aerial application of fertilizers is also common in some areas, particularly in rice production and forestry crops. The U.S. agricultural sector is able to take advantage of cost efficiencies available through the use of high-analysis fertilizer materials including the direct application of anhydrous ammonia. Further, because of the extensive use of mechanical applicators, bulk and liquid fertilizers dominate the market. Today, only about 9% of all fertilizer sales are in bagged form. Conversely, in many countries, cropping of small land areas and the predominance of traditional agricultural practices necessitate that retail sales be primarily in the form of bagged fertilizers. Another factor which favors the sale of fertilizer in bags is that farmers with small cropping areas and limited financial resources are unable to afford purchases of more than 50-100 kg of fertilizer.

Product Quality

Product quality is a key to any successful product strategy. As marketers, it is critical to develop and maintain a reputation of marketing quality products. The principal quality features of dry fertilizer products are that they should be:

- Free flowing (uncaked).
- Uncontaminated.
- Of the weight stated on the bag.
- Of the guaranteed analysis (should be accurate).

Most manufacturers provide a guarantee of product quality for the fertilizers that they produce. For countries that import fertilizers, procurement contracts normally include an inspection clause that stipulates that an independent inspection agency will verify the cargo quantity and quality at the port of loading and/or port of discharge. Any deviation from the contracted quantity or quality is then properly documented to allow for the proper settlement of any claim. As marketers it is our responsibility to ensure that the fertilizer products remain in good quality condition through proper handling and storage until they reach the consumer. Improper handling and storage results in lost revenue through product losses and/or quality deterioration. Zambia offers an example of a country confronted with a long supply line where, due to excessive handling and improper storage and shipment practices, losses are estimated at 12% of annual throughput; this must be one of the world's highest loss rates. A sizable portion of the tonnage sold in the country is also of poor quality and is sold at about one-half of the official price. Hence, inattention to quality control is costing the marketing organization a considerable amount in terms of lost revenues.

Augmented Product

Technical Services

In order for farmers to obtain the maximum benefit from their investment in fertilizers, they must know when and how to apply the fertilizer to their crops. Generally, such information may be obtained from a number of sources (friends, community leaders, extension agents, etc.), but one of the most important sources, and the one duly obligated to provide the information because of his position in the marketing system, is the retailer. In a competitive market, if you ask a farmer what separates a top dealer from the others, "good service" is often the answer. Retailers should provide farmers technical services before, during, and after the sale of fertilizers (and other agricultural inputs). Further, farmers are more likely to make future purchases from retailers who are willing to provide accurate advice on efficient crop production practices. In order to fully utilize this all-important link with the farmer, efforts should be made to train dealers in the proper use of fertilizers. Routine dealer contacts with extension staff, regularly scheduled dealer meetings, and providing dealers with literature on appropriate fertilizer use are methods that can be used to ensure that retailers have an understanding of fertilizer use technology.

Credit

Farmers are businessmen. They invest in fertilizer to promote crop production and, ultimately, improved profits. Farmers, like businessmen, rarely have the working capital necessary to carry on their business operation. They generally have to secure credit with which to operate their enterprise.

Although the individual credit needs of most farmers are not high by industrial standards, they must nonetheless be able to borrow money to purchase the inputs needed in crop production. Your need and ability as marketers to provide credit to consumers will vary depending upon such factors as the availability of other credit sources, your financial resources, the needs of your target consumers, and of course government policies. Some of the more important criteria which should be considered in meeting the farmer's credit needs are as follows:

- Ease of access to credit facilities.
- Type of collateral required.
- Repayment terms (including interest rate).
- Bureaucracy involved in securing credit.

Providing farmers easy access to a reasonable level of credit is a service area relative to the product decision that can contribute to your organization's growth.

Fertilizer retailers also require credit to carry their fertilizer inventory. The more lenient the credit terms, the greater the likelihood that they will carry a complete product line, maintain inventories at their shop during the off season, and invest in market development activities. As marketers, we should recognize the benefits and opportunities associated with a well-founded credit system.

Product Life Cycle

Any discussion on product strategies would be incomplete without addressing the problems, opportunities, and strategies associated with the product life cycle. A product life cycle is the various phases through which a product moves from new product development to market growth to market maturity to sales decline and eventually phasing out the product (Figure 4). Each of these life-cycle phases has specific characteristics and the length of time a product remains in any phase may be affected by such factors as the nature of the product, changes in the marketing environment, success in new product research and development, and the success of marketing strategies to extend the life of a product. In the fertilizer market, product life cycles tend to be quite long and product obsolescence is not a major problem. It is apparent that the worldwide trend is toward higher analysis fertilizers. Many countries are also increasing their use of multinutrient fertilizer based upon bulk blending. Bulk blends tend to be popular in areas where soil testing yields exact nutrient requirements of crops and where the physical infrastructure and basic market characteristics favor the handling of fertilizers in bulk. Long established products such as ammonium sulfate have lost some of their market share because of the availability of more advanced technology capable of producing more concentrated fertilizers at a lower cost per metric ton mt of nutrient; not necessarily because they are agronomically inferior, although this may be the case in some areas. As mentioned previously, environmental concerns will impact the market for anhydrous ammonia.

As a product begins to move into the sales-decline phase of the product life cycle, a decision should be made on whether or not the product (a) is still a potentially profitable product, (b) is needed to maintain a complete product line to satisfy consumers, (c) offers new marketing opportunities because of changing market conditions, or (d) should be phased out. If the product is viewed as an asset, efforts should be made to identify target markets within which the product offers the greatest potential for success. A unique marketing strategy (to market the product as a speciality product or as a preferred bulk blend material because of its sulfur content, etc.) will likely be needed to enhance the product's viability.

Summary

Product is one of the four key variables in an organization's marketing mix. Although of no more or no lesser importance than the other Ps, the product provides farmers with the end value they want. Fertilizers improve crop yields and farmer profitability – this is what they are investing in when they purchase fertilizer. Any successful product strategy must evolve around the consumer's needs or wants.

As marketers, your ability to fully develop a product strategy will, to a large degree, be dependent upon the (1) government policy relative to the fertilizer sector, (2) cropping system in the market area, (3) efficiency of the research system in developing and disseminating fertilizer recommendations, (4) stage of fertilizer market development, (5) product line carried by competitors, and (6) degree of mechanization in the agriculture sector. Product cost on a unit of nutrient basis is a key factor in any product mix decision. The tangible product characteristics offer marketers an opportunity to (1) develop a loyal customer base, (2) project a favorable image of the company, (3) ensure product quality, (4) differentiate products, and (5) target their marketing efforts to specific market segments. The various phases in the product life cycle can be influenced through the development and implementation of an appropriate product strategy.

An organization's product strategy is critical to the firm's success. However, the product strategy must be viewed as an integral part of the company's overall marketing strategy. The product decisions must be consistent with the organization's goals and complement the other variables in the overall marketing mix.

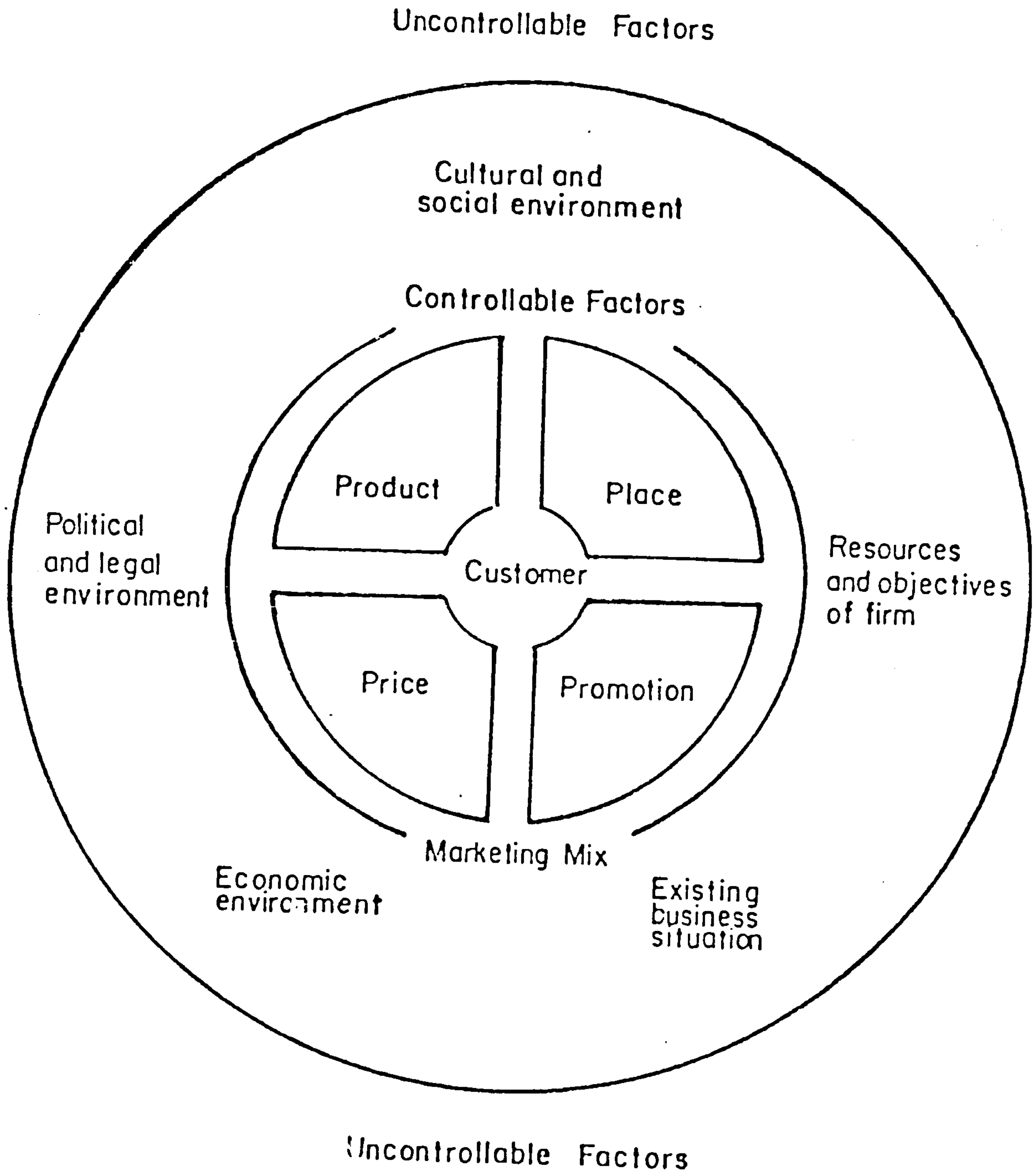

Uncontrollable Factors
Cultural and social environment
Controllable Factors
Product
Place
Customer
Price
Promotion
Political and legal environment
Resources and objectives of firm
Marketing Mix
Economic environment
Existing business situation
Uncontrollable Factors

Figure 2

Product Decision--A Three-Level View

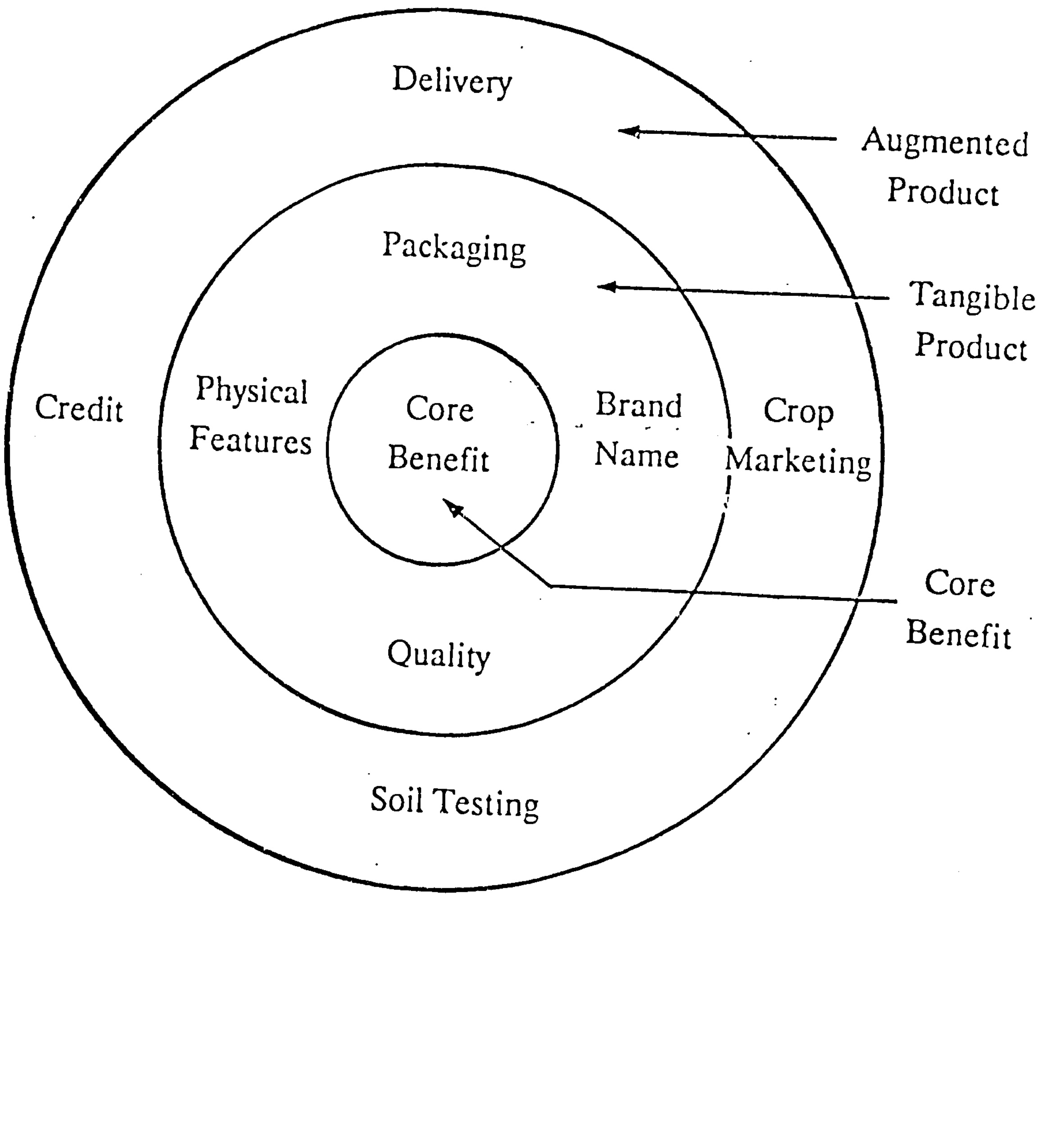
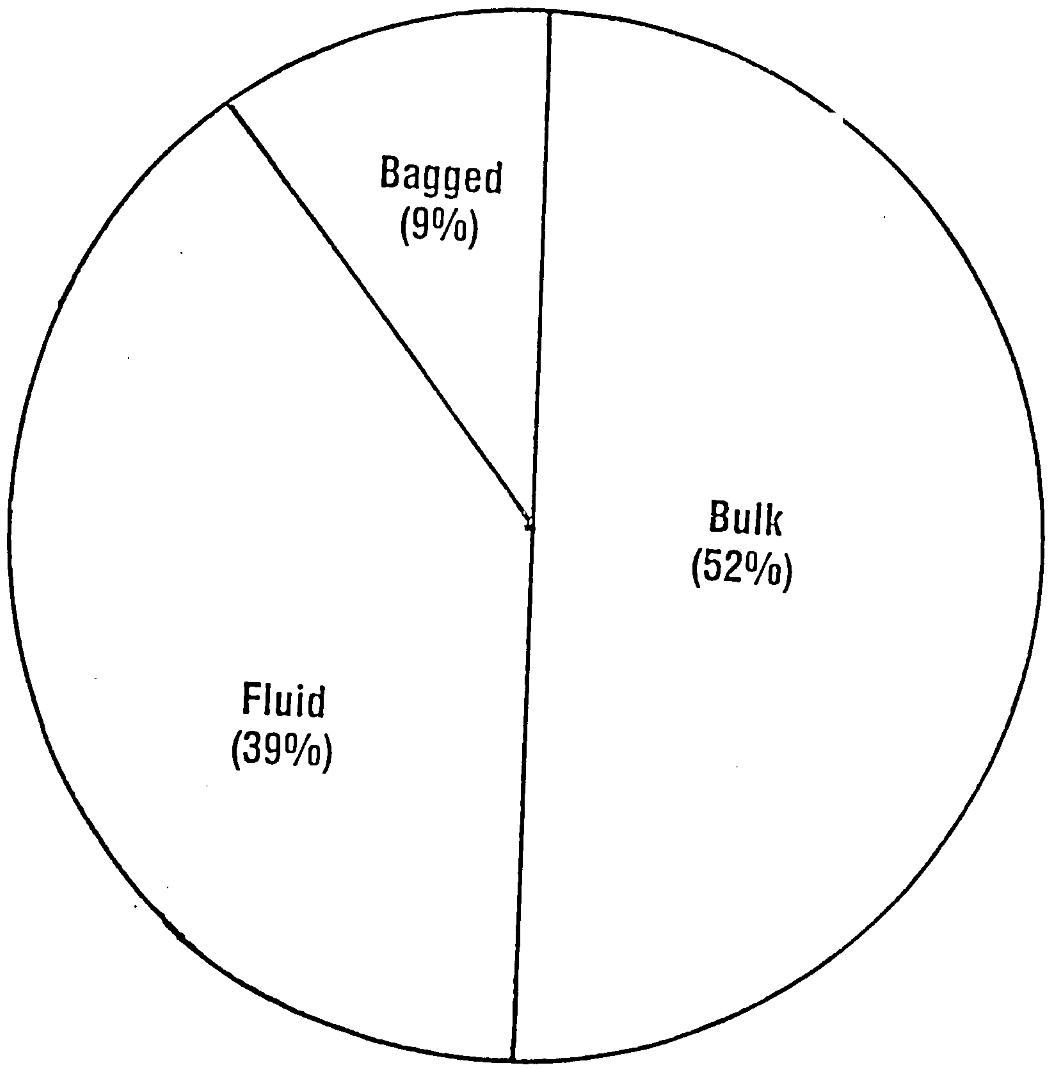


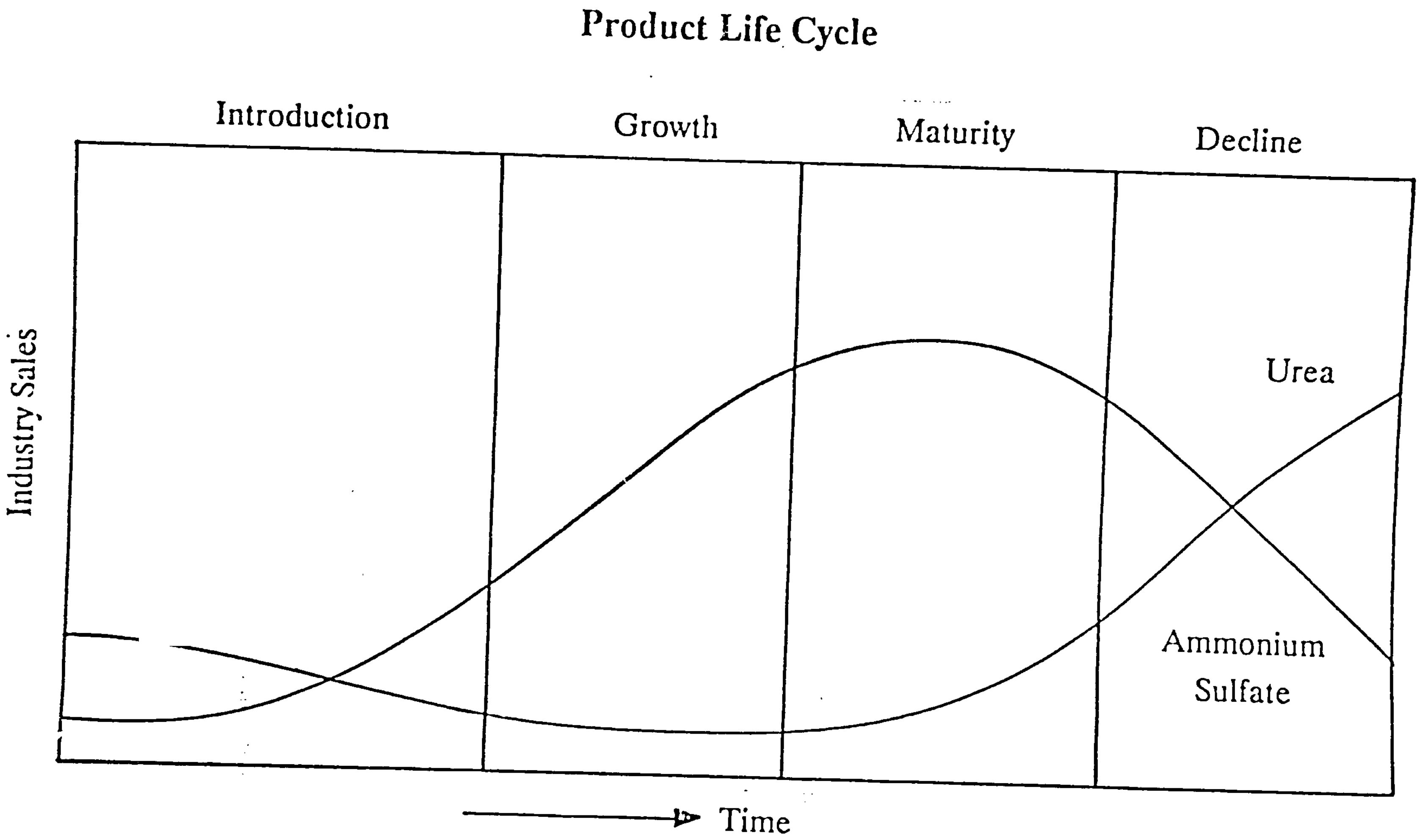
Figure 3.

Fertilizer Use by Product Classification in the United States.



Source: *Fertilizer Use by Class*, NFDC. 1988, Bulletin Y-208.

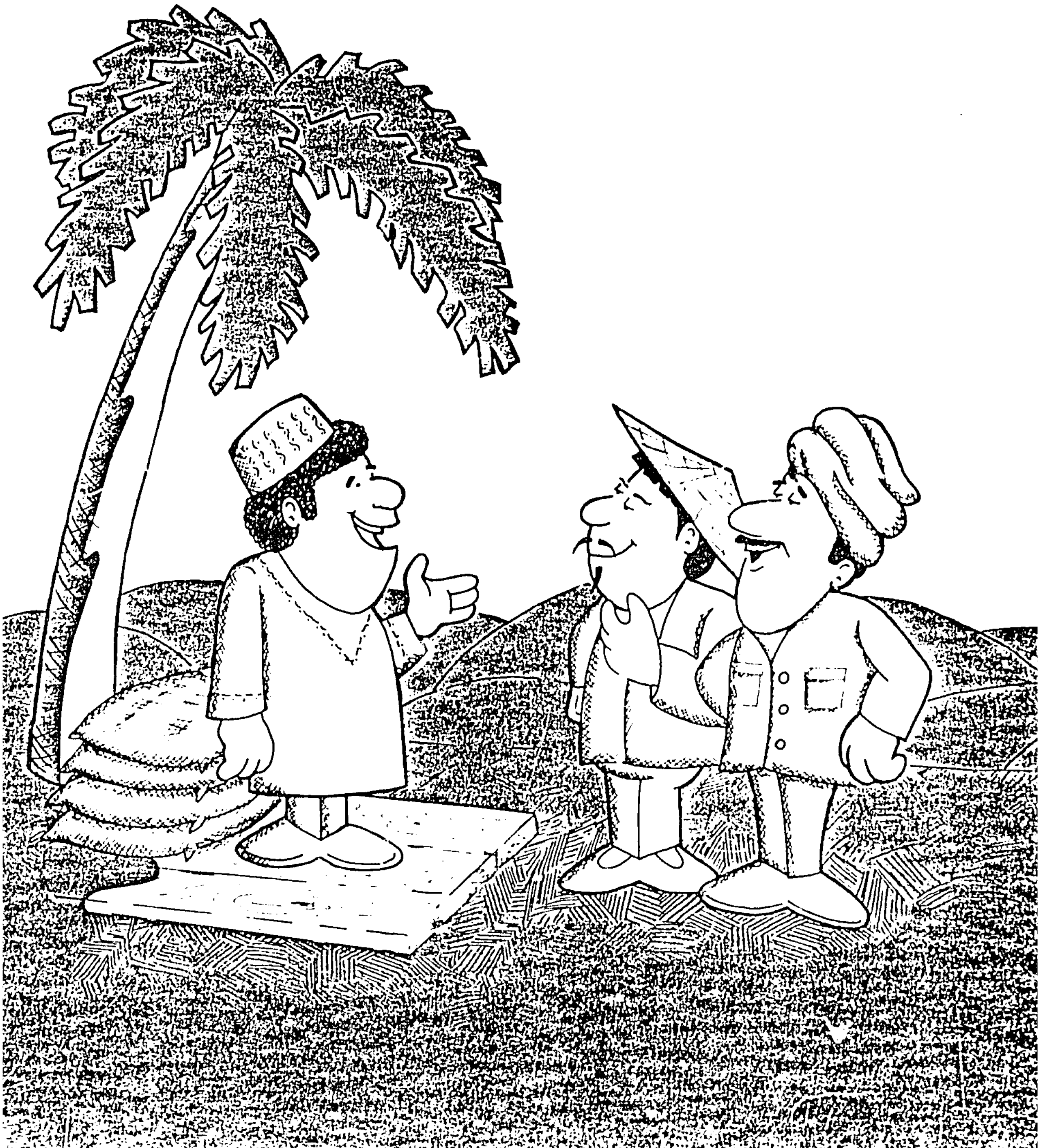
Figure 4


Product Life Cycle
Introduction
Growth
Maturity
Decline
Industry Sales
Urea
Ammonium Sulfate
Time

Appendix

A Seeding Program for Fertilizer Marketing

A Seeding Program for Fertilizer Marketing



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Introduction

Fertilizer marketing seeding programs have been used on a large scal in t e fertilizer industry since the early 1950s. Even today, after fertilizer seeding programs have been in use for some 35 years, there does not appear to be a standard understanding or definition of the term. Very often the following terms are used interchangeably: seeding program, pilot program, trial marketing, marketing startup, and test marketing. To some people a fertilizer marketing seeding program simply means the introduction of only a new fertilizer to farmers. A seeding program, however, is much more than this one activity. Seeding programs have proven to be highly successful in developing and developed countries alike when they have been properly designed and implemented. They have also failed when inadequately defined and planned. To be effective, fertilizer marketing seeding programs must be tailored to accomplish specific goals.

Definition

A fertilizer marketing seeding program can be defined as a planned marketing activity designed to introduce a new product, technology, procedure, or a combination of these on a limited basis into a market. The information gathered while the seeding program is being conducted can be used to gain experience or knowledge, adjust concepts, and refine operational procedures prior to a full-scale marketing operation. A seeding program involves a period of trial before the initiation of a full-scale marketing effort. Proven concepts are tested in a new and previously untried area. Fertilizer seeding programs are usually carried out 1 to 3 years prior to the startup of a fertilizer factory or prior to the time when a full-scale marketing effort will be required. When a seeding program is conducted, concepts are tested and new experiences are gained.

The limitations of a seeding program can be determined on the basis of geography and product quantity. The geographic limitation refers to the physical geography or specific area where the program will be carried out. The area may be a village or series of villages, a district, a state, a country, or some other area. The area selected for the seeding program should be representative of the fertilizer market to be covered at a later date. If the area selected is not a representative sample, the data collected can be misleading to those who formulate future marketing policy and management procedures. The area selected should be large enough to render valid information and yet small enough to be finely tuned with management to eliminate as many possibilities for error as is practical. Since a seeding program is a learning experience, care should be taken to select an area that is manageable from all aspects. The quantity limitation refers to the amount of product that will be offered for sale or disbursed in a seeding program. The quantity could be a small percentage—10% to 50%—of the quantity to be sold in a full-scale marketing program.

Test Marketing

A fertilizer seeding program should not be confused with premarket testing of a product. Premarket testing of a product includes such basic research activities as determining the agronomic suitability, the "shelf life" or long-term quality of a product, its performance under field conditions, and the economics of use. A product that will not perform in the field should not be marketed. Only when favorable results can be predicted is the product ready to be included in a seeding program. Premarket testing should precede the seeding program.

The product will continue to be refined as long as it is on the market. It is impossible to pretest a fertilizer product under all soil and ecological conditions before it is placed on the market. Information on means of improving the product, farmer acceptance, and how to best use the product will continue to accumulate especially during the seeding program and also during the routine marketing phase.

Goals

A fertilizer seeding program is a series of activities designed to accomplish one or more of the following goals:

1. Introduce to the farmers a fertilizer product that they are not accustomed to using. This can be a new and improved fertilizer, or it can be an old product that is new to the farmers. This activity may include creating brand identity and loyalty.
2. Introduce a new technology to farmers. The new technology may include the following:
   a. A new method of using fertilizer, proper placement, foliar application, time of application, etc.
   b. New farming practices associated with the use of the fertilizer, such as a package of practices, interplanting, new high-yielding varieties of seed, or population per hectare.
3. Test a new marketing system or some component of the system, including the agronomy program, retail-dealer concept, warehousing, transportation, credit scheme, sales promotion, and training requirements. Information gathered during the seeding program can be used to modify and improve the product, use technology, or marketing procedures.
4. Determine the constraints to fertilizer use and design a component of the fertilizer marketing system to overcome the constraints; these include agronomic, educational, cultural, political, economic, and government support policy constraints.
5. Determine the institutional support required or that which can be expected to support an effective fertilizer marketing system, such as extension service, bank credit programs, irrigation schemes, government policy, and crop produce markets, and appropriate school curricula for fertilizer marketing management.

Plan

The plan for a seeding program is a miniplan, an exact model of a larger fertilizer marketing plan. The plan maps a course of action to lead the marketing organization to its goal, with checkpoints along the route to determine performance. A seeding program plan is analogous to a full-scale fertilizer marketing plan in the same way that a small watch is analogous to a large watch. The small watch has all the parts of a large watch; the difference is the size. The marketing system used in a seeding program will have all the component parts of a system used in a larger marketing effort. The parts may be smaller and of a somewhat temporary nature rather than constructed for long-term performance. Yet all of the component parts of a marketing system must be used to provide a true test of the system that will be used in the larger marketing effort. The marketing system used in the seeding program should be designed to sell the farmers the benefits of fertilization and practices and not just bags of fertilizer. The benefits of fertilization are dependent upon the other crop production practices used by the farmer. A full-scale marketing system will provide education in product use. Many times in the initial stages of a seeding program, however, the educational aspects of product use are omitted with the expectation that they will be added in due time. When this happens, the seeding program results can be misleading. The seeding program must have all of the same components and be implemented with the same vigor as the larger marketing program if comparative results are to be obtained.

The fertilizer marketing plan for the seeding program and the larger marketing effort should have eight component parts or individual plans. These components are as follows:[1]

1. Product and supply plan.
2. Sales plan.
3. Agronomic plan.
4. Advertising and sales promotion plan.
5. Market research plan.
6. Distribution plan.
7. Price plan.
8. Personnel development plan.

Each individual plan will have stated quantitative objectives and assigned activities for accomplishing them. Fertilizer marketing embraces all business activities involved in the flow of the product and services from producer to farmer, including the elements of forecasting, determining the need for and nature of the product, providing place utility, product pricing, and promotion. The 4 P's in fertilizer marketing--*product, price, place* (distribution), and *promotion* (education)—are contained in the seeding program plan. The use of each P must be balanced in such a way that the overall marketing objective can be reached in the most efficient manner possible. Continuous adjustments should be made throughout the seeding program so that by the end of the program the best mix of the 4 P's will be obtained.

Planning and Phasing

It is difficult to present a detailed plan and specific phasing periods for a fertilizer marketing seeding program that can be used as a prototype. Plans vary to reflect methods for accomplishing different program objectives. For example, plans for introducing a new product in an old established marketing system would be considerably different from those of a new marketing system introducing its first products. Figure 1 indicates the major activities that are to be considered in planning a hypothetical fertilizer marketing seeding program and the phasing of these activities during year 1. Many of the activities would continue into year 2 and for the duration of the seeding program. Activities by years would include the following:

> **Year 1**—Figure 1—Determining objective, selecting area, planning activities, selecting and training staff, arranging products, determining pricing policy, preparing budget, preparing monitoring procedures, and obtaining equipment.
>
> **Year 2**—Monitoring program, redefining operational procedures, retraining and redeploying personnel, ordering products and equipment for the next period, making necessary adjustment and expansion in program.
>
> **Year 3**—Continuing monitoring process, continuing personnel selection and training, appraising program results, planning and carrying out required adjustments in programs, planning for expansion to cover entire market, and ordering necessary products and equipment for next phase.

In examining the outline given in Figure 1, it is important to know the scenario used to determine the activities and phasing periods. In this example, the following conditions were assumed.

1. The country is Alpha. Fertilizer distribution has been handled by the extension service.
2. A detailed fertilizer marketing plan has not been developed.
3. There is no fertilizer production in Alpha.
4. Low-analysis fertilizers have been imported and used for years. Popular fertilizers are single superphosphate (SSP), ammonium sulfate (AS), calcium ammonium nitrate (CAN), and complete fertilizers 10-10-10 and 5-10-10.
5. Seeding program objectives are as follows:
   a. To introduce diammonium phosphate (DAP) in Alpha.
   b. To replace SSP with DAP.
   c. To sell 20,000 tons of DAP by year 3.
   d. To implement the seeding program in four representative market areas.
   e. To determine capability and economics of importing in bulk and bagging in country.

The example in Figure 1 will provide some guidelines and a check on the many activities that must be adequately planned for a successful seeding program.

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1. IFDC covers each component plan in detail in its Fertilizer Marketing Management Training Program. Contact IFDC for details.

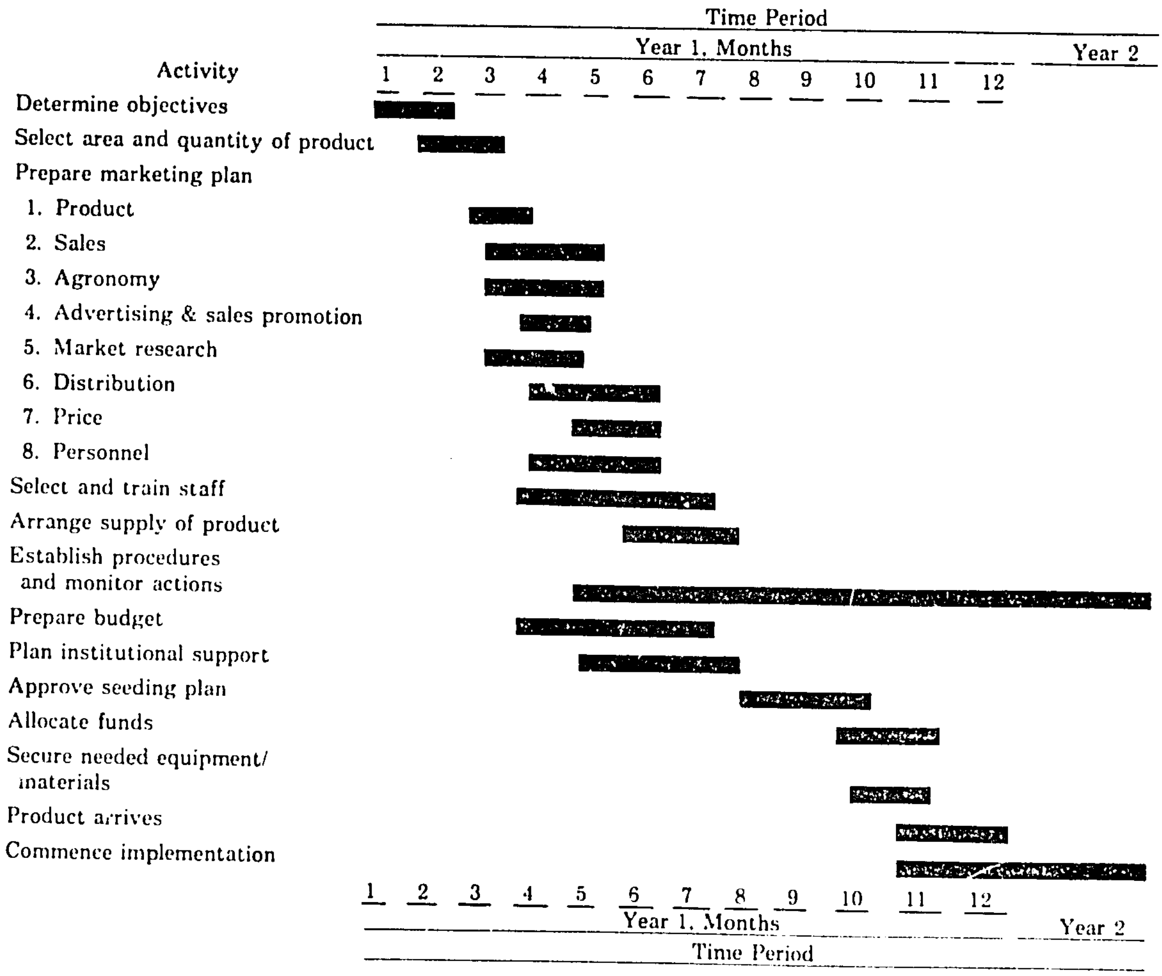


Figure 1. Planning and Phasing Major Activities in a Fertilizer Marketing Seeding Program.

Precautions

There are a number of ways in which a seeding program can go wrong or fail. Failures can often be traced to one or more of the following:

1. Marketing seeding program objectives are not clearly defined, do not have management approval and support, or are not realistic and in keeping with the organization's objectives.
2. The program is started before plans are made, recorded, and understood and essential activities and items are arranged.
3. Promised essential institutional and government support does not come through, especially extension, subsidies, crop produce markets, irrigation, essential inputs, and complementary programs.
4. The seeding program becomes an end within itself and not a portion of a larger marketing plan.
5. Ample time is not allowed for desired results to be developed and adopted.
6. Preparations for measuring results of all components and documentation for adjusting the larger marketing plan are not made.
7. Staff selection, training, and deployment are not completed on time.
8. Although budgets have been approved, there is often delay in receiving transportation and funds.
9. After the initial supply of the key product and other essential complementary inputs is made available, a shortage at a later stage may reduce the effectiveness of the seeding program.
10. Monitoring and measurement at critical stages and feedback to management for necessary adjustments are not made on a timely basis.
11. Communications on objectives, activities, and results limit operations and performance.
12. Staff motivation and desire are limited. A seeding program requires extra work and dedication for success.

Program Management

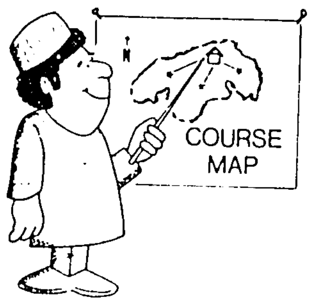
The manager of the seeding program must ensure its success. There should be no room for mistakes and errors. The seeding program should be designed to overcome all forseeable problems. Since the seeding program provides a learning situation, it should include full details so that "how" to handle the full-scale marketing program can be understood. Before the program commences, the manager should doublecheck to ensure that certain necessary tasks have been completed. The checklist includes the following:

1. Be sure that the marketing objective is clearly defined and compatible with that for the full-scale marketing program. The objective must be meaningful and quantifiable within a specific time period.
2. Determine the goals that the seeding program is to accomplish and be sure the program is designed to give these results.
3. Determine the quantity of product for the geographical areas covered by the seeding program.
4. If the seeding program is to be limited by quantity, determine exact amounts by products.
5. Arrange for the fertilizer and technology that will be introduced to be available when needed.
6. Select, train, and assign seeding program staff and establish their limits of authority and responsibility.
7. Determine dealer criteria and make selections.
8. Complete arrangements for all educational and promotional activities and material required and establish timetable for receiving and using.
9. Ensure the availability of product, budget approval, and availability of funds.
10. Finalize such items as product prices, dealer commissions, and incentive programs.
11. Prearrange procedures for monitoring and measuring program results.
12. Arrange for documentation of findings.

Management will have checks and balances built into the seeding program in the form of job descriptions for each individual. Goals will be set for each individual by time periods. For example, each field representative will be responsible for certain activities, for selecting a specific number of dealers, for selling a certain quantity of product, etc. Management will keep a close watch on performance and take the necessary actions to keep the seeding program on schedule.

Method of Management

The same method of management should be used for both the seeding program and the larger marketing effort. If a centralized method of management is to be used in the larger marketing plan, it would be unwise to use a decentralized method in the seeding program. Here again the results might not reflect those that could be achieved through another style of management.



Application

It is often thought that fertilizer seeding programs should only be used in countries that are developing their agriculture sector. Countries never finish developing their agriculture; therefore, the need for the introduction of new fertilizers and new fertilizer-related technology continues. Fertilizer seeding programs can be used in all stages of agricultural development and for the introduction of both low and high technology. Seeding programs must be designed for country- and site-specific conditions. Figure 2 indicates the stages of fertilizer use development by countries. A seeding program designed for use in a country where fertilizer use is just developing would not have the same objectives as one designed for a country where fertilizer use is highly developed. For example, a seeding program in Afghanistan or one of the countries where fertilizer use is being introduced could include high-analysis NPK fertilizers or urea in a market dominated by ammonium sulfate. In Japan or a country where fertilizer use is highly developed, a seeding program objective might be to introduce fertilizer supergranules or liquid fertilizers containing herbicides.

Successful Programs

Many examples of successful fertilizer seeding programs could be cited to indicate their benefits in developing an effective and efficient marketing system. Highly successful programs have been carried out by organizations in Costa Rica, Colombia, Venezuela, Philippines, Pakistan, United States, Canada, India, and many other countries.

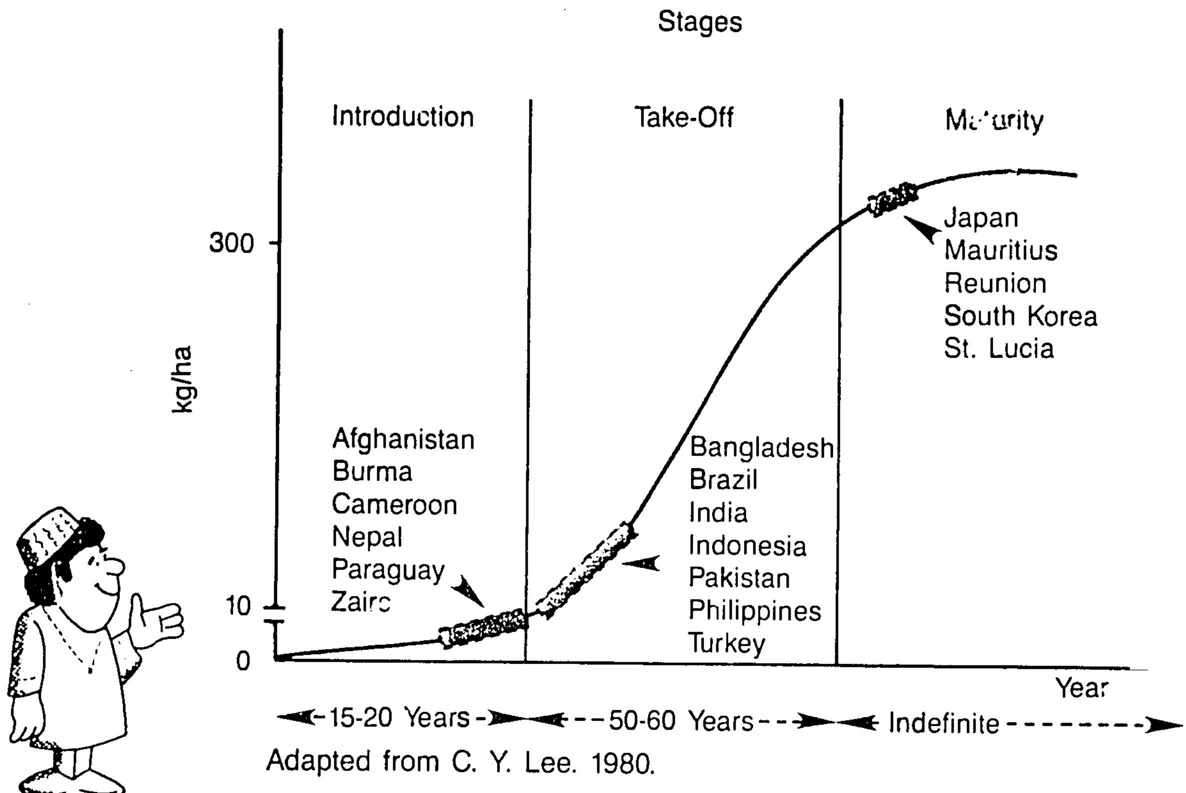
The Indian Farmers Fertiliser Cooperative, Ltd. (IFFCO) carried out an exceptionally effective fertilizer seeding program in the early 1970s. IFFCO, a consortium of some 30,000 Indian agricultural cooperatives, raised share capital to construct fertilizer plants in the State of Gujarat at Kandla and Kalol to produce 400,000 tons of urea and 400,000 tons of three high-analysis NPK grades. Grade I was 10-26-26, grade II was 12-32-16, and grade III was 14-36-12.

At that time urea and the high-analysis NPK fertilizers were new and not generally known by the Indian farmers. IFFCO decided that a fertilizer seeding program was needed. Objectives stated for their seeding program were the following:

1. To create a ready market for IFFCO products.
2. To establish brand identity.
3. To plan and develop an economical marketing system.
4. To help develop the cooperative distribution system.
5. To help in training the sales-point personnel in salesmanship, services, and sound management practices.
6. To develop an educational program designed to help farmers improve management practices and raise farm productivity.
7. To provide sound agronomy-extension experience for the IFFCO staff.

The fertilizer seeding program was included in IFFCO's detailed marketing plan. Staff members were hired and trained before the start of the program. The seeding program was started in 43 selected districts in 10 states. The first Rabi season (fall—wheat season) was used as a startup period for IFFCO's seeding program, and only 24,730 tons of NPK and urea fertilizers was imported and marketed through the system. Fertilizer was imported in bulk and bagged in the ports of Bombay, Kandla, and Madras. Small quantities came in through the ports of Tuticorin and Vizag. During the first full year of the seeding program, 83,384 tons of fertilizer was imported and marketed by IFFCO. In the second year, 265,000 tons was imported and marketed. In the third and final year of the seeding program before the plants came on stream, IFFCO imported and marketed 400,000 tons of NPK and 400,000 tons of urea.

When the IFFCO plants came on stream, the fertilizer marketing system was in place. It had been tested and reorganized and had already marketed as many tons as the new factories would produce. The communications network had been established. Unit trains had been organized and run. Over 1,500 fertilizer demonstrations and 500 field days had been successfully carried out. Over 2,000 farmer meetings had been organized and conducted by the agronomists and field representatives. Almost all its staff members had been selected and trained to do their jobs. The seeding program allowed IFFCO to have a successful beginning. In the 1982/83 fertilizer season ending June 30, 1983, IFFCO produced and sold 773,000 tons of urea and 683,000 tons of NPK/DAP fertilizers. The seeding program provided IFFCO an opportunity to learn how to do a first-class marketing job, and it continues to grow.



Adapted from C. Y. Lee. 1980.

Figure 2. Stages of Development of Fertilizer Use in Selected Countries.

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Fertilizer Products and Product Decisions

by

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Fertilizer Products and Product Decisions

In general, fertilizers are materials applied to the soil which provide plant nutrients necessary for plant growth for increasing production of food and industrial crops. They are usually classified into organic or inorganic, natural or synthetic, or solid or liquid. In this presentation the discussion on fertilizer products will be confined to solid, inorganic, and manufactured fertilizer products.

Plant Nutrient in Fertilizers

Sixteen elements have been identified as essential to plant growth. Thirteen elements must be present in the soil or supplied by the application of fertilizers, in addition to hydrogen, oxygen, and carbon from the air and water. The thirteen elements are classified as shown in Table 1.

Other materials, such as lime, gypsum, and organic matter which are not classed as nutrients also play an important role in soil chemistry and crop production. The primary nutrients (N, P, and K) are required in the greatest quantities and generally are used as the basis for description and classification of commercial fertilizers. Secondary nutrients are required in relatively large amounts but in smaller quantities than the primary nutrients. The seven micronutrients, or trace elements, are essential for plant growth but in much smaller amounts. Other elements that are not involved in plant nutrition are essential for animal health and are sometimes added to fertilizer to benefit the health of grazing animals when the soil is deficient in that element. One example is selenium, which is added to some fertilizers in New Zealand.

Fertilizer Raw Materials and Intermediates

Raw materials are those which are used in the manufacture of other fertilizer materials. Nature supplies the raw materials for fertilizers. In the manufacture of commercial fertilizer the three primary nutrients require the following basic raw materials.

Nitrogen (N)

Atmospheric nitrogen, combined with the hydrogen from fossil fuels such as natural gas, oil, naptha, or coal, is the basic raw material for the production of nitrogen fertilizers. These are used to produce anhydrous ammonia, the basic nitrogen fertilizer material that can be (1) applied directly as a finished fertilizer, (2) used as an intermediate to make other fertilizers, or (3) used as a raw material to produce intermediates such as nitric acid.

Table 1. Classification of Plant Nutrients

Classification	Element	Symbol
Primary nutrients	Nitrogen	N
	Phosphorus	P
	Potassium	K
Secondary nutrients	Calcium	Ca
	Magnesium	Mg
	Sulfur	S
Micronutrients	Boron	B
	Chlorine	Cl
	Copper	Cu
	Iron	Fe
	Manganese	Mn
	Molybdenum	Mo
	Zinc	Zn

Source: Frederick, M. T., and N. D. Le. 1987. "Fertilizer Products and Specifications," Training Program in Fertilizer Distribution and Handling, Europe, June 8-26.

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Phosphorus (P)

The starting point for phosphate fertilizers is phosphate rock, a calcium phosphate ore found in limited deposits. The reaction of sulfuric acid (produced from sulfur) with phosphate rock produces single superphosphate (SSP) with a nutrient value of 18%-22% P_2O_5 and about 12% S. To produce phosphoric acid, as an intermediate, phosphate rock is slurried with sulfuric acid.

Potassium (K)

Potassium, usually called muriate of potash (MOP, about 60% K_2O) or sulfate of potash (SOP, about 50% K_2O) also comes from mineral ore deposits. In contrast to phosphate rock, potash ore does not require extensive processing and can be used directly as potassium chloride fertilizer. Extensive processing is, however, necessary to remove impurities such as common salt.

The cheapest and most common form is potassium chloride. Some crops require potassium sulfate which is usually produced from potassium chloride by chemical processes. The sulfate form is about twice as expensive per product ton as potassium chloride.

Figure 1 is a flow diagram of principal fertilizers. This diagram represents the relationship between different raw materials, intermediates, and finished products. Typical raw material requirements for the production of fertilizers are given in Table 2.

Fertilizer Materials and Mixtures

Ammonia, nitric acid, sulfuric acid, superphosphates, phosphoric acid, and potassium chloride are the building blocks of the fertilizer industry. These basic materials allow the production of various formulations to suit specific agronomic and crop requirements.

Basic fertilizer materials may contain one or two of the primary nutrients. For example, the material may be anhydrous ammonia, containing nitrogen or diammonium phosphate, containing both nitrogen and phosphorus. Mixed fertilizers are mixtures of two or more fertilizer materials, either by merely *physically* mixing materials, for example, diammonium phosphate, urea, and MOP, together called blended fertilizers. By reacting acids (phosphoric, sulfuric, or nitric) with ammonia or nitrogen solutions and potash, a *chemical* reaction is involved and the resulting products are *granulated* fertilizers.

A listing of fertilizer materials is given in Table 3.

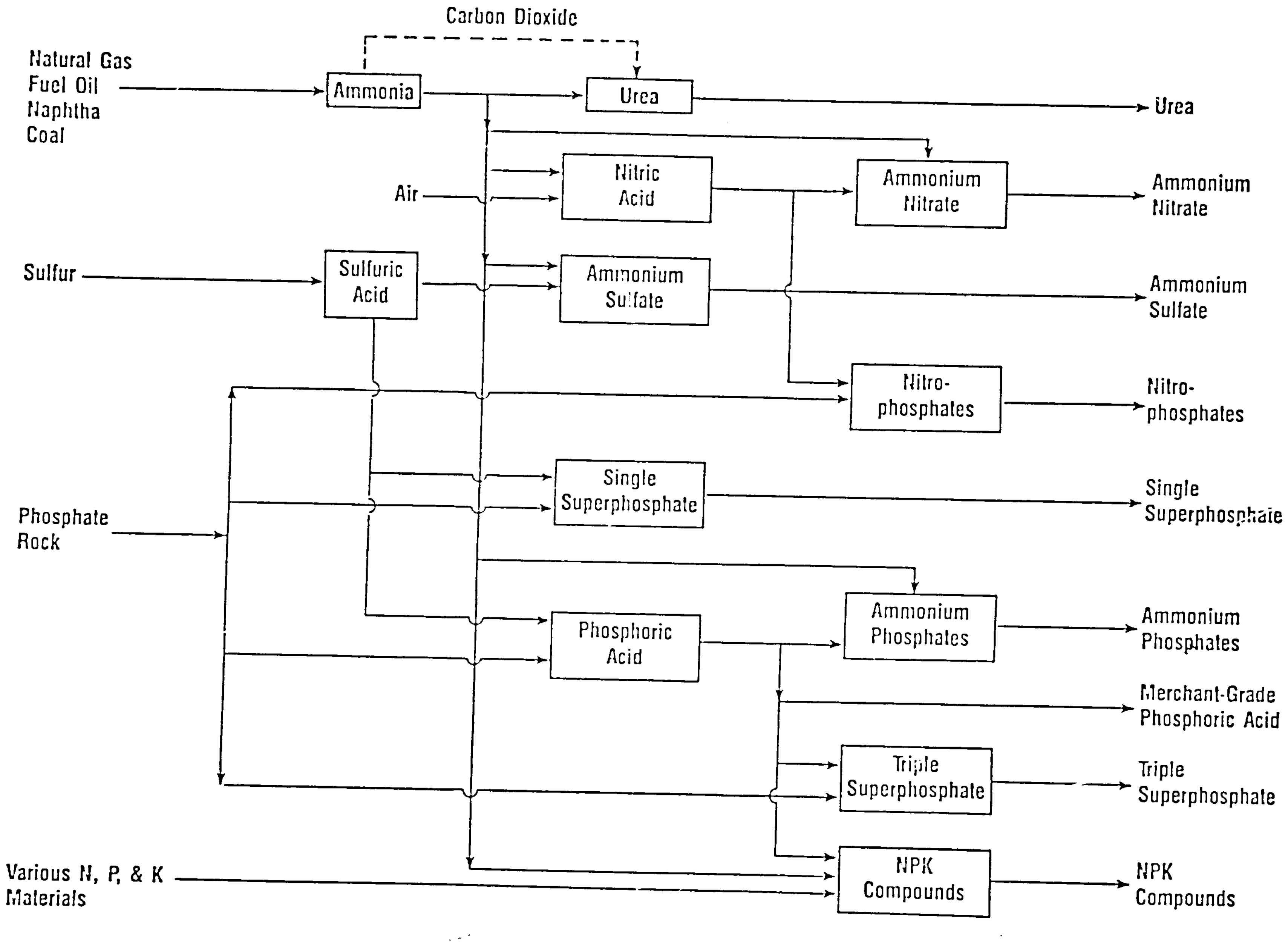

Figure 1. Flow Diagram of Principal Fertilizers.

Table 2. Typical Raw Material Requirements for Fertilizer Production

Product	Raw Material or Intermediate	Typical Requirement[a] (mt[b]/mt product)
Intermediate Products		
Ammonia (NH_3)	Natural gas	860 m^3 [c]
Sulfuric acid (H_2SO_4)[d]	Sulfur	0.34
Phosphoric acid (H_3PO_4)[e]	Phosphate rock	3.4
	Sulfuric acid[d]	2.8
Nitric acid (HNO_3)[d]	Ammonia	0.29
Finished Products		
Ammonium nitrate (NH_4NO_3)	Ammonia	0.21
	Nitric acid[d]	0.77
Ammonium sulfate [$(NH_4)_2SO_4$]	Ammonia	0.27
	Sulfuric acid[d]	0.78
Diammonium phosphate (DAP)	Phosphoric acid[e]	0.47
	Ammonia	0.23
Monoammonium phosphate (MAP)	Phosphoric acid[e]	0.54
	Ammonia	0.15
Single superphosphate (SSP)	Phosphate rock	0.64
	Sulfuric acid[d]	0.47
Triple superphosphate (TSP)	Phosphate rock	0.40
	Phosphoric acid[e]	0.35
Urea [$CO(NH_2)_2$]	Ammonia	0.58
	Carbon dioxide	0.77

a. Requirements can vary considerably depending on raw materials quality and plant design. Values presented are indicative.
b. Metric tons (mt), except as noted.
c. Does not include natural gas used as fuel.
d. On basis of 100% acid.
e. On basis of mt P_2O_5.

Source: Frederick, M. T., and N. D. Le. 1987. "Fertilizer Products and Specifications," Training Program in Fertilizer Distribution and Handling, Europe, June 8-26.

Table 3. Listing of Fertilizer Materials

Product	Acronym[a]	Chemical Symbol	Typical Nutrient Content	
			Nutrient	Wt %
Ammonia, anhydrous	-	NH_3	N	82
Ammonia, aqua[b]	-	NH_4OH	N	20-25
Ammonium chloride	AC	NH_4Cl	N	25-26
Ammonium nitrate	AN	NH_4NO_3	N	34
Ammonium phosphates				
Monoammonium	MAP	$NH_4H_2PO_4$	N	10-12
			P_2O_5	45-55
Diammonium	DAP	$(NH_4)_2HPO_4$	N	18
			P_2O_5	46
Ammonium polyphosphate	APP	[c]	N	[c]
			P_2O_5	[c]
Ammonium sulfate	AS	$(NH_4)_2SO_4$	N	20-21
Ammoniated superphosphate	-	[d]	N	[d]
			P_2O_5	[d]
Basic slag	-	[e]	P_2O_5	10-20
Calcium ammonium nitrate	CAN	[f]	N	20-30
Calcium cyanamide	-	$CaCN_2$	N	20-21
Calcium nitrate	-	$Ca(NO_3)_2$	N	15
Calcium phosphates	-	[g]	P_2O_5	[g]
Fused phosphates	-	[h]	P_2O_5	[h]
Nitrophosphates	-	[i]	N	[i]
			P_2O_5	[i]
Potassium chloride	MOP[j]	KCl	K_2O	60
Potassium nitrate		KNO_3	N	13
			K_2O	44
Potassium phosphates	-	[k]	P_2O_5	[k]
			K_2O	[k]
Potassium sulfate	SOP[l]	K_2SO_4	K_2O	50
Sodium nitrate	-	$NaNO_3$	N	16

(Continued)

Table 3. Listing of Fertilizer Materials (Continued)

Product	Acronym[a]	Chemical Symbol	Typical Nutrient Content	
			Nutrient	Wt %
Superphosphate				
Single (normal)	SSP	$Ca(H_2PO_4)_2 \cdot H_2O$[m]	P_2O_5	18-22
Triple	TSP	$Ca(H_2PO_4)_2 \cdot H_2O$	P_2O_5	46
Urea	-	$CO(NH_2)_2$	N	45-46
Urea ammonium phosphate	UAP	[n]	N	[n]
			P_2O_5	[n]

a. If applicable.
b. Chemical name is ammonium hydroxide.
c. Triammonium pyrophosphate [$(NH_4)_3HP_2O_7$]; pentaammonium tripolyphosphate [$(NH_4)_5P_3O_{10}$]; common APP solution grades are 10-34-0 and 11-37-0. Solid APP grade is 11-55-0.
d. Products made by reacting ammonia with superphosphates (SSP/TSP). Composition and nutrient content varies with degree of ammoniation.
e. Byproduct of steel production. Phosphate is calcium phosphates, mainly, tetracalcium phosphate ($4CaO \cdot P_2O_5$).
f. Mixture of ammonium nitrate (NH_4NO_3) and limestone ($CaCO_3$).
g. Monocalcium phosphate [$Ca(H_2PO_4)_2$] – main phosphatic material in SSP/TSP. Dicalcium phosphate [$CaHPO_4$] – 41%-52% P_2O_5.
h. Fused calcium-magnesium phosphate – 20% P_2O_5. Fused tricalcium phosphate [$Ca_3(PO_4)_2$].
i. Mixture of dicalcium phosphate ($CaHPO_4$), monoammonium phosphate ($NH_4H_2PO_4$), and ammonium nitrate (NH_4NO_3). Common grades are 20-30-0, 15-15-0, 20-20-0, 20-10-0, and 28-14-0. Also called nitric phosphates.
j. MOP – muriate of potash.
k. Monopotassium phosphate (KH_2PO_4): 0-52-35.
Dipotassium phosphate (K_2HPO_4): 0-40-54.
Tetrapotassium phosphate ($K_4P_2O_7$): 0-43-57.
Potassium metaphosphate (KPO_3): 0-60-40.
l. SOP – sulfate of potash.
m. Plus calcium sulfate ($CaSO_4$).
n. Mixture of urea and ammonium phosphates. Some grades are 34-17-0, 33-20-0, and 29-29-0.

Source: Frederick, M. T., and N. D. Le. 1987. "Fertilizer Products and Specifications," Training Program in Fertilizer Distribution and Handling, Europe, June 8-26.

Fertilizer Description and Classification

Fertilizer Grade

The grade is the guaranteed analysis in weight percentage of available primary nutrients in the fertilizer. The analysis is expressed in percent by weight of the three primary plant nutrients as a set of three numbers in the order N:P:K. These nutrients are always expressed in the same order.

Traditionally, the numerals represent total nitrogen as N, available phosphate as P_2O_5, and soluble potassium as K_2O. A 50-kg fertilizer bag labeled 15-15-15 or triple 15 contains 15% nitrogen (N), 15% phosphorus (as P_2O_5), and 15% potassium (as K_2O) or 7.5 kg N, 7.5 kg P_2O_5, and 7.5 kg K_2O of fertilizer nutrient. If a nutrient is not present it is represented by zero, so DAP with 18% N and 46% P_2O_5 is 18:46:0. TSP with 46% P_2O_5 is 0:46:0. Potassium chloride with 60% K_2O is 0:0:60. The guaranteed analysis of weight percentages is used to determine the quantity of fertilizer material per hectare needed to supply the nutrient requirements of a particular crop.

Where secondary nutrients and micronutrients are present in the fertilizer grade, their concentration is included in the fourth and fifth number, as necessary. For example, 15-15-15-5S-1B fertilizer grade would contain 15% N, 15% P_2O_5, 15% K_2O, 5% sulfur, and 1% boron.

Various fertilizer grades are produced with different ratios of the primary nutrients to meet the requirements of various crops. When possible the grades are formulated to give the highest nutrient concentration possible using the lowest cost available raw materials in order to reduce the cost of production, handling, and transportation (per ton of nutrient). Some filler or inert materials may be used to achieve a specified grade. Table 4 lists some common fertilizer materials.

Recently, FAO has recommended that phosphorus and potassium content be expressed in the elemental form, i.e., P and K rather than oxide from P_2O_5 and K_2O. Some countries such as Denmark, Ireland, and Norway have adopted the elemental basis for all plant nutrients, but internationally the old system is the one generally used.

Conversion factors of plant nutrients are given in Table 5.

Straight and Compound Fertilizer

"*Straight*" fertilizers contain only one of the primary nutrients (N, P, or K), e.g., urea is a straight "N" fertilizer (46%); TSP is a straight P fertilizer (46% P_2O_5); MOP is a straight potash fertilizer (60% K_2O).

Table 4. Common Fertilizer Materials

Material	N	P_2O_5	K_2O	S	Ca
Ammonia	82	-	-	-	-
Phosphate rock	-	27 -36[a]	-	-	-
Phosphoric acid	-	52 -54[b]	-	-	-
SSP (single superphosphate)	-	18 -22	-	12	20
TSP (triple superphosphate)	-	46	-	1.5	13
Urea	46	-	-	-	-
Ammonium sulfate	21	-	-	24	-
DAP (diammonium phosphate)[c]	18	46	-	-	-
MAP (monoammonium phosphate)[d]	11	45 -55	-	-	-
Potassium chloride	-	-	60	-	-
Potassium sulfate	-	-	50	17.6	-
15-15-15	15	15	15	-	-

a. Concentration of phosphate rock is quite variable and depends on the individual deposits, impurities, and beneficiation.
b. Wet-process merchant-grade acid.
c. Theoretical grade is 21-53-0.
d. Theoretical grade is 12-62-0.

Source: Frederick, M. T., and N. D. Le. 1987. "Fertilizer Products and Specifications," Training Program in Fertilizer Distribution and Handling, Europe, June 8-26.

Table 5. Conversion Factors of Plant Nutrients (Between Oxide and Elemental Forms)

P_2O_5 x 0.44	=	P	x	2.29	= P_2O_5
K_2O x 0.83	=	K	x	1.20	= K_2O
CaO x 0.71	=	Ca	x	1.40	= CaO
MgO x 0.60	=	Mg	x	1.66	= MgO
SO_3 x 0.40	=	S	x	2.50	= SO_3

Phosphate Rock

P_2O_5 x 2.18	=	BPL[a]	x	0.46	= P_2O_5
P x 4.95	=	BPL	x	0.202	= P

a. Bone phosphate of lime.

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"*Compound*" fertilizers contain two or three of the primary nutrients. They are also called complex, mixed, complete, finished or multinutrient fertilizers. Both straight and compound fertilizers may also contain secondary nutrients and micronutrients.

Compound Fertilizer Production

The fertilizers described in the previous section were mainly straights and some two-nutrient fertilizers, such as MAP and DAP. There is a significant requirement for multinutrient fertilizers arising from a variety of marketing, agronomic, and economic factors. These compound or complex fertilizers may be produced from a wide range of materials and by a wide range of chemical and physical processes. Some of the processes are:

1. Dry mixing of powdered materials to give powdered blends.
2. Dry mixing of granulated or prilled materials (blends, bulk blends).
3. Mixing with water to produce liquid fertilizers as solutions or suspensions.
4. Granulation of dry-mixed materials with addition of water.
5. Granulation by chemical reaction (usually ammonia with phosphoric, nitric or sulfuric acids) and addition of other materials.
6. Melt processes (not widely used for compounds).
7. Compaction in which mixtures of dry materials are granulated between rollers under high pressure. A wide range of grades may be produced in the above process, together with the possibilities of adding secondary nutrients or micronutrients, pesticides, and inert fillers.

In all the above processes a wide range of grades may be produced, together with possibilities for addition of macro- or micronutrients, herbicides, pesticides, and inert fillers.

Physical Form

The physical form of a fertilizer particle greatly influences the ease of application. The farmer wants a fertilizer that is hard, free flowing, of uniform size, not caked, not dusty, and easy to apply. He wants fairly small particles of uniform size to enhance uniform application. Fertilizer particles around the same size are more important when using a mechanical spreader. To meet the farmer's needs, manufacturers have developed a variety of processes and anticaking treatments. The most common particles are granules and prills.

Granules – Fertilizers may be produced by chemical reaction and mixing to form a wet slurry which is mixed or sprayed in a drum or granulator to produce agglomerated lumps. The required granule size is sieved out and the rest recycled. Water may be sprayed onto a powdered fertilizer in a rotation drum, or molten fertilizer is sprayed into a drum or bed to build up granules. Granular potash is produced by compaction under high pressure into sheets, the sheets are crushed, and sieved to give correctly sized granules, commonly 2-4 mm size range.

Prills – Materials may be melted and sprayed from the top of a tall tower against a current of air. By the time particles reach the bottom of the prilling tower, they have solidified into small spheres called prills. Urea and ammonium nitrate are commonly produced in drill form, normally 1-3 mm size range, but frequently contain smaller particles.

The crushing strength of granules and prills varies in crushing strength. Generally granules have higher crushing strengths than prills. Granules of NPK or "complete" fertilizers vary widely in crushing strength.

Materials available in other physical forms include sulfur as a liquid, powder pellets, or flake; ammonium sulfate as crystals; and phosphate rock as a powder. In the production of TSP and SSP, after reaction the products may be cured in a pile and are termed ROP (run-of-pile), consisting of a mixture of powder and lumps.

Caking of Fertilizer

Finished fertilizers have a tendency to cake by a variety of physical and chemical mechanisms. Caking is a complex phenomenon. Finished fertilizers are more prone to cake in the presence of (a) moisture, (b) small particles or dust ("fines"), and/or (c) pressure. Rugged handling and exposure to a humid atmosphere can adversely affect finished fertilizers. Caking tendencies can be reduced by incorporating anticaking agents – chemicals added during manufacture or the use of coatings of various kinds: chemicals, oils, plastics, and various dusty coatings. "Treated" or coated fertilizers are much better to handle. If too much coating is used, the fertilizer can be very dusty and unpleasant to handle.

Fertilizer Specifications

The requirements for fertilizer specifications differ according to the intended use of the information. For instance, when purchasing fertilizers, specifications would normally be very detailed while the supplier of the fertilizer may issue a very limited specification sheet for his fertilizer. The fertilizer technical specification is a detailed list of the chemical

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and physical properties of a given material. This list of specifications is normally used in the sales contract between the seller and buyer of the material to ensure agreement of the product attributes. In addition to product properties, the specification will normally define sampling, analytical procedures, and package specifications.

The specifications which are usually considered most important are those which have legal significance for buyers and sellers of large quantities of materials. The final consumer, the farmer, normally makes a purchase based on the grade marked on the bag, on price, and on his visual judgment of the physical quality of the material. The grade would hopefully be assured by a decree of the national government in the form of quality control regulations. International traders are not protected. To protect their respective interests, it is critical that sellers and buyers agree on a comprehensive specification.

A well-written fertilizer specification for procurement purposes should include:

1. Nutrient content(s) and concentration(s).
2. Nutrient chemical composition(s).
3. Moisture content.
4. Particle-size range.
5. Physical condition.
6. Water solubility.
7. Conditioner.
8. Any special limitations or hazards.
9. Packaging details.
10. Analytical methods used.
11. Penalties or discounts for deviation from the stated values and conditions.

While the legal aspects of contractual agreements between buyers and sellers are normally handled by international agents, it is still the responsibility of the buyer or seller to prepare a clear concise and complete specification for fertilizer raw materials or products. Examples of such specifications are given in the Appendix.

Fertilizer Quality

There are three major objectives of a fertilizer quality control program.

1. To produce an excellent product, of uniform quality at the most economical cost.
2. To assure the customer that what is on the label or guarantee is what he obtains.
3. To satisfy all laws regulating the distribution and sale of fertilizer products.

The measurement of fertilizer quality can be divided into three areas.

1. **Process control** – Done during fertilizer manufacture to determine when the reaction has reached a point that will yield a good product.

2. **Product assurance** – Before the manufactured product is bagged, detailed chemical analysis and determination of physical properties, moisture content, and dustiness are performed to ascertain if the product meets the standard of specification's set.

3. **Regulatory monitoring** – The sale and distribution of fertilizer as normally regulated by regulatory laws to protect the consumer and reputable producers from those who are fraudulent or unscrupulous. This is done by randomly sampling materials available in the marketplace by control officials for analysis by methods validated by authoıized agencies.

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APPENDIX

A.I.D. Small Business Memo

Trade Information for American Suppliers

Issued By
DEPARTMENT OF STATE
Agency for International Development, Office of Small Business
Washington, D. C. 20523 Area Code 703 235-9156

SBM 82-3
September 7, 1982
(Supersedes SBM 77-3)
(M/L: 8-23)

AID FERTILIZER SPECIFICATIONS

The following specifications supersede the product and packing specifications for fertilizer contained in U.S. Agency for International Development (AID) Commodity Eligibility Listing, (TM 15:54) dated January 1, 1981, pages 61-92, and SBM No. 77-3 dated August 12, 1977. This revision includes minor changes in fertilizer specifications and significant additions to the inspection section.

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I. FERTILIZER - GENERAL

A. AID financing for fertilizers normally is limited to products of U.S. source (000). From time to time, lack of access to requirements for specific products and/or other exigencies may necessitate off-shore procurement of limited quantities. For each purchase from a non-U.S. source, prior approval of the specific product, quantity, and source is required from AID/W - SER/COM.

B. AID finances only those fertilizers which conform to product and bagging specifications approved by AID.

C. Fertilizers conforming to the product specifications listed alphabetically (Part IV) and with bagging specifications (Part V) are considered eligible. All fertilizers are subject to special provisions 42.

D. Requests for fertilizers not covered by the specification herein may be submitted through the U.S. AID Mission for review and possible approval by AID/W - SER/COM. All such requests must contain details covering the proposed product and/or bagging specifications and should justify the need for such material.

E. All invitations for bid covering fertilizers must be approved by AID/W SER/COM before official publication and/or release to the trade.

II. EVALUATION

A. Single-Nutrient Fertilizers

Fertilizers will be evaluated on the basis of the minimum guaranteed analysis in increments of one unit of Plant Nutrient (PN); e.g., triple superphosphate ranging from 46.00% to and including 46.99% P_2O_5 will be evaluated as 46%.

B. Multinutrient Fertilizers

Fertilizers must be guaranteed and will be evaluated only on the basis of the analysis requested in the tender; e.g., 18-46-0 will be evaluated as 18% nitrogen and 46% P_2O_5 or a total of 64 units of Plant Nutrient.

III. DISCOUNTS

A. Rates of Discount

When a shipment fails to meet the grade of Plant Nutrient as guaranteed, the following discount schedule will apply:

Deviation from Guaranteed Analysis	Adjustment Factor
When the deficiency of any nutrient guaranteed is 0.5 units or less.	0
When the deficiency of any nutrient guaranteed is more than 0.5, but less than 1.0 units.	2
When the deficiency of any nutrient guaranteed is 1.0 units or more	3

The above discounts will apply to each nutrient guaranteed. No allowance will be made for excess over guarantee of one nutrient to balance deficiency of another nutrient. Plant Nutrient value will be calculated on the basis of the contract price per ton of material.

B. Examples of Computation

1. Analysis of triple superphosphate guaranteed by the bidder is 46% on a lot of 1,000 tons priced at $175 per ton. Upon testing, the Plant Nutrient content was found to be 45.2% viz., deficiency was 46.0 - 45.2 = 0.8 of a unit. Price adjustment (discount) is computed as follows: 0.8 (unit deficiency) times 2 (adjustment factor) times $3.80 (Plant Nutrient value equals $175 divided by 46), times 1,000 (number of tons) equals $6,080 (discount). NOTE: "Price" for calculating discount is unit landed cost at foreign destination.

2. Analyses of 16-16-8 granular mixed fertilizer guaranteed by the bidder are 16% N, 16% P_2O_5, and 8% K_2O on lot of 5,000 tons priced at $160. Upon testing, the Plant Nutrients were found to be 15.3% N, 16.1% P_2O_5, and 8.8% K_2O, viz., deficiency was 16.0 - 15.3 equals 0.7 of a unit of N. Although both P_2O_5 and K_2O exceeded guarantee, no allowance is made for these excesses to balance the deficiency in N. Price adjustment (discount) is computed as follows: 0.7 (unit deficiency) times 2 (adjustment factor) times $4 (Plant Nutrient value equals $160 divided by 40), times 5,000 (number of tons) equals $28,000. NOTE: "Price" for calculating discount is unit landed cost at foreign destination.

C. <u>Discount for Exceeding Chlorine Tolerance in Potassium Sulfate</u>

Chlorine tolerance of 0.5% above specifications will be permitted without penalty. For every 0.5% in excess of this tolerance, a discount of 5% of the computed contract cost will be charged.

D. <u>Non-Nutrient Deficiencies</u>

Non-nutrient deficiencies include deficiencies in specified physical condition, packaging, labeling, particle size, moisture content, and others.

If, after inspection, the fertilizer is determined by the purchaser at the port of loading to be so deficient as to be unacceptable, the purchaser may decline to accept the commodity and exercise appropriate legal remedies. If, however, in spite of deficiencies the purchaser determines to accept the commodity, the purchaser shall be entitled, in any event, to a reasonable adjustment in the quoted landed cost for foreign destination.

IV. AID-APPROVED FERTILIZER SPECIFICATIONS

AMMONIUM NITRATE, - 33.5% GRADE (Schedule B. No. 480.6510)

Specification

Nitrogen content, total	33.5% as N, minimum
Moisture content	0.3% as H_2O, maximum
Coating	2.5%, minimum
Organic matter	0.1%, maximum
Screen size (Tyler)	minimum, 90.0% -6+16 mesh, 100.0% -4 mesh, 98% +28 mesh;
Physical condition	Prills or granules, free-flowing, non-caking

Analytical Methods for Quality Control

Chemical	AOAC No.
Nitrogen, total	2.068
Moisture	2.013

Physical	TFI No.
Sieve analysis	IV. A.

AMMONIUM NITRATE, - PHASE STABILIZED (Schedule B, No. 480.6510)

Specification

Nitrogen content, total	34.0% as N, minimum
Moisture content	0.5% as H_2O, maximum
Stabilizer or additive	1.0%, maximum
Organic matter	0.1%, maximum
Screen size (Tyler)	minimum 90.0% -6+16 mesh, 100.0% -4 mesh, 98% +28 mesh;
Physical condition	Prills or granules, free-flowing, non-caking

Analytical Methods for Quality Control

Chemical	AOAC No.
Nitrogen, total	2.068
Moisture	2.013

Physical	TFI No.
Sieve analysis	IV. A.

AMMONIUM SULFATE, STANDARD (Schedule B. No. 480.6525)

Specification

Nitrogen content	20.5% as N, minimum
Free acid content	0.10% as H_2SO_4, maximum
Moisture content	1.0% as H_2O, maximum
Screen size (Tyler)	minimum 90.0% -6 mesh;
Physical condition	Coarse, crystalline or granular, free-flowing

Analytical Methods for Quality Control

Chemical	AOAC No., or as noted
Nitrogen	2.065
Free acid	Titration of 10% solution to methyl red end point with 0.1 N NaOH[a]
Moisture	2.012, dry at 129°-131°C to constant weight

Physical	TFI No.
Sieve analysis	IV. A.

[a] Reagent Chemicals and Standards, 5th Edition, Joseph Rosin, D. Van Nostrand Co. Inc., Princeton, NJ

AMMONIUM SULFATE, GRANULAR (Schedule B. No. 480.6525)

Specification

Nitrogen content	20.5% as N, minimum
Free acid content	0.10% as H_2SO_4, maximum
Moisture content	1.0% as H_2O, maximum
Screen size (Tyler)	minimum 90.0% -6 +16 mesh, 100.0% -4 mesh, 98% +28 mesh
Physical condition	Coarse, crystalline or granular, free-flowing

Analytical Methods for Quality Control

Chemical	AOAC No., or as noted
Nitrogen	2.065
Free acid	Titration of 10% solution to methyl red end point with 0.1 N NaOH[a]
Moisture	2.012, dry at 129° -131°C tc constant weight

Physical	TFI No.
Sieve analysis	IV. A.

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[a] Reagent Chemicals and Standards, 5th Edition, Joseph Rosin, D. Van Nostrand Co., Inc., Princeton, NJ

UREA, - 45% GRADE

(Schedule B. No. 480.3000)

Specification

Nitrogen content	45.0% as N, minimum
Coating (clay, kieselguhr, talc, etc.)	1.0%, minimum
iuret content	2.0%, maximum
oisture content	0.5%, as H_2O maximum
creen size (Tyler)	minimum 90.0% -6+16 mesh, 100.0% -4 mesh, 98% +28 mesh;
iysical condition	Prills or granules, free-flowing, non-caking

alytical Methods for Quality Control

Chemical	AOAC No.
Nitrogen	2.055, 2.056, and 2.057
Biuret	2.082, 2.083, and 2.084
Moisture	2.013

Physical	TFI No.
Sieve analysis	IV. A.

UREA, - 46% GRADE (Schedule B. No. 480.3000)

Specification

Nitrogen content	46.0% as N, minimum
Chemical Conditioner	
Methylenediurea (a product of the addition of a formaldehyde-based additive)	0.2% HCHO equivalent, minimum
Biuret content	2.0%, maximum
Moisture content	0.5% as H_2O, maximum
Screen size (Tyler)	minimum 90.0% -6+16 mesh, 100.0% -4 mesh, 98% +28 mesh;
Physical condition	Prills or granules, free-flowing, non-caking

Analytical Methods for Quality Control

Chemical	AOAC No., or as noted
Nitrogen	2.055, 2.056, and 2.057
Biuret	2.082, 2.083, and 2.084
Moisture	2.013
Methylenediurea	Chromotropic acid[a]

Physical	TFI No.
Sieve analysis	IV. A.

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[a] Formaldehyde, 3rd Edition, J. F. Walker, ACS Monograph, Reinhold Publishing Corp., New York, NY

UREA, - 46% N, LOW BIURET (Schedule B. No. 480.3000)

Specification

Nitrogen content	46.0% as N, minimum
Chemical conditioner	
Methylenediurea (a product of the addition of a formaldehyde-based additive)	0.2% HCHO equivalent, minimum
Biuret content	1.0%, maximum
Moisture content	0.5% as H_2O, maximum
Screen size (Tyler)	minimum 90.0% -6+16 mesh, 100.0% -4, 98% +28 mesh;
Physical condition	Prills or granules, free-flowing, non-caking

Analytical Methods for Quality Control

Chemical	AOAC No., or as noted
Nitrogen	2.055, 2.056, and 2.057
Biuret	2.082, 2.083, and 2.084
Moisture	2.013
Methylenediurea	Chromotropic acid[a]
Physical	**TFI No.**
Sieve analysis	IV. A.

[a] Formaldehyde, 3rd Edition, J. F. Walker, ACS Monograph, Reinhold Publishing Corp., New York, NY

DIAMMONIUM PHOSPHATE, GRANULAR 18-46-0 GRADE (Schedule B. No. 480.8005)

Specification

Nitrogen content (nitrate free). . . .	18.0% as N, minimum
Urea nitrogen	1.5% as N, maximum
Phosphorus content	
Available	46.0% as P_2O_5, minimum
Water soluble	39.1% as P_2O_5, minimum
Moisture content	2.0% as H_2O, maximum
Screen size (Tyler).	minimum 90.0% -6+16 mesh, 100.0% -4 mesh, 98% +28 mesh
Physical condition	Granules, free-flowing, non-caking

Analytical Methods for Quality Control

Chemical	AOAC No.
Nitrogen	2.055, 2.056, and 2.057
Urea	2.080 and 2.081
Phosphorus	
Total	2.026c, 2.027, and 2.028b
Citrate insoluble	2.044, 2.045, and 2.046
Available	2.048
Water soluble	2.040 and 2.041
Moisture	2.013

Physical	TFI No.
Sieve analysis	IV. A.

MONOAMMONIUM PHOSPHATE, GRANULAR 11-48-0 GRADE (Schedule B. No. 480.6015)

Specification

Nitrogen content (ammoniacal)	11.0% as N, minimum
Phosphorus content	
Available	48.0% as P_2O_5, minimum
Water soluble	40.8% as P_2O_5, minimum
Moisture content	2.0% as H_2O, maximum
Screen size (Tyler)	minimum 90.0% -6+16 mesh, 100.0% -4 mesh, 98% +28 mesh
Physical condition	Granules, free-flowing, non-caking

Analytical Methods for Quality Control

Chemical	AOAC No.
Nitrogen, ammoniacal	2.065
Phosphorus	
Total	2.026c, 2.027, and 2.028b
Citrate insoluble	2.044, 2.045, and 2.046a
Available	2.048
Water soluble	2.040 and 2.041
Moisture	2.013

Physical	TFI No.
Sieve analysis	IV. A.

MONOAMMONIUM PHOSPHATE, GRANULAR 13-52-0 GRADE (Schedule B No. -80.8015)

Specification

Nitrogen content (ammoniacal) . . .	13.0% as N, minimum
Phosphorus content	
Available	52.0% as P_2O_5, minimum
Water soluble	44.2% as P_2O_5, minimum
Moisture content	2.0% as H_2O, maximum
Screen size (Tyler)	minimum 90.0% -6 +16 mesh, 100.0% -4 mesh, 98% +28 mesh
Physical condition	Granules, free-flowing, non-caking

Analytical Methods for Quality Control

Chemical	AOAC No.
Nitrogen, ammoniacal	2.065
Phosphorus	
Total	2.026c, 2.027, and 2.028b
Citrate insoluble	2.044, 2.045, and 2.046a
Available	2.048
Water soluble	2.040 and 2.041
Moisture	2.013

Physical	TFI No.
Sieve analysis	IV. A.

MONOAMMONIUM PHOSPHATE, GRANULAR 11-52-0 GRADE (Schedule B No. 480.8015)

Specification

Nitrogen content (ammoniacal)	11.0% as N, minimum
Phosphorus content	
Available	52.0% as P_2O_5, minimum
Water soluble	41.6% as P_2O_5, minimum
Moisture content	2.0% as H_2O, maximum
Screen size (Tyler)	minimum 90.0% -6+16 mesh, 100.0% -4 mesh, 98% +28 mesh
Physical condition	Granules, free-flowing, non-caking

Analytical Methods for Quality Control

Chemical

	AOAC No.
Nitrogen, ammoniacal	2.065
Phosphorus	
Total	2.026c, 2.027, and 2.028b
Citrate insoluble	2.044, 2.045, and 2.046a
Available	2.048
Water soluble	2.040 and 2.041
Moisture	2.013

Physical

	TFI No.
Sieve analysis	IV. A.

MONOAMMONIUM PHOSPHATE, RUN-OF-PILE 10-50-0 GRADE (Schedule B No. 480.8015)

Specification

Nitrogen content*(ammoniacal)	10.0% as N, minimum
Phosphorus content*	
Available	50.0% as P_2O_5, minimum
Water soluble	42.5% as P_2O_5, minimum
Moisture content	2.0% as H_2O, maximum
Screen size (Tyler)	minimum 90.0% -6 mesh;
Physical condition	Free-flowing, non-caking

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Analytical Methods for Quality Control

Chemical	AOAC No.
Nitrogen, ammoniacal	2.065
Phosphorus	
Total	2.026c, 2.027, and 2.028b
Citrate insoluble	2.044, 2.045, and 2.046a
Available	2.048
Water soluble	2.040 and 2.041
Moisture	2.013

Physical	TFI No.
Sieve Analysis	IV. A.

Nitrogen and P_2O_5 specifications on dry basis

TRIPLE SUPERPHOSPHATE, GRANULAR (Schedule B No. 480.7050)

Specification

Phosphorus content	
Available	44.0 to 46.%[a] as P_2O_5, minimum
Water soluble	75% of guaranteed P_2O_5, minimum
Free acid content	5.0% as H_3PO_4, maximum
Moisture content	4.0% as H_2O, maximum
Screen size (Tyler)	minimum 90.0% -6+16 mesh, 100.0% -4 mesh, 98% +28 m
Physical condition	Granules, free-flowing, non-caking

Analytical Methods for Quality Control

Chemical	AOAC No. or as noted
Phosphorus	
Total	2.026c, 2.027, and 2.028b
Citrate insoluble	2.044, 2.045, and 2.046a
Available	2.048
Water soluble	2.040 and 2.041
Free acid	No. 16 Section XI (AFPC[b])
Moisture	2.013

Physical	TFI No.
Sieve analysis	IV. A.

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[a] Offers should be made on guaranteed minimum and they will be evaluated on basis of lowest landed cost of P_2O_5

[b] Association of Florida Phosphate Chemists, Analytical Methods, 6th Edition (1980)

TRIPLE SUPERPHOSPHATE, RUN-OF PILE (Schedule B. No. 480.7050)

Specification

Phosphorus content	
Available	44.0 to 46.0%[a] as P_2O_5, minimum
Water soluble	75% of guaranteed P_2O_5, minimum
Free acid content	5.5% as H_3PO_4, maximum
Moisture content	6.0% as H_2O, maximum
Screen size (Tyler)	minimum 90.0% -6 mesh
Physical condition	Free-flowing, non-caking

Analytical Methods for Quality Control

Chemical	AOAC No., or as noted
Phosphorus	
Total	2.026c, 2.027, and 2.028b
Citrate insoluble	2.044, 2.045, and 2.046a
Available	2.048
Water soluble	2.040 and 2.041
Free acid	No. 16 Section XI (AFPC[b])
Moisture	2.013

Physical	TFI No.
Sieve analysis	IV. A.

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[a] Offers should be made on guaranteed minimum and they will be evaluated on basis of lowest landed cost of P_2O_5

[b] Association of Florida Phosphate Chemists, Analytical Methods, 6th Edition (1980)

POTASSIUM CHLORIDE, STANDARD (Schedule B. No. 480.500)

Specification

Potassium content, soluble	60.0% as K_2O, minimum
Moisture content	0.5% as H_2O, maximum
Screen size (Tyler)	90.0% -10 mesh, minimum
Physical condition	Free-flowing, non-caking

Analytical Methods for Quality Control

Chemical

	AOAC No.
Potassium, soluble	2.102, 2.103, and 2.104
Moisture	2.012, dry at 129° -131°C for five hours

Physical

	TFI No.
Sieve analysis	IV. A.

POTASSIUM CHLORIDE, COARSE (Schedule B No. 480.5000)

Specification

Potassium content, soluble	60.0% as K_2O, minimum
Moisture content	0.5% as H_2O, maximum
Screen size (Tyler)	90.0% as -6+28 mesh, minimum
Physical condition	Free-flowing

Analytical Methods for Quality Control

Chemical

	AOAC No.
Potassium, soluble	2.102, 2.103, and 2.104
Moisture	2.012, dry at 129° -131°C for five hours

Physical

	TFI No.
Sieve analysis	IV. A.

POTASSIUM CHLORIDE, GRANULAR (Schedule B. No. 480.5000)

Specification

Potassium content, soluble	60.0% as K_2O, minimum
Moisture content	0.5% as H_2O, maximum
Screen size (Tyler)	minimum 90.0% -6+16 mesh, 100.0% -4 me 98% +28 mesh
Physical condition	Granular, free-flowing

Analytical Methods for Quality Control

Chemical

	AOAC No.
Potassium, soluble	2.102, 2.103, and 2.104
Moisture	2.012, dry at 129° -131°C for five hours

Physical

	TFI No.
Sieve analysis	IV. A.

POTASSIUM NITRATE, GRANULAR

(Schedule B. No. 480.7500)

Specification

Nitrogen content	12.0% as N, minimum
Potassium content, soluble	44.0% as K_2O, mimimum
Moisture	0.3% as H_2O, maximum
Screen size (Tyler)	minimum 90.0% -6+16 mesh, 100.0% -4 mesh, 98% +28 mesh
Physical condition	Granules free-flowing, non-caking

Analytical Methods for Quality Control

Chemical	AOAC No.
Nitrogen	2.068
Potassium, soluble	2.102, 2.103, and 2.104
Moisture	2.012, dry at 129° -131°C to constant weight

Physical	TFI No.
Sieve analysis	IV. A.

POTASSIUM SULFATE, STANDARD

(Schedule B. No.480.5400)

Specification

Potassium content, soluble	50.0% as K_2O, minimum
Moisture content	0.5% as H_2O, maximum
Chlorine content	2.5% as Cl, maximum
Screen size (Tyler)	90.0% -10 mesh, minimum
Physical condition	Free-flowing, non-caking

Analytical Methods for Quality Control

Chemical	AOAC No.
Potassium soluble	2.102, 2.103, and 2.104
Moisture	2.012, dry at 129° -131°C to constant weight
Chlorine	2.119 and 2.120

Physical	TFI No.
Sieve analysis	IV. A.

POTASSIUM SULFATE, GRANULAR

(Schedule B. No. 480.5400)

Specification

Potassium content, soluble	50.0% as K_2O, minimum
Chlorine content	2.5% as Cl, maximum
Moisture content	0.5% as H_2O, maximum
Screen size (Tyler)	minimum 90.0% -6+16 mesh, 100.0% -4 mesh, 98% +28 mesh
Physical condition	Granular, free-flowing

Analytical Methods for Quality Control

Chemical	AOAC No.
Potassium, soluble	2.102, 2.103, and 2.104
Moisture	2.012, dry at 129° -131°C to constant weight
Chlorine	2.119 and 2.120

Physical	TFI No.
Sieve analysis	IV. A.

SULFATE OF POTASH-MAGNESIA, STANDARD (Schedule B. No. 480.7500)

Specification

Potassium content, soluble	21.0% as K_2O, minimum
Magnesium content, water soluble . .	18.0% as MgO, minimum
Sulfur content	22.0% as S, minimum
Chlorine content	2.5% as Cl, maximum
Moisture content	0.5% as H_2O, maximum
Screen size (Tyler)	90.0% -10 mesh, minimum
Physical condition	Free-flowing, non-caking

Analytical Methods for Quality Control

Chemical	AOAC No.
Potassium, soluble	2.102, 2.103, and 2.104
Magnesium, water soluble	2.138
Sulfur total	2.A01[a]
Chlorine	2.119 and 2.120
Moisture	2.012, dry at 129° -131°C for five hours

Physical	TFI No.
Sieve analysis	IV. A.

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[a] Journal of AOAC, 63, No. 4, 854-58 (1980)

SULFATE OF POTASH-MAGNESIA, GRANULAR (Schedule B. No. 480.7500)

Specification

Potassium content, soluble	21.0% as K_2O, minimum
Magnesium content, water soluble . . .	18.0% as MgO, minimum
Sulfur content	22.0% as S, minimum
Chlorine content	2.5% as Cl, maximum
Moisture content	0.5% as H_2O, maximum
Screen size	minimum 90.0% -6 +16 mesh 100.0% -4 mesh, 98% +28 mesh
Physical condition	Granular, free-flowing

Analytical Methods for Quality Control

Chemical	AOAC No.
Potassium, soluble	2.102, 2.103, and 2.104
Magnesium, water soluble . . .	2.138
Sulfur	2.A01[a]
Chlorine	2.119 and 2.120
Moisture	2.012, dry at 129° -131°C for five hours

Physical	TFI No.
Sieve analysis	IV. A.

[a] Journal of AOAC, 63, No. 4, 854-58 (1980)

GRANULAR MIXED FERTILIZER: ( )-( )-( ) GRADE
(CHEMICALLY OR PHYSICALLY MIXED)

(Schedule B. No. 480.8025)

Specification

Nitrogen content . . . . ______% as N, minimum

	% as N
Ammoniacal nitrogen	______
Nitrate nitrogen	______
Urea nitrogen	______
Organic nitrogen	______

Available phosphorus content . . . . ______% P_2O_5, minimum
Potassium content . . . . ______% K_2O, minimum
Secondary and micronutrients ______

Element	%
______	______
______	______
______	______
______	______
______	______

Moisture content . . . . ______% H_2O, maximum
Anticaking conditioner

______ . ______% minimum
(Type)

Screen size (Tyler) . . . . minimum 90% -6+16 mesh, 100% -4 mesh, 98% +28 mesh

Physical condition . . . . Granules, homogenous, free-flowing, nonsegregating, non-caking

---

Tender to specify chemical or physical mix. If urea is included in physical mix, superphosphate or nitrates must not be included. Physical mixes must be made with due regard to particle size matching of ingredients.

Analytical Methods for Quality Control

Chemical

	AOAC No.
Nitrogen	
Total	2.059 and 2.060, or 2.063 and 2.064
Ammoniacal	2.065
Nitrate	2.069
Urea	2.080 and 2.081
Phosphorus	
Total	2.026c, 2.027, and 2.028b
Citrate insoluble	2.044, 2.045, and 2.046a
Available	2.048
Potassium, soluble	2.102, 2.103, and 2.104
Secondary and micronutrients	
Calcium	2.121
Sulfur	2.A01[a]
Copper, iron, magnesium, manganese, and zinc	2.109-2.113
Boron	2.C01-2.C04[b]
Moisture	2.013

Physical

	TFI No.
Sieve analysis	IV. A.

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[a] Journal of AOAC, Volume 63, No. 4, 854-58, (1980)

[b] Journal of AOAC, Volume 65, No. 2, 450-51, (1982)

V. AID - Approved Bagging Specifications - Fertilizers

A. Outer Bags

1. Polypropylene Bags

a. Capacity

50-kg net or 100-lb net

b. Fabric

Bags shall be made of 100% ultraviolet-stabilized polypropylene resin with a weight of not less than 2.6 oz. per square yard and possess the properties described following test methods. The color shall be light tan or beige. A colored identification marker (yarn) shall be inserted in the weave by the fabric manufacturer. The identification marker is to be reported to AID.

The fabric forming the top or bottom of the furnished bags shall be a tucked selvedge or a natural selvedge containing not less than the number of ends prevalent in the body of the fabric. Alternatively, the selvedge may be heat cut and formed a minimum of 1-inch wide with a minimum of 20 warp threads per inch.

The fabric must be woven to a construction tight enough to prevent excessive product sifting in the event bag liner failure occurs. The bottom seam is to be flat sewn in accordance with Federal Standard 751a, SSa-1, regardless of heat cut or tucked selvedge fabric. The side seam "Export Type" shall be in accordance with Federal Standard 751a, SSd-1. Bags shall be turned so seams are inside. The sewing thread shall be U.V. stabilized, polypropylene nominal 1000 denier with test strength of 5 grams/denier. There is no thread color requirement.

c. Test Methods

Ultraviolet stability test: Material and thread must have not less than 70% strength retention after 200 hours exposure in weatherometer. The U.V. testing weatherometer exposure method is 5804 Federal Standard 191.

Tensile Strength: Strength warp and fill, each 105 lbs. average. (10 samples shall be tested in each direction) with no single test below 90 lbs.) ASTM Method D-1682 (Grab Method)

Permeability: Air permeability of the fabric in an unstressed state should not exceed 100 cubic feet per minute per square foot. ASTM Method D737-75.

2. Jute Bags

a. Capacity

50-kg net or 100 lb. net

b. Fabric

New fabric shall weight 9 ounces per square yard (305 grams per square meter) 11 porter into 12 shot Hessian, or heavier.

B. Liner (Inner Bag)

Inner loose tubular liner shall be of 4 ml polyethylene film. The liner shall be heat-sealed at the bottom. The film shall be of low slip plastic.

Test Methods

1. Thickness--ASTM, D374. 4-ml polyethylene film.

2. Impact resistance--ASTM, D1709. An impact failure weight of 165 g.

3. Kinetic coefficient of friction--ASTM, B1894 (kinetic coefficient of friction 0.8 m/s maximum.)

C. Methods of Closure

1. Outer Bag

Top seam stitching shall be a minimum of one inch from the selvedge. The sewing thread shall be 200 hours U.V. stabilized, polypropylene nominal 1000 denier with test strength of 5 grams per denier. There is no thread color requirement. The outer bag shall be sewn above--not to the liner.

2. Liner

The polyethylene liner shall be closed at the top by one of the following methods after exhausting the excess air:

a. Heat sealing

b. Mechanically applied acid resistant clip of 0.150 inch minimum diameter (9 gauge) completely circling the polyethylene liner to hermetically seal it.

c. Mechanically applied bag tie 4½ inches long, plastic-covered wire with a 3/8 inch inside loop on each end. The wire shall be a minimum of 17 gauge before being covered with plastic to a minimum of 16 gauge.

d. For valve type bag, see alternative below.

D. Valve Type Bags as an Alternative-Bag Construction

Bags submitted under this performance specification shall perform as well as those made under existing specifications (paragraph V. A. - V. C. herein) with respect to closures, retention of printed information and resistance to snags, tears, and water vapor transmission.

1. Capacity

   50-kg net or 100-lb net

2. Outer Bags

   Bags must be manufactured from polypropylene or jute fabric meeting specifications stated in paragraph V. A. herein, except in valve bag, top and bottom will be folded seam double selvedge per Federal Specifications S/S-N-1. The side will be folded seam double, raw per Federal Specifications S/S-N-1.

3. Liner (Inner Bag)

   Liners must be manufactured from polyethylene film meeting specifications stated in paragraph V. B. herein, except film is strip laminated to fabric and is folded over top, bottom, and edge with fabric.

4. Impact Resistance

   All bags, including inserted film liners, shall be capable of withstanding the following performance test for impact resistance:

   a. Ten filled and sealed bags containing the product to be shipped or an equivalent in specific gravity and general physical characteristics must each survive a single drop on the butt or bottom, on a shock machine that produces for each test a velocity change of 195 inches per second using a shock duration of .002 seconds without loss of product. Ten (10) bags constitute a test lot and all ten (10) bags must meet the minimum impact specified without a single failure.

   b. Test shall be conducted under standard temperature (73.4 degrees F plus or minus 1.8 degrees F) and relative humidity (50% plus or minus 2%) conditions.

   c. Filled bags must be placed in the conditioned atmosphere for sufficient time before the tests are conducted for the bags to come to equilibrium.

5. Sifting

   Valve bags including inserted film liners shall be capable of withstanding the following test for sifting. Testing of filled and sealed bags is to be performed on a variable frequency vibration table (1g input) from 2.5 to 30 hz and sifting observed at the frequency (ies) where the most violent bouncing occurs. Loss of product from the valve bags, due to sifting, shall be no greater than 0.5% of net weight filled.

6. Independent laboratories known to be capable of conducting the above impact resistance and sifting tests are:

MTS Systems Corporation Box 24012 Minneapolis, MN 55425	(612) 937-4000
Lansmont Corporation P. O. Box 1390 Montery, CA 93940	(408) 373-4791
Rutgers University Packaging Science and Engineering Department P. O. Box 909 Piscataway, N.J. 08854	(201) 932-3679
Bemis Company, Inc. P. O. Box 568 Peoria, IL 61601	(309) 682-5406
Michigan State University School of Packaging East Lansing, MI 48824	(517) 355-9580
Owens-Illinois, Inc. P. O. Box 1035 Toledo, OH 43666	(419) 247-5000

7. Valve type bags <u>are not acceptable</u> for ammonium nitrate or urea.

VI. INSPECTION AND SAMPLING

A. Responsibility

1. A "Certificate of Inspection and Approval" must be issued for each shipping lot by an independent inspection firm acceptable to AID, unless independent inspection is waived by the purchaser with AID's prior approval. In the event Purchaser elects not to inspect the fertilizer, as this determination requires AID/W approval, they shall provide to Supplier written waiver of its right to such inspection, duly executed by Purchaser or its agent. Said waiver shall be delivered to Supplier prior to sailing date of the shipment concerned.

2. The inspections shall be performed and reported in accordance with the instructions in the following sections VI.B, C, and D.

3. Independent inspections shall not be performed if the supplier's test shows that the contracted commodity specifications were not met in full.

4. The supplier shall arrange and grant the independent inspection firm any and all reasonable access to the commodity for the purpose of conducting all inspections and tests. The supplier shall notify the inspection firm by telephone, and confirm by telegram, or letter, at least ten days before commencement of bagging, that the fertilizer is ready for inspection. If the supplier has not met the contracted commodity specifications, the inspection firm shall not issue any certificate, and shall notify the purchaser, the supplier, and AID, Washington, at once.

B. Instructions--Inspection

The inspection firm shall:

1. Verify that the vessel holds are clean, dry, and ready to receive the cargo.

2. Verify that the specified weight of cargo is loaded aboard the ocean vessel.

3. Verify that loading is ceased during inclement weather or for any other reasons which may damage the cargo, and that stowage will not damage the cargo, or result in discharging difficulties.

   (Should the conditions of items 1, 2, or 3 not be met, the inspector will notify immediately the purchaser, supplier, the ship's captain and AID/SER/COM/CPS.)

4. Examine bags and report, if true, that the bags appear to meet specifications upon visual inspection. In addition, they shall verify that the export shipping marks are in accordance with the terms of the contract.

5. Sample, prepare, distribute, and furnish analyses of samples as prescribed in Sections IV. and VI C. Make the weight determination prescribed in Section VI. E.

6. Furnish documentations and notifications of inspections as prescribed in Section VI. D., this document.

7. If inspection and/or analysis reveal any deviation between the actual commodity or commodities and the specifications as stated in the IFB, the inspection firm must notify the Purchaser, Supplier, and A.I.D./SER/COM/CPS of such discrepancies immediately.

C. <u>Instruction--Collection, Preparation and Distribution of Official Samples</u>

1. The official samples shall be taken at the last point where the material is handled prior to ship loading. The inspection firm is required to draw the official samples <u>itself</u>, and arrange laboratory analysis of same in accordance with procedures specified herein. Bagged material shall be sampled periodically at the time of bagging before the bag is closed whenever possible. Bulk material shall be sampled progressively during the entire time of loading onto the vessel.

2. The inspector shall be responsible for making arrangements with the bagging firms to follow the sampling procedures as indicated below.

3. The official samples obtained by the following procedures may be used in the event of a dispute regarding quality of commodity.

4. Sampling

a. Bagged Fertilizer

Sampling shall be done at unannounced times, but at intervals not exceeding eight hours bagging time.

Closed Bags--Material shall be sampled as specified by TFI Method I.C.1. and the number of bags to be sampled is specified in the Sampling Schedule 3. The punctured bags should be neatly patched with printed labels, pressure sensitive tags, or special patching material.

Open Bags--Material shall be sampled by taking cup samples from the bags before they are closed. The samples shall be taken during random visits to the bagging operation to insure representation of the entire lot. The number of bags to be sampled is specified in the following Sampling Schedule 3.

b. Bulk Fertilizer

When available at the loading port, the automatic sampling system for fertilizer materials shall be used. Otherwise, if possible, bulk materials shall be sampled from a transfer belt in accordance with TFI Method I.C.2., procedure 1.a. Where stream-cutting is not possible, sampling shall be done at equally spaced intervals from random points on the belt immediately following and as close to a belt discharge as safety will permit, all increments being of approximately equal size. The number of increments to be taken is specified in the following Sample Schedule.

c. Sampling Schedule

Where stream-sampling is not feasible as a means of obtaining official fertilizer samples, the following guide for sampling bagged or bulk materials shall be followed:

Consignment		
Tons	Thousands of bags	No. of bags to be sampled or increments to be taken
Under 500	Under 10	60
501-1000	10 - 20	80
1001-5000	21 - 100	100

5. Sample Preparation

Consolidation of increment samples into the gross sample and sample reduction by riffling shall be by the official inspector in accordance with TFI Method I.C.3. Procedure A. All samples must be kept in covered moisture-proof containers except when being added to the containers or being reduced. Final preparation of sample for chemical analysis shall be according to TFI Method I.C.3 procedure B.

6. Distribution of Official Sample

The official consolidated sample shall be divided into four equal parts, prior to grinding, by means of riffling using the procedure specified in Sample Preparation. One of the four parts shall be analyzed by the official inspector either in his own laboratory or another laboratory acceptable to the Buyer and A.I.D. Another part is made available to the seller upon request, and the remaining two such parts shall be retained by the official inspector for a minimum period of twelve months for possible use by a third referee chemist in the event of a dispute, or for reserve purposes. (In the case of an off-shore supplier, one of the two reserve portions shall be returned to an accepted U.S. laboratory for verification of analytical results.) Regarding commodity shipped from non-U.S. sources, if no independent laboratory acceptable to A.I.D. is available locally, the inspection firm must air mail its consolidated, official sample (s) to an alternative laboratory acceptable to A.I.D. 'NOTE: Analyses performed in the Manufacturer's laboratory under the inspection firm's supervision are an unacceptable substitute for the inspection firm's own sampling and chemical analyses.

7. Collection of Bag Samples

The inspector shall obtain at least four of the outer bags and of the liners being used and retain such bags for twelve months.

D. Manuals

Each product specification includes, under the heading "Analytical Methods for Quality Control," precise analytical methods for checking compliance with AID specifications. Unless otherwise indicated, the numerical citations shown for chemical requirements refer to analytical methods in the 13th Edition (1980) of the Association of Official Analytical Chemists (AOAC) manual, Official Methods of Analysis. Citations for physical requirements refer to the 4th Edition (1982) of The Fertilizer Institute (TFI) manual, Fertilizer Sampling and Analytical Methods. Both manuals are well known to persons in the United States and abroad who work with agricultural chemicals. The AOAC manual may be obtained from the Association of Official Analytical Chemists, 1111 North 19th Street, Arlington, Virginia 22209. The TFI manual may be obtained from The Fertilizer Institute, 1015 18th Street, Northwest, Washington, D.C. 20036.

E. Weight Determination

1. The independent inspection firm shall attest, on or prior to the date of the Bill of Lading, as to the weights of the commodity or commodities described in the invoice.

2. On bulk fertilizer the inspector is responsible for checking scales for calibration and weight verification. If scales are not available, weight should be verified from actual tare weights of hopper cars. If loading is directly from barges, or from stockpile, weights should be established by means of light and heavy draft survey of vessel.

3. On bagged fertilizer the inspector shall check the bagging scales and tare weights at intervals not to exceed 16 bagging hours. Inspector shall also spot check bagged material already stockpiled in the warehouse at intervals not to exceed 8 bagging hours. For purposes of check-weighing, an accurate platform scale adjacent to the bagging line should be maintained, kept clean and in balance. The inspector shall see that scales are checked at intervals during bagging and shall reweight bags periodically during the operation, keeping a record of these weight checks.

F. Instructions--Documentation

1. Within ten days of final sampling and completing the weight verification, and concluding that the identified shipping lot has met all of the commodity requirements, the inspection firm shall issue its "Certificate of Inspection and Approval" to the Purchaser, Seller, A.I.D., and others that may be designated. The certificate issued in the name of the purchaser must be transmitted immediately to the supplier.

The following is a suggested format for the "Certificate of Inspection and Approval"

Certificate of Inspection and Approval

Purchaser	-	B/L No.	-
Supplier	-	AID No.	-
Commodity Name/Grade	-		-
Metric Tons	-	Laboratory Report	-
Ocean Carrier	-	Certificate of Weight Verification	-

The "Certificate of Inspection and Approval" shall comprise of a narrative describing the inspection events in sequence. Where laboratory analyses are included in the commodity specifications, the inspection certificate must include actual laboratory results for each required test. If the commodity or commodities meet the specifications without exception, the inspector shall conclude his report stating, if true:

> "We attach our 'Laboratory Report, and Certificate of Weight Verification,' each containing an attestation confirming the supplier's conformance to the contracted commodity specifications. On the basis of inspections and tests we conducted in accordance with our contract and the aforesaid attestations, we certify and confirm that the subject shipping lot meets all of the commodity, bagging, marking, and weight requirements stipulated in the contracted commodity specifications."

2. The "Laboratory Report" so labeled shall:

   a. Identify the supplier's contract with the purchaser.

   b. Identify the shipping lot tested and analyzed.

   c. State the contracted commodity specifications, and the laboratory's corresponding analysis of the fertilizer, and shall if true,

   d. Attest that through use of the testing procedures stipulated in the Section above, and other means available to it, the fertilizer met the stated commodity specifications.

The "Laboratory Report" shall be issued in the name of the purchaser and be dated and signed by an executive authorized to bind the laboratory and/or the inspection firm.

3. The "Certificate of Weight Verification," so labeled, shall be issued by the inspection firm under its letterhead, and be dated and signed by an executive authorized to bind the firm. The certificate shall state in so many words the date the data were taken and the number and weight of unbroken bags duly filled with fertilizer delivered to the ocean carrier, or in the case of bulk goods, contain an attestation from the weighmaster at the port as to the weight loaded aboard ship.

4. The "Certificate of Inspection and Approval" shall be typewritten under the letterhead of the U.S. inspection firm, and shall be dated and signed by an officer authorized to bind the firm. The certificate shall contain no exculpatory provisions exempting the inspection firm from the performance of its contracted obligations. Provision of inspection services by an independent inspection firm shall not relieve the supplier from his responsibility to assure that he has inspected and tested the shipping lot before calling for inspection, nor from his responsibility to assure that each lot has met the specifications of the commodity contract.

VII. INSPECTION CLAUSES FOR PROCUREMENT DOCUMENTS

A. When inspection is arranged by the Supplier:

1. Fertilizer inspection and weight determination will be performed by an independent inspection firm for the account of the supplier in accordance with specifications set forth herein.

2. The cost of inspection and certification of weight must be included in the offered price.

3. Certificate of Inspection and Approval issued by any of the independent inspection firms listed in the IFB will be accepted. Bids must include the name of the inspection firm choosen, and the name of the laboratory to be used if other than its own.

4. Suppliers wishing to use inspection firms other than those shown herein must receive prior approval from A.I.D., SER/COM/CPS, in Washington, D.C. before the use of another firm.

B. When inspection is arranged by the Purchaser:

1. The cost of inspection and certification of weight is for the account of the Purchaser and is not to be included in the offered price.

2. Purchaser at its sole cost and expense shall have the right to inspect the fertilizer at all reasonable times prior to shipment thereof. Supplier agrees to grant Purchaser's Agents and representatives any and all reasonable access for the purpose of inspection at Supplier's plant, and at Supplier's subcontractor's plant, if any. Purchaser will provide the Supplier with the name and address of the firm which will perform the inspection services on Purchaser's behalf.

3. Certificate of Inspection and Approval will be issued by one of the independent inspection firms listed in the IFB, or other firm having prior approval of A.I.D.

4. Inspection will be performed by the independent inspection firm in accordance with the specifications set forth herein.

K-gran™

GRANULAR MURIATE OF POTASH

TYPICAL ANALYSIS

CHEMICAL ANALYSIS	Percent
KCl	95.9
K_2O (as is)	60.6
H_2O	0.3
K_2O (dry)	60.7
K	50.3
Na	1.12
Mg	0.11
Ca	0.11
Cl	47.4
S	0.15
H_2O Insol.	0.60
Fe	0.038
Al	0.028
Br	0.065

SCREEN ANALYSIS
TYLEP STANDARD SCALE
(% Cumulative)

+ 6 Mesh	0
+ 8 Mesh	35
+10 Mesh	80
+14 Mesh	95
+20 Mesh	98
+35 Mesh	99

DENSITY
POUNDS PER CUBIC FOOT

Poured	62
Packed	67

ANGLE OF REPOSE

Degrees	33

DAP™

DIAMMONIUM PHOSPHATE

TYPICAL ANALYSIS

CHEMICAL ANALYSIS –	Percent as is
N (ammoniacal)	18.0 (Min.)
P_2O_5 (A.P.A.)	46.0 (Min.)
H_2O	1.9
CaO	1.1
Fe_2O_3	1.3
Al_2O_3	1.2
MgO	0.6
K_2O	0.2
Na_2O	0.3
F	2.0
SO_4	4.8
Water Soluble A.P.A.	92% of total

SCREEN ANALYSIS
TYLER STANDARD SCALE
(% Cumulative)

+ 6 Mesh	3
+ 8 Mesh	60
+10 Mesh	93
+14 Mesh	99
+20 Mesh	99
+35 Mesh	100

BULK DENSITY
POUNDS PER CUBIC FOOT

Poured	58
Packed	63

ANGLE OF REPOSE

Degrees	26.5

For samples: Call our toll-free number, 800-243-2980, or write to:
AMAX Chemical Corporation, 35 Mason St., Greenwich, Connecticut 06830.

AMAX
CHEMICAL CORPORATION

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Printed in U.S.A.

Product Data
Product Data Product Data
oduct Data Product Data Product Data

ANHYDROUS AMMONIA (Commercial Grade)

Description:

Colorless gas with a characteristic pungent odor. Easily liquified under pressure and very soluble in water, alcohol and ether. Used in organic preparation. Is a hazardous liquid and gas under pressure.

Typical Chemical Analysis:

Ammonia	99.7 wt. %
Moisture	0.2 wt. %
Oil	5 ppm

Agrico International
ONE OF THE WILLIAMS COMPANIES
P.O. Box 3166 • Tulsa, Oklahoma 74101, USA
Telex: 497523 AGRICHEM TUL
Telephone: (918) 588-3526

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10/345 6

72/70% Run-of-Mine Florida Phosphate Rock

Contract Specifications
Dry Basis

BPL Nominal	72.0%
BPL Minimum	70.0%
Moisture Maximum	3.5%
Combined Oxides of Iron and Alumina	As mined (expected maximum 4%)

Typical Range of Chemical Analysis
Dry Basis

Phosphoric Acid (P_2O_5)	32.0	-	33.0
Calcium Oxide (CaO)	47.8	-	49.2
Iron Oxide (Fe_2O_3)	1.1	-	1.7
Aluminum Oxide (Al_2O_3)	0.8	-	1.2
Silica (SiO_2)	5.5	-	7.0
Fluorine (F)	3.7	-	3.9
Carbon Dioxide (CO_2)	3.7	-	4.2
Magnesium Oxide (MgO)	0.4	-	0.6
Arsenic (As_2O_3)	0.0012	-	0.0020
Potassium Oxide (K_2O)	0.10	-	0.15
Sodium Oxide (Na_2O)	0.6	-	0.8
Organic Carbon (C)	0.20	-	0.30
Sand and Insol	5.0	-	7.8
BPL	70.0	-	72.0

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GRANULAR UREA
46-0-0

Guaranteed Analysis

Nitrogen Content	46.0% as N, minimum
Chemical Conditioner	0.6%, maximum
Biuret Content	1.5%, maximum
Moisture Content	0.5% as H_2O, maximum
Screen Size (Tyler)	90.0% −6 + 16 mesh, minimum
	100% −4 mesh; 98% +28 mesh
Physical Condition	Granular, free-flowing

Typical Chemical Analysis

Nitrogen	minimum 46.0%
Moisture	0.2 - 0.3%
Biuret	1.2 - 1.4%
Conditioner	0.3 - 0.4%

Typical Sieve Analysis

Tyler Mesh	Tyler Metric Equivalent (screen opening)	Cumulative % Retained
+ 6	3.33 mm	1 - 3%
+ 9	1.98 mm	65 - 90%
+ 14	1.17 mm	96 - 99%
+ 20	.83 mm	98%

Typical Stowage Factor

Cubic feet required to stow one *long ton* of bulk product.

bulker	49
'tween decker	55/60

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GRANULAR MONOAMMONIUM PHOSPHATE (MAP)
11-53-0

Guaranteed Analysis

Nitrogen content (Total)	11.0% as N, minimum
Phosphorus content	
Available	53.0% as P_2O_5, minimum
Water soluble	45.1% as P_2O_5, minimum
Moisture content	2.0% as H_2O, maximum
Screen size (Tyler)	90.0% −6 + 16 mesh, minimum
	100% − 4 mesh; 98% + 28 mesh
Physical condition	Granular, free-flowing

Typical Chemical Analysis

Total Nitrogen	11.0 - 11.4%
Total P_2O_5	53.4 - 53.9%
Neutral Citrate Insoluble P_2O_5	0.2 - 0.8%
Available P_2O_5	minimum 53.0%
Moisture	1.0 - 1.8%
Water Soluble P_2O_5	45.2 - 47.8%
Fe	1.2 - 1.7%
Al	0.6 - 1.0%
S	1.5 - 2.0%
Ca	0.1 - 0.5%
Mg	0.4 - 0.7%
As	4 - 6 ppm

Typical Sieve Analysis

Tyler mesh	Tyler metric equivalent (screen opening)	cumulative % retained
+ 6	3.33 mm	1 - 3%
+ 9	1.98 mm	30 - 70%
+ 14	1.17 mm	80 - 95%
+ 20	.83 mm	98%

Typical Stowage Factor

Cubic feet required to stow one *long ton* of bulk product.

bulker	40
'tween decker	45/50

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201

'214-6

GRANULAR DIAMMONIUM PHOSPHATE (DAP)
18-46-0

Guaranteed Analysis

Nitrogen content (nitrate free)	18.0% as N, minimum
Urea nitrogen	1.5% as N, maximum
Phosphorus content	
Available	46.0% as P_2O_5, minimum
Water soluble	39.1% as P_2O_5, minimum
Moisture content	2.0% as H_2O, maximum
Screen size (Tyler)	90.0% −6 + 16 mesh, minimum
	100% −4 mesh; 98% +28 mesh
Physical condition	Granular, free-flowing

Typical Chemical Analysis

Total Nitrogen	18.0 - 18.2%
Total P_2O_5	46.1 - 46.3%
Neutral Citrate Insoluble P_2O_5	0.1 - 0.3%
Available P_2O_5	minimum 46.0%
Water Soluble P_2O_5	39.1 - 42.3%
Moisture	1.4 - 1.8%
Fe	1.2 - 1.8%
Al	0.6 - 1.0%
S	1.5 - 2.0%
Ca	0.1 - 0.3%
Mg	0.3 - 0.6%
As	4 - 6 ppm

Typical Sieve Analysis

Tyler mesh	Tyler metric equivalent (screen opening)	cumulative % retained
+ 6	3.33 mm	1 - 3%
+ 9	1.98 mm	30 - 70%
+14	1.17 mm	80 - 95%
+20	.83 mm	98%

Typical Stowage Factor

Cubic feet required to stow one *long ton* of bulk product.

bulker	40
'tween decker	45/50

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Product Data

AGRICO NITROGEN SOLUTION
(UREA-AMMONIUM NITRATE)
32-0-0

Description:

A non-pressure solution containing urea and ammonium nitrate in water. It is used for direct application and as an ingredient in the manufacture of NP and NPK grades Pesticides, secondary and micronutrients may be added to UAN solution This fertilizer may also be added to irrigation systems; either ditch or sprinkler types

Typical Chemical Analysis:

Urea	35.40%
Ammonium Nitrate	44.30%
Total Nitrogen	32.00%
Corrosion Inhibitor	.15%
pH	7.0
Free Ammonia	500 ppm

Typical Physical Properties:

Salting out temperature	+29°F (-2°C)
Specific Gravity @ 60°F (16°C)	1.336
Weight per Gallon @ 60°F (16°C)	11.04 lbs

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Agri-Chemicals
Division of United States Steel

Product Specification Sheet

PRILLED AMMONIUM NITRATE (34.0-0-0)

DENSE PRODUCT MANUFACTURED AT CHEROKEE, ALABAMA

CHEMICAL ANALYSIS (WEIGHT PERCENT)

	Guarantee	Typical	Range
Total Nitrogen (N)	34.0	34.0	34.0-34.2
Ammonical		17.0	
Nitrate		17.0	
Coating Agent		2.0	
Moisture		0.2	

TYPICAL SCREEN ANALYSIS (WEIGHT PERCENT, U.S.SIEVE)

+6	0.0
-6+8	5.0
-8+14	87.0
-14+20	8.0
-20	0.0

BULK DENSITY

Loose Bulk Density, lbs. per cu. ft.	56	53-60
Packed Bulk Density, lbs. per cu. ft.	60	58-62

MANUFACTURED AND STORED

Manufactured: Cherokee, Alabama
Stored: Cherokee, Alabama

Technical Services 01/16/81

Agri-Chemicals
Division of United States Steel

Product Specification Sheet

14-14-14 VERTAGREEN POWR PRILS

CHEMICAL ANALYSIS (WEIGHT PERCENT)

	Guarantee	Typical	Range
Total Nitrogen (N)	14.0	14.1	14.0-14.4
Ammonical		14.1	
Total Phosphate (P_2O_5)		14.0	
Citrate Insoluble P_2O_5		0.1	
Available P_2O_5	14.0	14.0	14.0-14.7
Water Soluble P_2O_5		13.0	
Potash (K_2O)	14.0	14.1	14.0-14.7
Sulfur (S)	10.0	10.0	
Boron (B)	0.02		
Manganese (Mn)	0.05		
Zinc (Zn)	0.05		
Coating Agent		0.5	
Moisture		1.6	

TYPICAL SCREEN ANALYSIS (WEIGHT PERCENT, TYLER)

+6	1.2
-6+14	96.8
-14	2.0

BULK DENSITY

Loose Bulk Density, lbs. per cu. ft.	59	58-62
Packed Bulk Density, lbs. per cu. ft.	62	60-65

ANGLE OF REPOSE

32°

DERIVED FROM

Phosphoric Acid, Ammonia, Sulfuric Acid and Muriate of Potash

MANUFACTURED AND STORED

Manufactured: Cherokee, Alabama
Stored: Cherokee, Alabama

Technical Services 3/31/80

11-22-22 VERTAGREEN POWR PRILS WITH Mg

CHEMICAL ANALYSIS (WEIGHT PERCENT)

	Guarantee	Typical	Range
Total Nitrogen (N)	11.0	11.1	11.0-11.5
Ammonical		11.1	
Total Phosphate (P_2O_5)		22.2	
Citrate Insoluble P_2O_5		0.1	
Available P_2O_5	22.0	22.1	22.0-22.5
Water Soluble P_2O_5		20.4	
Potash (K_2O)	22.0	22.1	22.0-22.5
Boron (B)	0.02		
Manganese (Mn)	0.05		
Zinc (Zn)	0.05		
Magnesium (Mg) (Water Soluble)	0.50		
Coating Agent		1.0	
Moisture		1.6	

TYPICAL SCREEN ANALYSIS (WEIGHT PERCENT, TYLER)

+6	1.0
-6+14	97.0
-14	2.0

BULK DENSITY

	Typical	Range
Loose Bulk Density, lbs. per cu. ft.	64	63-65
Packed Bulk Density, lbs. per cu. ft.	73	71-76

ANGLE OF REPOSE — 33^{o}

DERIVED FROM
Phosphoric Acid, Ammonia and Muriate of Potash

MANUFACTURED AND STORED
Manufactured: Cherokee, Alabama
Stored: Cherokee, Alabama

Technical Services 5/14/80

Special Standard Muriate of Potash

Chemical Data

	Range	Typical	Guarantee
K_2O %	60.0 –60.8	60.3	60.0 min.
Moisture %	0.10– 0.18	0.13	

Physical Data, % Cumulative

(Tyler Mesh)	Opening		
+ 35	(420 microns)	0–15	12
+ 48	(297 microns)	25–50	35
+ 65	(210 microns)	45–85	70
+100	(149 microns)	75–95	86
+150	(105 microns)	93–100	95

Typical bulk density, loose, 67-70 lbs/ft³
Angle of repose, 28-30 degrees

Typical Chemical Analysis

	Percent
K	50.3
Mg	0.26
Ca	0.02
NaCl	3.6
Cl	47.75
SO_4	0.04
Insol.	0.43
H_2O	0.13

International Minerals & Chemical Corporation

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Standard Muriate of Potash

Chemical Data	Range	Typical	Guarantee
K_2O %	60.0 –61.5	60.8	60.0 min.
Moisture %	0.06– 0.12	0.10	

Physical Data, % Cumulative

(Tyler Mesh)	Opening		
+14	(1.19 mm)	0–6	4
+20	(841 microns)	17–32	23
+28	(595 microns)	42–63	55
+35	(420 microns)	66–90	76
+48	(297 microns)	84–98	90
+65	(210 microns)	93–100	96

Typical bulk density, loose, 67-72 lbs/ft³
Angle of repose, 29-31 degrees

Typical Chemical Analysis

	Percent
K	50.5
Mg	0.30
Ca	0.02
NaCl	3.5
Cl	47.86
SO_4	1.0
Insol.	0.30
H_2O	0.10

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Coarse Muriate of Potash

Chemical Data		Range	Typical	Guarantee
K_2O %		60.0 –61.5	61.1	60.0 min.
Moisture %		0.10– 0.18	0.12	

Physical Data, % Cumulative

(Tyler Mesh)	Opening			
+ 8	(2.38 mm)	5–25	16	
+10	(1.68 mm)	35–70	45	
+14	(1.19 mm)	65–93	80	
+20	(841 microns)	87–99	95	
+28	(595 microns)	97–100	98	

Typical bulk density, loose, 69-71 lbs/ft^3
Angle of repose, 31-33 degrees

Typical Chemical Analysis

	Percent
K	50.7
Mg	0.10
Ca	0.02
NaCl	2.8
Cl	47.75
SO_4	0.04
Insol.	0.45
H_2O	0.12

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1762 3/73 Printed in U.S.A.

Granular Muriate of Potash Esterhazy

Chemical Data		Range	Typical	Guarantee
K_2O %		60.0 —61.5	60.8	60.0 min.
Moisture %		0.05— 0.12	0.07	

Physical Data, % Cumulative

(Tylor Mesh)	Opening			
+ 6	(3.36 mm)	1—10	7	
+ 8	(2.38 mm)	30—60	45	
+10	(1.68 mm)	60—90	80	
+14	(1.19 mm)	90—97	96	
+20	(841 microns)	97—100	98	

Typical bulk density, loose, 66-68 lbs/ft³
Angle of repose, 32-34 degrees

Typical Chemical Analysis

	Percent
K	50.5
Mg	0.12
Ca	0.02
NaCl	3.2
Cl	47.85
SO_4	0.04
Insol.	0.37
H_2O	0.07

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Granular Muriate of Potash Carlsbad

Chemical Data		Range	Typical	Guarantee
K_2O %		60.0 —61.5	60.4	60.0 min.
Moisture %		0.05— 0.12	0.07	

Physical Data, % Cumulative

(Tyler Mesh)	Opening			
+ 6	(3.36 mm)	TR—10	5	
+ 8	(2.38 mm)	25—50	38	
+10	(1.68 mm)	60—90	75	
+14	(1.19 mm)	90—97	93	
+20	(841 microns)	97—100	99	

Typical bulk density, 64 lbs/ft³ loose, 72 lbs/ft³ packed
Angle of repose, 32-34 degrees

Typical Chemical Analysis

	Percent
K	50.1
Mg	0.25
Ca	0.03
NaCl	2.0
Cl	46.70
SO_4	1.16
Insol.	0.29
H_2O	0.07

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1702 3/73 Printed In U S A

10-50-0
(Monoammonium Phosphate Powder)

Chemical Data*	Range	Typical	Guarantee
Available Nitrogen %	10.0—10.5	10.2	10.0 min.
Total P_2O_5 %	50.2—51.0	50.4	—
Available P_2O_5 %	50.0—50.8	50.2	50.0 min.
Water Soluble P_2O_5 (As % of Available P_2O_5)	75—80	78	—
Water Soluble Nitrogen (As % of Available N)	88—91	90.0	—
Moisture %	0.5— 1.5	1.0	—
pH	4.2— 5.0	4.7	—

*Nitrogen and P_2O_5 specifications on bone dry basis.

Physical Data % Cumulative

(Tylor Mesh)	Opening		
+ 20	(841 microns)	3—10	6
+100	(149 microns)	70—90	80
+200	(74 microns)	96—99	97

Bulk density, 58-62 lbs/ft³
Angle of repose, 30-34 degrees

IMC International Minerals & Chemical Corporation

1702 2/79 Printed in U.S.A.

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Code 44

Texasgulf

Tgreen solution

10-34-0

Typical Analysis

Component	Typical Percent	Guaranteed Percent
Total nitrogen, as N	10.0	10.0 minimum
Total P_2O_5	34.0	34.0 minimum
Polyphosphate, % of total P_2O_5	72.0	
Iron, as Fe_2O_3	0.5	
Aluminum, as Al_2O_3	0.4	
Fluoride, as F	1000 PPM	
Magnesium, as MgO	0.2	
Sulfate, as SO_4	2.2	
Calcium, as CaO	0.0	
Solids	0.0	
Specific Gravity at 75°	1.395	
pH	5.95	
Color	Green	

Viscosity

Apparent Brookfield Temperature °F	Centipoise
40	80
60	70
100	40

Texasgulf Chemicals Co.
P.O. Box 30321
Raleigh, North Carolina 27622
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3/81

Workshop on
Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994
Bamenda, Cameroon

Soil Testing and Plant Analysis

(Resource Paper)
for

Developing a Soil Testing Program

Prepared by

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Muscle Shoals, Alabama 35662, U.S.A.
Sponsored by
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Soil Testing and Plant Analysis

The goal of fertilization for the farmer, and for the fertilizer dealer serving the farmer, is to increase profits returned from farming through fertilizer use. It is not difficult to convince farmers that additional nutrients above those available from the soil are needed by the crop to increase his profits, the more difficult question is how much of each nutrient is needed to maximize profits.

The most practical approach to predict fertilizer needs and identify nutrient problems is to use soil testing and plant analysis. An understanding of the application, limitations, and strengths of soil testing and plant analysis will enable marketing strategies to utilize these tools effectively.

Soil testing and plant analysis techniques have been applied as guides to fertilizer use to firstly maximize the benefit to using fertilizers, to decrease environmental pollution hazards, and to avoid the development of other nutritional problems due to nutrient imbalances. They are indispensable tools to serve the customer. As with any tools they can be misused and misunderstood, leading to lost opportunities for both the farmer and the fertilizer dealer.

I. Soil Testing

Since the 1940s, soil testing has been viewed as a valuable tool to predict fertilizer needs. Techniques have been developed and applied to solve plant nutrition problems, some of which are practically universal, while others are very specific for particular areas. It involves four major stages:

1. Taking a representative soil sample from a field or part of a field.

2. Performing a chemical test on the soil in a laboratory.

3. Interpreting the meaning of the chemical test.

4. Making fertilizer recommendations based on the interpretation of the test.

The entire process is analogous to a medical doctor diagnosing the needs of a human patient from a set of laboratory tests and consultations with the patient. Years of experiments and many personal judgments go into the process, and it all must be based on knowledge developed from extensive research in the particular geographical area of concern.

Stage 1. Soil Sampling

The process of soil testing is based on the assumption that the soil sample submitted to the soil testing laboratory is representative of a particular field. It has been estimated that as much as 50% of the soil tests performed in the United States are of less than maximum value because of improper soil sampling techniques (Jones, 1984). The success of a soil test depends on the representativeness of the soil samples.

A thorough discussion of the factors that affect soil fertility variation in a field, and correct soil sampling techniques, is beyond the scope of this presentation. Appropriate procedures to take representative soil samples have been developed and these methods are available from the laboratory and extension personnel associated with the soil testing facility.

Probably the most important advice in sampling soils is to avoid unusual areas such as manure piles, dead furrows, old fence lines, and fertilizer bands. It is practically impossible to "average out" fertility differences since a very small sample is taken (perhaps 500 g) from such a huge soil mass (over 10^9 g for a 5-ha field). If a field varies in slope or soil type, separate samples should be taken from the identifiable areas, or a decision to sample only the most predominant area should be made. Differences in crop management can also lead to large differences in fertility, so this leads to difficulties when small fields are combined into larger ones.

The soil test and recommendation can only be as good as the samples taken. Every effort should be made to take good soil samples by consultations with the farmer and use of soil maps to try to ensure that the samples are representative. Confidence in soil testing is often eroded when poor sampling results in widely divergent fertilizer recommendations from year to year.

Stage 2. Chemical Test

The chemical tests are rapid laboratory procedures which are used to predict the major nutrient needs of crops (N, P, K) and sometimes other nutrients, particularly S, Zn, or B, depending on known deficiencies of the area. Other tests for soil pH, soluble salts, soluble sodium, and organic matter are also performed to indicate other soil characteristics or problems that can be important to develop reliable liming and management recommendations.

Different tests or techniques are used in different areas to obtain the best relationship between the test value and crop performance. Thus, different extractants and different absolute magnitudes of the derived numbers are used by different laboratories to meet specific soil characteristics. Few tests are universally applicable.

Stage 3. Interpretation of the Soil Tests

The chemical soil test results are simply numbers with particular units of measurement. Without knowledge of what a particular test result represents and whether that number indicates a low, medium, or high state of fertility, the number by itself is meaningless. The correlation of the number to a nutrient status of a soil is what is meaningful, and its reliability depends on the quality and the quantity of research used to establish the relationship of yield to test value for each nutrient.

Farmers and dealers ultimately need to know not only the status of nutrients (very deficient, deficient, sufficient, highly fertile), but how much of a fertilizer nutrient should be applied to achieve a particular yield. This is called correlation and calibration. However, yield is not dependent solely on soil nutrients but also on many other factors–the genetic ability of the crop, rainfall amount and timing, sunlight, diseases, insects, weeds, rooting conditions, and other factors. This makes the relationship of nutrient level and yield at best tenuous. Extensive field research is needed to estimate and integrate all the factors that influence nutrient status, fertilizer application, and crop yield. When trials with different fertilizer rates are conducted, controllable growth factors are kept as optimal as possible in order for the benefits of nutrients to be manifest. Extensive field research is conducted for many years and sites to relate test results and crop response for each nutrient.

Stage 4. Making the Fertilizer Recommendation

In making fertilizer recommendations many factors must be considered besides the nutrient status. Crops have different nutritional needs and abilities to absorb nutrients, so the crop, and possibly even the variety, must be considered. Their abilities to absorb nutrients are very related to their rooting depth and pattern, the crop's growth duration, and the environment in which the crop is grown. For instance, upland rice might have a similar recommendation to the other small grains, while the recommendation for flooded rice will be much different, due to the differences in N dynamics and P availability of flooded versus upland conditions.

Additional factors that affect how much fertilizer should be applied, and how it can be best used are:

Yield Goal–The farmer's yield goal is a major factor to be considered, since more nutrients are required to support the growth of a larger crop. The yield should be a realistic goal for the farmer, depending on the soil limitations, climatic constraints, pest problems, etc., that he faces. An excessively high yield goal will probably call for a higher recommendation than he should use and will result in inefficient use of the fertilizer, reduced income for the farmer, and difficulties in maintaining a customer.

Method of Application–The method of fertilizer application should be considered in recommendations since the efficiency of the nutrient use can vary greatly with different application methods. An example of this is the greater efficiency of P use with banded than with broadcast, incorporated applications. Based on fieldwork to establish the relationships, 20 kg/ha P banded might be equivalent to 40 kg/ha broadcast incorporated preplant. The placement effect cannot usually be shown for a mobile nutrient like N, but the method of N application, whether split applied or preplant incorporated, may have a large effect on the losses of N and consequently the N recommendation may include management suggestions as well as rates.

Relative Cost and Benefit–The relative value of the crop in relation to the cost of the nutrient must be given a large consideration in making recommendations. Fertilizer response follows a pattern of diminishing returns with higher rates applied. Since costs as well as yield can only be approximated, a large part of this aspect of fertilizer recommendation relies on personal judgment and experience of the scientists conducting the soil testing correlation research and his knowledge of the relative costs of the crop produce and the fertilizer.

Previous Crop—The previous crop is very important in making fertilizer recommendations, particularly those for crops following legumes. The residues from a good soybean crop may produce 40 kg N/ha for the next crop. If the land was fallowed for a growing season, available nitrate may accumulate and less N fertilizer will be needed by the next crop. In most cases, farmers are asked to supply the crop and the yield obtained for the last 2 years to the laboratory doing the testing. Also the amounts of fertilizer applied in previous years may be requested. This information may be used to either increase or decrease the recommendation. If the farmer applied a reasonable amount of N for one crop, but the crop yield was very low because of drought, for instance, a large part of the N would probably still be available for this crop. While if the farmer took off a large yield of stover, there would be little left for the next crop and the N recommendation may have to be increased.

Examples of How Soil Testing Works

If a crop is grown under particular growth conditions and a single fertilizer is applied at several application rates, a nutrient response curve for that site, crop, and season is determined. Normally, all other nutrients are applied at sufficient amounts to ensure that they are not deficient. Considering a particular soil test, cropping history, etc., a particular fertilizer recommendation, R, can be made (Figure 1).

Curve I—Curve I illustrates a desired response curve, which would be found if the sampling technique, correlation, and calibration research results are all working well. The correlation work predicted that a response would be obtained and the rate was near, but not beyond, the maximum yield obtained.

Curve II—Curve II illustrates a situation in which a response was predicted, but the calibration work was not correct. Therefore, either the fertilizer was under applied, or growth conditions changed the expected response curve. Similarly, another curve with a steeper slope might have been obtained due to improper calibration and too much fertilizer was applied at R.

Curve III—If a response shown in Curve III is found, the correlation information was not correct, since a response was predicted (since fertilizer was recommended), but no response was found. The farmer did not receive any profit from fertilization of that year's crop.

Curve IV–The correlation may not indicate the degree of deficiency, and more fertilizer use may have been warranted.

Few Guarantees in Life

The entire procedure does not have a guarantee that it will work to the farmer's best advantage, but it is the best estimate of what rate will be the most economically rewarding for the farmer.

A properly calibrated soil test should provide the following important information on the use of fertilizers to the farmer:

1. Identify the degree of deficiency or sufficiency of the nutrient.

2. Identify how much of the nutrient should be applied.

3. Suggest fertilizer management techniques.

4. Point out factors other than nutrients that may need attention.

If one soil sample were divided and sent to several soil testing laboratories, the fertilizer recommendations might vary tremendously, even though the chemical test results are usually found to be the same. Tables 1 and 2 show examples of the discrepancies found in recommendations from different laboratories for a split soil sample. It is important to note that in the examples shown, the laboratory tests were in very close agreement, but the recommended rates varied wildly. The largest discrepancies in fertilizer recommendations result from differences in the philosophies of the testing laboratories and the motivation of the person making the recommendation.

Soil Testing Philosophies

Two philosophies, as well as hybrids thereof, may be applied to recommending fertilizer rates: (a) the sufficiency level approach and (b) the buildup/maintenance approach. The sufficiency level approach is oriented to fertilize each crop, i.e., derive the maximum economic yield for the current crop. The buildup/maintenance approach is oriented to *fertilize the soil* and generally is designed to cause a buildup of the nutrient until no more fertilizer is recommended, and then annual replacements of the amount of nutrients removed by the crop are applied. The buildup/maintenance approach may be preferable to the farmer and the dealer under some circumstances.

Approaching soil testing as a fertilizer marketing tool, it is clear that the use of the buildup/maintenance approach may be a good short-term marketing strategy, particularly on very deficient soils with relatively low-risk agronomic situations. In higher risk, or low-cash availability situations, the sufficiency level approach may offer a better strategy even when the dealer's short-term profits are curtailed.

In practice, these two philosophies are frequently integrated to try to obtain the best returns from fertilizer use. For soils that test very low in P or K, for instance, the buildup of nutrients may be recommended so maximum early benefit can be obtained and rates may be reduced in the future. At high soil test levels, more conservatism is warranted, as will be discussed more thoroughly later. Therefore, a buildup philosophy may be applied for low test values of P and K, while a sufficiency approach is more warranted at higher test values. Crop removal must be considered to maintain fertility and not cause excessive "mining" of soil fertility. At very high soil test values, a degree of "mining" may be desirable to reduce fertilizer costs for a period of time to avoid nutrient imbalances, such as excess P causing the development of Zn deficiencies, or to reduce nitrate contamination of groundwater.

Tests for Nutrients and Soil Problems

Actual analytical procedures vary with location to meet particular needs and generally are not too important to users unless in-depth understanding of soil reactions, testing, and calibration is needed. Tests generally performed and their uses are as follows:

pH–The soil acidity or pH is an extremely important parameter since the pH greatly affects the availability of many soil nutrients and provides the basis for lime recommendations. The pH alone may not provide a reliable lime recommendation, and a measurement of "reserve" acidity may be necessary. Consider, for instance, how much easier it would be to raise the pH of a very sandy soil with few protons (H^+) on soil cation exchange sites in comparison to a clay soil high in organic matter, with large amounts of H^+ ion exchange which must be neutralized. The availability of P is the major nutrient affected by soil pH. In many cases, P deficiencies can be greatly decreased by liming the soil. The plant availability of micronutrients, which are mainly metals, is largely pH dependent.

N–Nitrogen is used by plants in the highest amount of all the nutrients. Soil tests which reliably predict N needs are very difficult to attain. The reasons for this are that available N forms are highly mobile in soil and are mainly derived from soil organic material. Available forms of N (nitrate in upland soils, ammonium in flooded soils) are continually interchanged with organic forms which are not available to the plant. Some laboratories use an organic matter determination to make N recommendations, while others use simply the crop, yield goal, and past cropping (estimate for N derived from previous legume crops) to make a recommendation. In semiarid areas, where plant available nitrate-N rarely leaches from the crop rooting zone, nitrate tests on soil samples taken to a 50- or 60-cm depth are used with a good reliability.

P–Phosphorus is immobile in soils, so it tends to stay in a band or at the soil surface if the soil is not tilled. The P tests used are generally dilute acids or bases which attempt to estimate "available" P, that is, the fraction of the total P which is expected to be available during crop growth. Soil P can only be lost through erosion and crop removal, but much of the fertilizer P becomes unavailable as relatively insoluble compounds in the soil.

K–Potassium that is available to the crop is held on cation exchange sites of organic matter and clays. Therefore, to measure its availability, K is displaced by another cation and the amount of K displaced is measured. This test is practically universal, and with only one form of K to measure, it is probably the easiest element for which to establish recommendations. But other cations can affect the ability of the plant to take up K, so testing for other cations may be needed to develop good recommendations for some soils.

Soluble Salts–These tests are used in areas where alkaline soils are present, generally in semiarid regions, or for closed, sealed depressions where salts accumulate. The tests are used to advise a farmer about salt problems and to recommend management practices to help alleviate or avoid problems. These tests are especially important in irrigated areas where marginal or poor quality water is used. Soluble salts accumulate when water is not applied in large enough quantities to leach the salts below the root zone.

Other Nutrients–Besides the normal nutrient needs of N, P, and K, other deficiency problems have been identified in particular areas, principally sulfur, zinc, and boron. In some areas and crops, even chlorine has been identified as deficient. These nutrients can be tested for and recommendations made with varying degrees of success. In many cases a tissue or plant analysis is far more reliable to identify deficiencies of these nutrients and of the other remaining nutrients (Ca. Mg, Fe, Mo, Cu, Cl, and Mn) since, in general, soil tests are not very reliable.

II. Plant Analysis

The basic philosophy and approach to plant analysis as a tool to determine fertilizer needs is similar to that for soil testing. Representative, properly handled samples must be sent to a laboratory, and the nutrient concentrations in the tissue have to be interpreted correctly for the effort to have any validity. There are a few basic differences that should be noted:

1. Soil *testing* tries to estimate what is available to the plant, while plant *analysis* measures the nutrient actually in the plant.

2. Plant analysis has the advantage over soil testing in that the plant nutrient contents can reflect the entire environment in which the plant grows, both below the ground and above. Particular growth conditions, as well as nutrient imbalances, can induce certain deficiencies which would not be shown by a soil test but can be detected in the plant. However, with annual crops plant analysis is more like an autopsy than a diagnosis and prescription. It is usually too late to help the current crop, but it may be more definitive and exacting than a soil test for next year's crop, particularly for the diagnosis of minor or micronutrients which are difficult to determine from soil tests. Tissue analyses of perennial crops are an important diagnostic tool to monitor nutrient status and prescribe fertilizers.

3. It requires a higher level of sophistication in sampling techniques, laboratory facilities, and interpretation than does soil testing.

4. It can be best utilized to complement rather than replace soil testing programs.

Specific plant parts and sampling procedures are used for different crops at different stages of growth. As in soil testing, the sampling technique is calibrated to the rest of the analytical and interpretation procedures, so it must be rigorously followed. The amount of nutrients in particular plant parts can vary widely in a crop over the growing season.

Plant analysis is a very valuable tool under certain circumstances:

1. To determine nutrient needs of plantation or perennial crops (tree crops, coffee, etc.).

2. To identify visible symptoms, especially if one area of the field shows symptoms and the other does not. Analyses from both areas can then be compared readily.

3. To identify hidden problems. Visible symptoms may not be manifest, while nutrient deficiencies may be indicated by a plant analysis.

4. To survey areas for deficiencies. Where micronutrient deficiencies are suspected, a survey may determine problems that could otherwise require many field experiments with and without many different nutrients.

5. To determine if nutrients actually are entering the plant and identify interactions between nutrients. These interactive problems can be very difficult to determine from soil tests. Examples are excess P limiting Zn uptake and interactions of Mg and Ca with K uptake.

Nutrients used by crops in large amounts (termed macronutrients, N, P, K, and S), follow a general pattern of yield to nutrient content (Figure 2), and the minor elements and micronutrients (Ca, Mg, Zn, Fe, Cu, Mn, Mo, B, and Cl) follow a slightly different pattern (Figure 3). The macronutrients tend to affect uptake and yield over a fairly wide range. The nutrients used in lesser amounts generally have a much sharper change from deficiency to sufficiency, and the sufficiency plateau is generally pretty wide. However, in certain cases, such as B, the area between deficiency and excess can be quite narrow. These diagrams are not universally applicable to all nutrients and crops, since crops vary greatly in their demand for nutrients, their response, and their ability to discriminate nutrient ions.

III. Relationship of Fertilizer Costs and Yield Benefit in Determining Recommendations

Yield response (or similarly crop value) can be related to the application rate of a particular nutrient by a quadratic mathematical expression:

$Y = a + bx - cx^2$,
or yield (kg/ha) = yield with no fertilizer + a linear
coefficient "b" times the rate of fertilizer (x)
- a quadratic coefficient "c" times the rate squared.

But to determine the economically optimum rate (EOR), the cost of the fertilizer relative to the value of the crop must be considered. At the economically optimum rate the slope of line tangent to the curve of the value of the crop is equal to the slope of the linear function of the fertilizer cost (Figure 4). Putting in the relative cost per unit of the fertilizer related to the value of the crop, or the price ratio (PR), and the response function (in value of the crop) distills down to the relationship:

$b - 2cx = PR$
(with the coefficients the same as above, and the PR is the
cost of 1 kg of nutrient:value of 1 kg of crop)

The important thing to remember about this relationship is for a very responsive soil (b is large), the EOR changes very little with changes in PR, while with a poor response (b is small, because the soil nutrient level is high or response is low due to climatic, management, or other limiting factors) then the EOR changes greatly with changes in PR. This is illustrated in Table 3. In practical terms, this means that with a low response, fertilizer recommendations should be kept conservative since the PR cannot be predicted very accurately. It also means that for two soils of equal production potentials, the risk associated with fertilizing a responsive soil is much less than to apply fertilizer to a higher testing soil, or to a soil with production constraints that prevent a high response to fertilizer. These are major concepts which influence the philosophy of making fertilizer recommendations.

IV. Considering Risk in Fertilizer Recommendations

The recommendation of economically optimum fertilizer rates for a specific crop grown in a specific area is determined by conducting experiments with several fertilizer rates and obtaining a response curve for crop yield related to applied fertilizer. A mathematical calculation can then be used to determine the fertilizer rate that maximizes profit. Under these conditions the optimum rates are determined without any consideration of risk, because the response curve is already known. However, when a soil testing laboratory, a fertilizer dealer, or an agronomist provides the farmer with a recommendation, a risk factor should always be involved. While recommendations are based on all available pertinent information (soil test value, expected yield, previous crop, etc.), even with the best interpretation, there will always be a risk of making an erroneous recommendation, partly because all determinations include a degree of error, and partly because other factors may drastically affect the crop response to fertilizer (e.g., drought, pests, diseases). Consequently, the determination of optimum fertilizer rates at the farmer level becomes more difficult: the risks change with time, and are different for different farmers (e.g., depending on their management level, financial conditions, etc.). Hence, some laboratories provide the farmers with two recommendations for an average and a high yield and let the farmer decide which is the more appropriate.

An additional approach to deal with the problems of risk in fertilizer recommendations is to include an indication in the soil test report of how serious the deficiencies are and the degree of response that the farmer can expect if he follows the recommendation. In this way farmers can evaluate the reports considering their own managerial and economic capabilities.

In general, conservative recommendations are more successful when farmers are just starting to use fertilizers. Conservatism is also called for in areas of high risk of drought or with farmers of low managerial abilities.

V. Using Soil Testing and Plant Analysis in Marketing Strategy

Fertilizer marketing in the long run will only be successful if it meets the customer's needs. Soil testing and plant analyses are tools to better quantify those

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needs. In many cases, however, the testing of individual fields on a routine basis is impractical. These tools may serve marketing purposes in more general ways:

1. Marketing identification – What nutrients are needed where.

2. Developing regional or local fertilizer recommendations – especially important with small landholdings.

3. Long-term monitoring of trends in soil nutrient levels (a most important function).

4. Problem solving, such as identifying previously unknown deficiencies.

5. Promotional incentives. Using soil testing and plant analysis in demonstrations and field trials will help build credibility with farmers.

The use of soil testing and plant analysis in marketing strategies will be best used if the philosophies and limitations of these two tools are taken into consideration. While the explanations of determining fertilizer recommendations are presented here in fairly simple terms, actual recommendations can be considered to be reliable only to ± 15-20 kg for N, P, and K.

VI. Summary

Soil tests and plant analyses can be powerful tools to determine fertilizer needs, serve the farmer to make the highest economic yields, and to help educate and convince farmers of fertilizer needs. When the tools are not used, or are used poorly, the farmer loses confidence in the procedures; then fertilizer application becomes principally an exercise of guesswork on the part of the farmer and salesmanship on the part of the dealer. A strong, ongoing research program to establish the relationships of soil test and plant analysis to fertilizer response is the backbone of the program. While both procedures are neither foolproof nor completely accurate, they still remain the best tools to predict fertilizer needs.

Historical records of soil tests in an area are extremely valuable to monitor long-term changes in soil fertility, establishing whether any "mining" or excessive buildup of a particular nutrient has occurred. Fertilizer dealers are an extremely important link in advising farmers and promoting sound fertilizer practices. They can only perform this role by being knowledgeable of fertilizer practices and soil reactions of nutrients. Soil testing and plant analysis, despite their limitations, provide valuable tools for the farmer to maximize the benefits of fertilizer use and for dealers to meet the farmer's needs.

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Table 1. **Comparison of Two Sets of Recommendations From Two Laboratories (Cramer, 1987)**

Laboratory	Fertilizer Recommendations (pounds/acre)[a] N	P_2O_5	K_2O	Cost ($/acre)[b]
Field 1 – Trefoil-Timothy Hay (Topdressing)				
A&L (private)	15	85	175	51.25
Cornell (university)	25	45	70	28.00
Field 2 – Alfalfa-Timothy Hay (Topdressing)				
A&L	15	30	160	35.25
Cornell	25	0	0	6.25
Field 3 – Corn (100 bu; Following Alfalfa)				
A&L	115	80	120	66.75
Cornell	20	60	50	27.50
Field 4 – Corn (100 bu; Following Corn)				
A&L	115	30	75	47.50
Cornell	90	20	20	30.50

a. One pound/acre x 1.12 = kg/ha. The numbers were not converted to kilograms/hectare because it would give an impression that very precise recommendations are normally given.
b. Based on \$.25/pound for N and P_2O_5 and \$.15/pound for K_2O.

Table 2. **Comparison of Recommendations for the Same Soil Sample From Four Private and One University Laboratories, and Obtained Corn Yields With Recommended Fertilizer Rates** (Olson et al., 1987)

Laboratory	Recommendation[a] N	P_2O_5	K_2O	Cost	Yield
	(kg/ha)			($/ha)	(tons/ha)
A (private)	220	24	10	121	10.65
B (private)	220	22	27	141	10.96
C (private)	220	15	0	143	10.58
D (private)	230	18	0	101	10.65
E (university)	150	0	0	59	10.71

a. Recommendations for micronutrient application are not included in the table.

Table 3. **Relationships of Fertilizer Response, Price Ratios, and Economically Optimum Rates, Using a Quadratic Function[a]**

Quadratic Coefficients	Fertilizer Response	Price Ratio Fertilizer:Crop	Economically Optimum Rate (kg/ha)
b = 80, c = 0.05	High	2.0	78
		6.0	74
b = 40, c = 0.2	Medium	2.0	76
		6.0	68
b = 10, c = 0.05	Low	2.0	80
		6.0	40

a. Function $Y = a + bx - cx^2$,
where Y = yield, kg/ha x unit value, \$/kg.
a = control value (value of crop with no fertilizer).
b = linear coefficient (the larger this coefficient the more response to the fertilizer).
c = quadratic coefficient (the larger this coefficient, the more rapidly the yield decreases past the maximum Y achieved).
x = fertilizer application rate x cost per unit and
PR = b - 2 cx, or Price ratio = b - 2 cx

Figure 1. Conceptual Response Curves to Fertilizer Application.

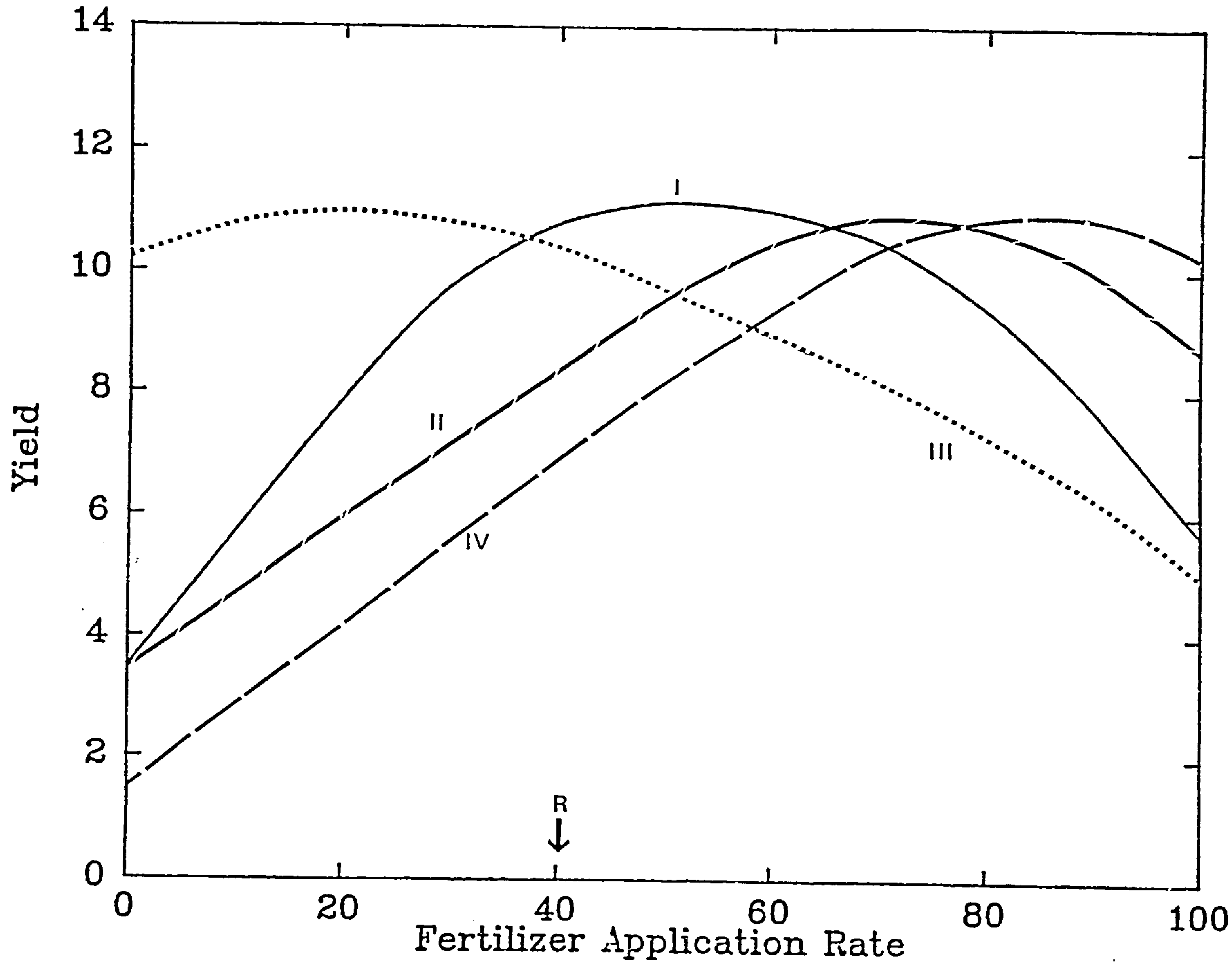


Figure 2. Conceptual Pattern of Macronutrient and Minor Element Response.

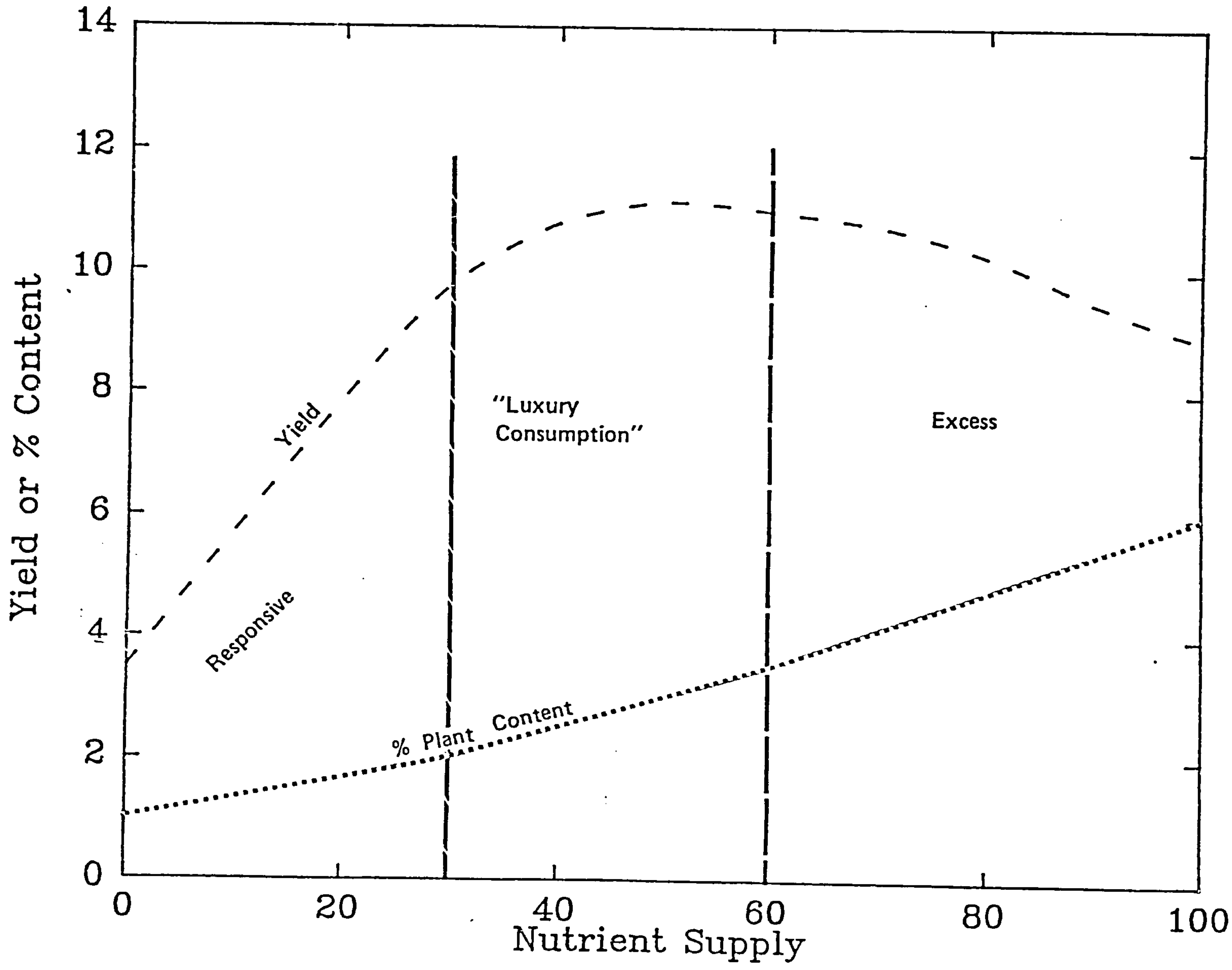


Figure 3. Conceptual Pattern of Micronutrient Content and Yield.

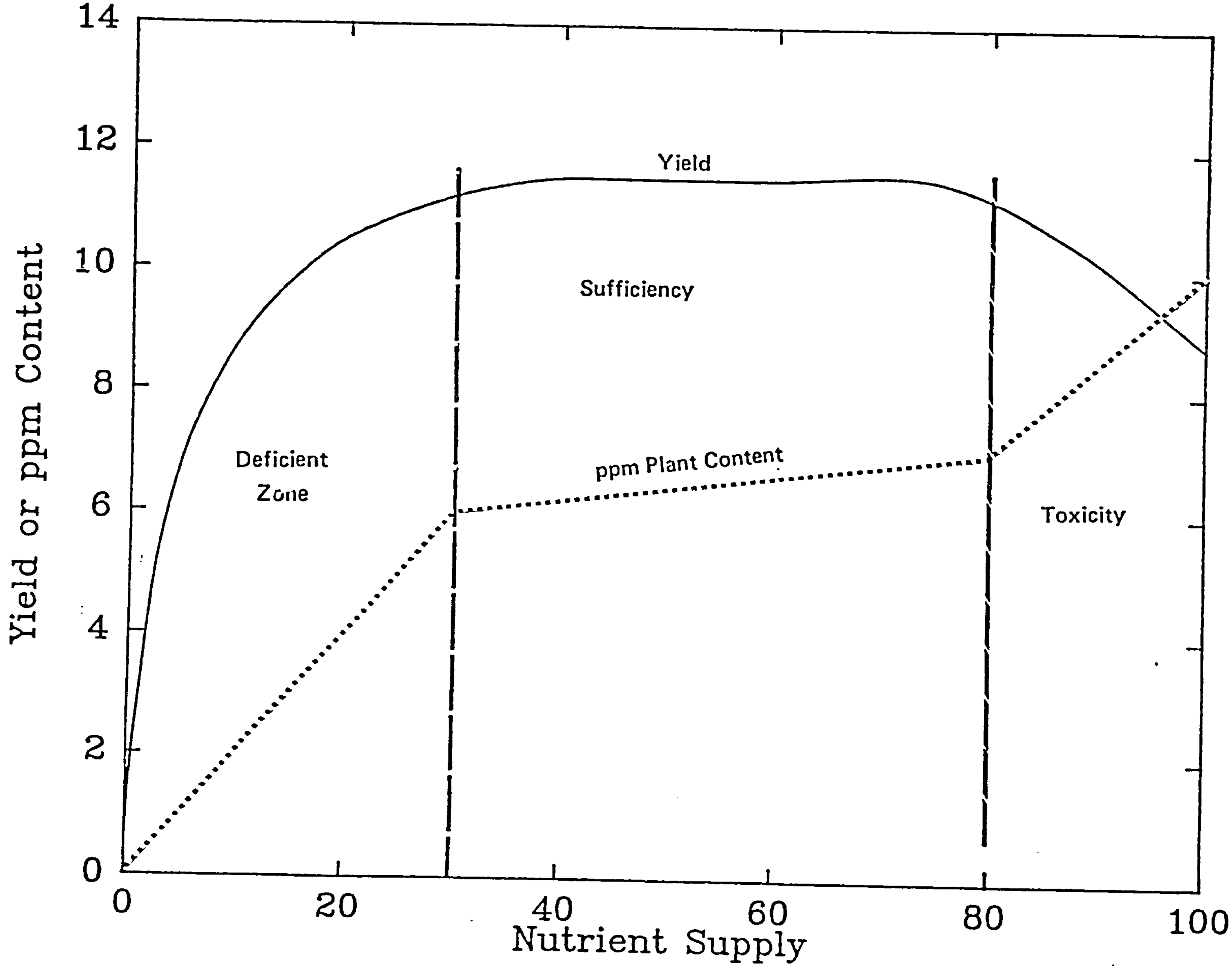
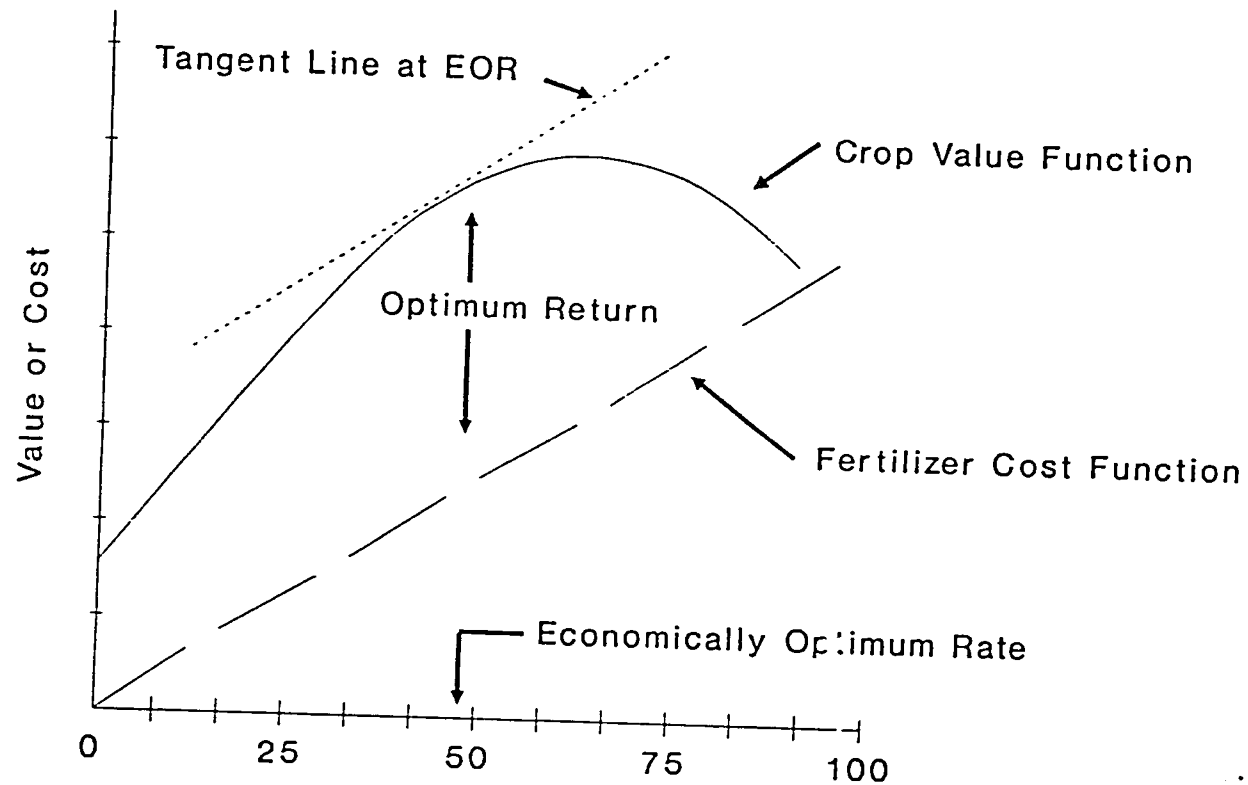


Figure 4. Relationships between the quadratic functions of crop value and fertilizer cost to estimate the economically optimum rate of fertilizer application.



Soil Testing for
Fertilizer Recommendation

Stages

1. Soil Sampling

   - Representativeness of samples

2. Chemical Tests

   - Few test are universally applicable

3. Interpretation of the soil tests

   - Correlation
     Association soil nutrient and yield

   - Calibration
     How much fertilizer is needed to achieve a particular yield

     Crop requirements and managements
     Farmer yield goals
     Fertilizer and soil management practices

   Selection of critical limits (sufficiency levels)

4. Fertilizer Recommendations

   - Sufficiency level approach
     Fertilizing the plant

   - Buildup/maintenance
     Fertilizing the soil

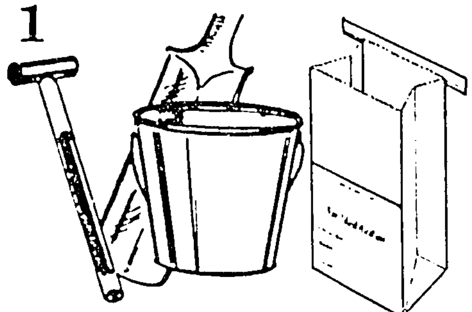
5. Economics in fertilizer recommendations

   - Fertilizer costs and yield prices
     Maximizing profits (unconstrained, EOR)
     Maximizing profits (constrained, EOR)

   - Risk in fertilizer recommendations
     Use of diagnostic data (Plant Analysis)
     Range of recommendations

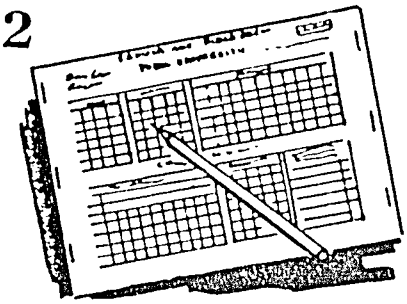
How To Take A Soil Sample — And Prepare It For Testir

1



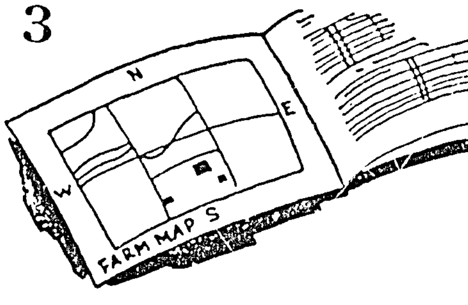
To take the sample, you will need a sampling tube, auger or spade and a clean plastic pail. Get sample containers from your county agent.

2



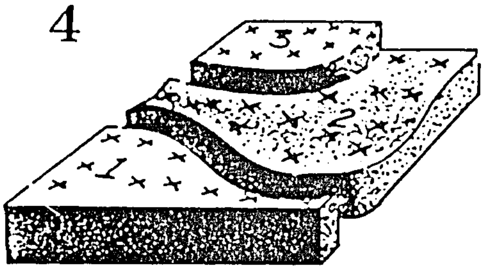
To identify the sample and to record the cropping and fertilizer information about it, use a field and cropping information sheet.

3



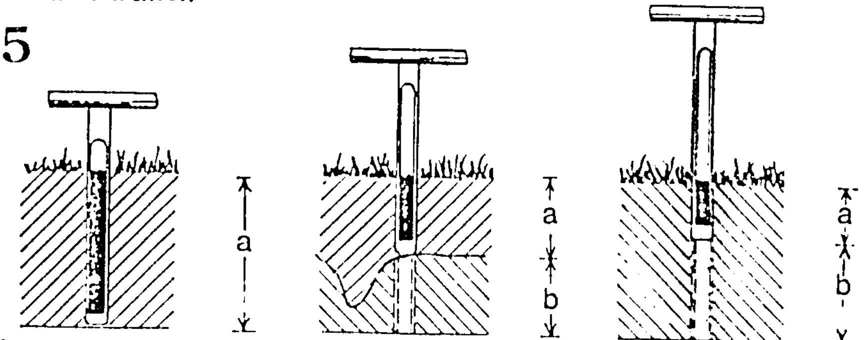
Draw a field sketch or farm map on a separate sheet and keep it in your files until we return your results.

4



Sample each area separately. Get equal-sized cores or slices from 15 or more places using probe, auger, or spade. Do not mix light and dark colored soils together.

5



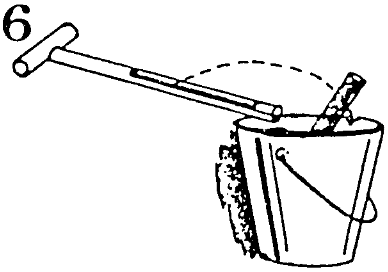
5-1 Moldboard plow, (a) Mixed

5-2 Chisel and/or disc (a) Mixed – (b) Unmixed

5-3 No-till (a) Top 2-in – (b) Unmixed

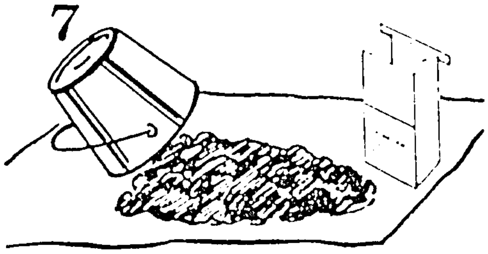
Take Samples from the mixed zones in the tillage system shown above (5-1a) moldboard plow, (5-2a) chisel and/or disk, and (5-3a) top two inches of no-till. Take separate deeper samples from (5-2b) chisel and/or disk and from (5-3b) unmixed no-till zone. No-till fields that will be plowed periodically should be sampled to plow depth.

6



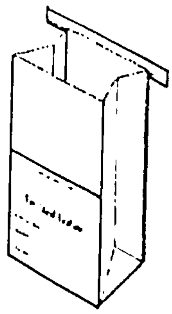
Place cores or slices in a clean *plastic* pail. Mix them together thoroughly, breaking up the cores or slices. If soil is muddy, dry it *before* mixing. If soil crumbles easily, dry after mixing.

7



Spread mixture out on clean paper to dry. Do not heat in oven or on stove. Do not dry in places where fertilizer or manure may get in sample.

8



Fill the sample bag to the line with air-dry soil. Discard the rest. Label and number the sample container.

Caution! *In sampling, stay away from:*

1. Farm lanes and field borders.
2. Fertilizer bands in row crops and small grains.
3. Areas within 8-10 rods of gravel roads.
4. Any other areas which are distinctly different, such as potholes, sandy ridges and eroded spots.

Take separate sample if interested.

Important! Your recommendations will be no better than the information that you send in with the samples. Be sure to . . .

Read Mailing Instructions on the Back of This Sheet

FOR LAWNS:

Take the soil to a depth of 2-3 inches.

FOR GARDENS AND FLOWER BEDS:

Sample the soil to rototilled or plowed depth of 4-8 inches.

The "Information Sheet" is available from your county agent's office.

How To Fill Out Information Sheet

Important! Your recommendations will be no better than the information you give.

Use a hard lead pencil, or ball point pen. Press hard! You are making 5 copies.

Check columns and fill in other information for each sample.

Nitrogen recommendations depend on past cropping history as well as on soil properties.

1. Be sure to list all legume crops such as hay, pasture, meadow, seedings and intercrops.
2. Describe the mixture, stand and growth in space provided.

This information is essential because no chemical test is made for nitrogen.

Mailing Instructions

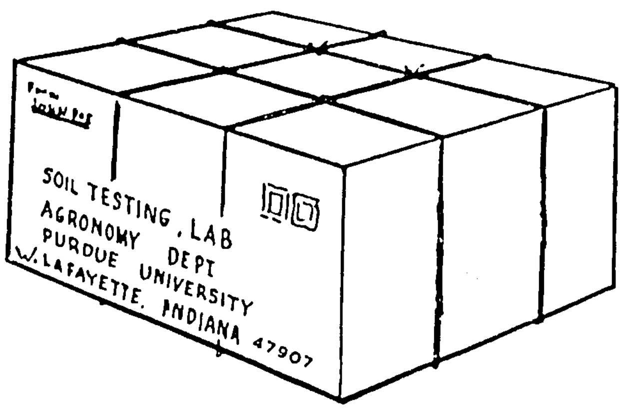
The service charge for a standard test (ph, lime requirement test, phosphorous, potassium, soil color, texture) is quoted on a price sheet. *Remittance must accompany samples.*

Samples submitted for testing must be accompanied by the Field and Cropping Information Sheet, or the Turf, Garden, or Landscape Information Sheet, properly filled out, and the remittance to cover the cost of testing. Make check or money order payable to Department of Agronomy, Purdue University.

Samples without remittance will be held while notification is sent. If no reply is received within 30 days, samples will be discarded.

Place sample containers in shipping cartons provided by your county agent. Place the Field and Cropping Information Sheet, or the Turf, Garden, or Landscape Information Sheet with remittance in an envelope, seal it, and enclose it with the samples.

Write your name and return address in the space provided. Tie or wrap securely and mail via Parcel Post, or United Parcel to the following address:



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Plant Analysis for
Fertilizer Recommendations

1. Plant sampling
   - Representative of the plant

2. Analytical Methods
   - Diagnostic

     Determine nutrient needs in perennial crops
     Identify hidden problems
     Survey areas for deficiencies
     Identify interactions between nutrients

   - Complement fertilizer recommendations

3. Fertilizer Recommendations
   - Critical limits (sufficiency limits)
   - DRIS norms

Plant Analysis: a Diagnostic Tool

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Interest in plant analysis as a crop management tool has been stimulated in recent years by increased use of scouting programs and crop consultants and by a higher level of sophistication among farmers themselves. In addition, narrowing profit margins and the continual pursuit of higher yields has spurred this interest.

The information provided through plant analysis helps farmers with decisions on fertilizer effectiveness, the need for additional nutrients, and planning fertilizer programs for future years. If used properly, plant analysis can be an important guide to efficient crop production because it provides a nutritional profile of the growing plant.

The objective of this publication is to explore the use and limitations of plant analysis in evaluating soil fertility programs for corn.

ESSENTIAL ELEMENTS

Plants require 16 elements for normal vegetative growth and reproduction. Different amounts of each element are required by different plant species. Plant growth is restricted when: 1) not enough of one or more elements are present; 2) too much of one or more elements are present, including toxic levels of nonessential elements such as aluminum, arsenic, selenium or sodium; or 3) the levels of one or more elements are adequate but out of balance with other elements.

The first result of nutrient deficiency, toxicity, or imbalance is a reduction in plant growth. If the condition persists, visible symptoms of deficiency or toxicity appear, and plant yield is reduced. "Hidden hunger" is a nutrient deficiency or imbalance not expressed in visible symptoms, but yield is restricted nevertheless.

WHAT IS PLANT ANALYSIS?

Plant analysis is the quantitative determination of the elements in plant tissue. Carbon, hydrogen, and oxygen are not analyzed routinely because they come from air or water and virtually never limit plant growth. Chlorine is normally sufficient under field conditions, but it may become excessive in saline soils. It is usually analyzed in special cases only. Similarly, molybdenum deficiency or toxicity is rare, and this element is not analyzed routinely. Thus, plant analysis usually refers to analysis of nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sulfur (S), iron (Fe), manganese (Mn), copper (Cu), zinc (Zn), and boron (B). Aluminum (Al) and sodium (Na) are sometimes included even though they are not essential elements. Aluminum can be toxic in acid soils, and sodium improves the quality of some crops such as beets and celery.

Plant analysis is distinguished from tissue testing in that it is a quantitative laboratory analysis; whereas tissue testing refers to semi-quantitative "quick" tests of plant sap carried out in the field for trouble-shooting purposes. Plant analysis is unique from other crop diagnostic tests in that it gives an overall picture of the nutrient levels within the plant at the time the sample was taken. Its use is based on the principle that the nutrient level present is a result of all factors affecting the growth of the plant.

The general relationship between nutrient level and crop growth is shown in Figure 1. When a nutrient is deficient, addition of that nutrient results in increased crop growth and usually an increase in the concentration of that element in the plant. As the level of the deficient nutrient increases, crop growth increases until some maximum yield is reached. Further additions of the element will cause the concentration of that element in the plant to rise more rapidly because it is not being diluted by added dry matter accumulation. Eventually, toxicity of that element may occur.

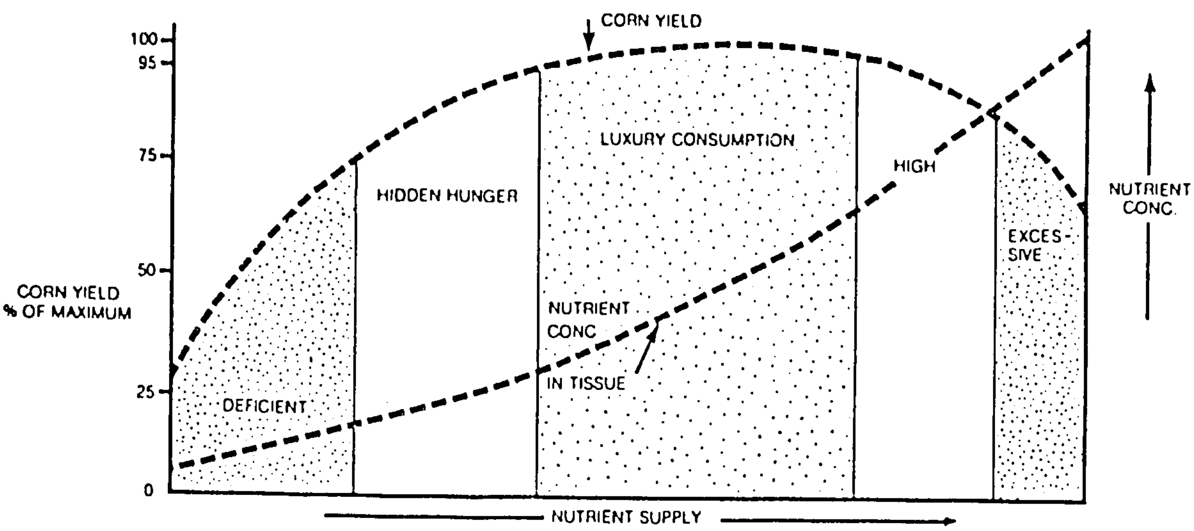

Figure 1. Relationship between nutrient supply, corn yield and nutrient concentration in earleaf tissue. (Adapted from Brown, 1970).

HOW PLANT ANALYSIS CAN BE USED

Plant analysis has proven useful in confirming nutrient deficiencies, toxicities or imbalances, identifying "hidden hunger," evaluating fertilizer programs, determining the availability of elements not tested for by other methods, and studying interactions among nutrients.

Determining nutritional problems. Plant analysis defines nutrient problems more precisely than does an examination of deficiency symptoms, soil tests, or quick tissue tests. In addition to confirming suspected deficiencies, plant analysis can also detect toxicities or hidden deficiencies where visible symptoms are not manifest. One of the major uses of plant analysis is troubleshooting crop problems. Farmers seem to have confidence in the technology associated with plant analysis more so than with visual inspection and diagnosis. The second most common use is crop monitoring to evaluate potential nutritional problems while they can still be corrected or so they can be avoided in subsequent seasons.

Evaluating fertilizer programs. Adding fertilizer to the soil is no guarantee that plants will benefit from it. The form of the fertilizer might make it unavailable to plants, or it might react with the soil to form unavailable compounds. Soil scientists use plant analysis to study element uptake from fertilizer and to evaluate different methods and times of fertilizer application. Farmers can also use plant analysis to determine whether their fertilizer program is performing according to expectations.

Determining nutrient availability where soil tests are not available. Most laboratories test soils routinely for lime needs, phosphorus, and potassium. Some have optional tests for calcium, magnesium, and some of the minor elements. However, reliable soil tests have not been developed for all of the elements. A test for iron developed in one state, for example, is not applicable to the soils of another state until the test has been calibrated for the soils in that state. Plant analysis can be particularly advantageous in determining the availability of nutrients for which there are no reliable soil tests, or for those areas where soil test calibration has not been done.

Deficiencies of most micronutrients and sulfur are identified more accurately by plant analysis than by soil test. The soil test commonly used for sulfur, for example, measures only the amount of sulfate-sulfur present in the sampled area. It does not include possible contributions from other sources such as rainfall. A high sulfur soil test indicates adequate sulfur is present, but a low test may mean either the sulfur is not there or it was not measured. Plant analysis gives an accounting of the sulfur available to the plant.

Studying nutrient interactions. Plant analysis frequently reveals relationships among essential elements. While plant physiologists sometimes make these interactions a deliberate study, more often they discover these relationships when they summarize results of many plant analyses. This use of plant analysis is important for research but beyond the scope of "routine" use and will not be discussed here.

PLANT ANALYSIS COMPLEMENTS SOIL TESTING

Sometimes adequate nutrient levels may be present in the soil, but because of other problems such as insect feeding, root damage, and too much or too little moisture, inadequate amounts of nutrients get into the plant. Plant analysis along with soil tests can help pinpoint the problem. Quite often the two techniques should be used together; for example, plant analysis of corn earleaf samples from central Wisconsin may show high levels of Mn present, but the soil analysis identifies the real problem as one of very acid soils.

Soil tests normally are calibrated for the average depth of plowing. If a subsoil is high in a particular nutrient, the subsoil contribution will go undetected unless a subsoil sample is also analyzed. A plant analysis will not tell how much of the nutrients in the plant came from the subsoil, but it will measure the integrated effect of the entire root volume. A soil sample typically consists of 5 to 10 cores of soil to tillage depth from a 5- to 20-acre field. A single corn plant, on the other hand, extracts nutrients from several cubic feet of soil.

LIMITATIONS OF PLANT ANALYSIS

Interpretation difficulties. In general, good relationships can be developed between soil nutrient supply, nutrient levels in the plant, and crop yield for a given location in any one year. However, differences in location, variety, time, and management often cause variations in these relationships and make them difficult to interpret. Nutrient levels in plants differ depending on the plant part sampled, stage of maturity, hybrid, and climatic conditions. Therefore, interpretations of plant analysis must take these factors into consideration. For this reason, most plant analysis interpretations are based on a specific plant part sampled at a definite stage of development. Greater detail on plant sampling for tissue analysis is in NCH-15.

For corn, the ear leaf at silking is most commonly used for analysis. In most situations, this is too late for remedial treatment if some is needed. The results of the analysis, then, can only be used to forestall future problems. In many cases, however, it is possible to identify nutrient disorders at an earlier stage of crop development if plants from a normal growing field at the same growth stage are also analyzed for comparison. The normal/abnormal comparison is often essential since sampling the entire plant tends to mask the differences in key parts of the plant. The plant must also be sufficiently mature to have developed a spread in concentrations.

Interrelationship of other factors. Martin and Matocha (1973) stated that "the basic principle of the use of plant analysis is that the chemical composition of the plant reflects its nutrient supply in relation to growth." They caution, however, that "the chemical composition of any plant is a 'result' of the interaction of nutrient supply and plant growth. Any factor that limits growth...may cause other nutrients to accumulate in the plant." They point out that in using plant analysis as a diagnostic tool, "we are in effect attempting to infer a cause and effect relationship from two results (yield and nutrient concentration), either of which may have been brought out by some other factor." Thus, restricted root growth due to compacted soil layers or cold weather can result in reduced nutrient uptake even though the nutrient supply in the soil would be considered adequate under normal conditions.

Progressive deficiencies. Another limitation of plant analysis is that it usually detects only the one element that inhibits plant growth the most. Rarely are two or more elements acutely deficient at the same time. A corn plant, for example, may be deficient in K; but, because K is limiting growth, there may be sufficient P for the reduced amount of dry-matter production even if soil P is low. When K is added as a remedial treatment, dry-matter production increases sharply; then P becomes deficient. Nitrogen stress, on the other hand, can limit the uptake of phosphorus and some of the micronutrients to the extent that they appear to be "low."

Sample contamination. Contamination of a plant sample with soil particles or pesticide residue can lead to erroneously high results for iron, aluminum, manganese, zinc, or copper. Washing the sample to remove contamination can introduce other contaminants if a detergent or tap water are used. Appreciable potassium can be lost by washing. These problems are discussed further in NCH-15.

Sample deterioration. Decomposition of a plant sample before it reaches the laboratory will result in a loss of carbon (as CO_2 through respiration and microbial activity) and the concomitant concentration of most other elements, thereby giving erroneously high readings. This can be prevented by refrigerating the sample until it is delivered to the lab, avoiding weekends if the sample is mailed, or by partially drying the sample before shipment. Solar drying to 15 to 20% moisture prior to shipment will not only eliminate the likelihood of sample spoilage but will reduce shipping costs as well. Brief drying in a microwave oven to about 10 to 15% moisture will halt enzymatic activity, but care must be taken to avoid over-drying the sample.

INTERPRETATION OF PLANT ANALYSES

Critical value and sufficiency range approaches. For most diagnostic purposes, plant analyses are interpreted on the basis of "critical levels" for each nutrient. The critical level has been defined in several ways by different persons. Jones and Eck (1973) define it as "that concentration below which yields decrease or deficiency symptoms appear." For many nutrients, yield decreases even before visible deficiency symptoms are observed. Because the exact concentration of a nutrient below which yields decline is difficult to determine precisely, some define the critical level as the nutrient concentration at 90 or 95% of maximum yield.

The nutrient composition of a plant changes as the plant matures and with the portion of the plant sampled; therefore, critical levels are defined for a specific plant part at a specified stage of maturity. For corn, the ear leaf from tasseling to silking is most commonly used. For most crops, there is an optimal range of concentration over which yield will be maximized rather than a single point. If possible, one would attempt to supply nutrients at the lowest level which still provides top yields, but because of the many factors affecting yields and concentrations, this point is difficult to identify. Growers, therefore, usually strive for operating in the sufficiency range.

In the deficient range, visible nutrient deficiency symptoms are evident, and crop yield is less than 75% of maximum. In the low range, there are no clear-cut deficiency symptoms, yet responses to additions of the low nutrient are likely. The sufficiency range represents the yield plateau. The nutrient concentration increases more rapidly as nutrient supply increases because there is no further increase in dry matter production to "dilute" the additional nutrient. Most nutrients have fairly broad sufficiency ranges. The lower end of the sufficiency range (or the upper end of the low range) represents the critical range. In the "high" range the plant takes in more of the nutrient than is required for maximum production. This range is sometimes referred to as the zone of "luxury consumption."

If the nutrient supply is increased sufficiently, yields decline either because of an imbalance with other plant nutrients or direct toxic effects of the excessive nutrient. Phosphorus, for example, at high levels can suppress the uptake of copper and zinc and be out of balance with respect to nitrogen or potassium, but it is rarely toxic *per se*. Boron, on the other hand, can easily become toxic to corn if misapplied.

Melsted et al. (1969) point out that critical levels of plant nutrients "can seldom be derived through a single carefully designed experiment." More typically, results of many experiments over a number of years and at various locations are averaged. Critical levels were published by Melsted et al. (1969) and sufficiency ranges were published by Jones (1967) and Neubert et al. (1969), and they are given in Table 1. Also included are the sufficiency ranges used by the Soil and Plant Analysis Lab, University of Wisconsin-Madison. These were compiled from a number of sources, including Jones (1967), Chapman (1966), and others. Agreement is remarkably close considering the variety of sources from which the data were derived.

Nutrient ranges for corn representing deficient, low, sufficient, high, and excessive concentrations used by the Soil & Plant Analysis Lab, UW-Madison, are given in Table 2. For some nutrients, excessive nutrient levels have not been well-defined. These ranges are useful guidelines for interpreting plant analyses, but they must not be used dogmatically. Knowledge of hybrid requirements, unusual soil or climatic conditions, or other extenuating information should be taken into account.

As plant analysis becomes more popular as a diagnostic tool, the need for earlier sampling and analysis intensifies so problems can be corrected before serious yield loss occurs. Plant analyses interpretations at early growth stages would require that critical levels be established for those stages. Unfortunately, limited data are available on critical nutrient concentrations for very young plants. Lockman (personal communication) has developed sufficiency ranges for whole corn plants 24 to 45 days after planting as well as ranges for more mature corn (see Table 3). Nutrient uptake and dry matter accumulation are generally rapid during early stages of growth. Consequently, nutrient concentrations may be expected to vary considerably with maturity, as reflected in the rather wide sufficiency range for the mobile elements. The concentration of these elements (N, P, K, Mg) in whole plant tissue is appreciable higher at 24 to 45 days than is their concentration in earleaf tissue. A variation of a few days in sampling time at this stage of growth would be more critical than at silking stage.

Multiple regression approach. Modern analytical multiple-element analysis gives results which lend themselves to multiple-regression analysis for interpretation. Greater information is gained since additional complex interactions can be evaluated with respect to yields. Although some work in this manner has been done, particularly for N, P, and K, this type of interpretation has not been incorporated into routine plant analysis programs.

Nutrient ratio approach. A variation of the multiple regression approach recently developed is the Diagnosis and Recommendations Integrated System (DRIS) developed by Beaufils (1971, 1973) and introduced in this country by Sumner (1977a, 1977b, 1979). As originally developed, as many yield determining factors as are capable of quantitative or qualitative expression are considered simultaneously in making a diagnosis, and recommendations are made from that diagnosis. These factors include not only soil and plant analysis data but also information pertaining to climate, insects, disease, varieties, etc.

The DRIS approach to interpreting the results of plant analysis involves the analysis of thousands of samples of a specific crop. The samples are divided into high and low yielding populations, and the analytical results from each population are studied to determine what criteria can be used to distinguish between the high and low yielding populations. As it turns out, ratios of plant nutrient concentrations have given better results than simple concentrations alone. The ratios corresponding to the high yielding population (norms) are then compared to the ratios present in the sample being analyzed. A ratio of plant nutrient concentrations by itself cannot be used to diagnose plant problems, but combinations of different nutrient ratios can be combined mathematically to determine what nutrients are most likely to limit yield. The results of such calculations are the "DRIS Indices."

Although finer tuning may be possible, DRIS indices are normally calibrated so that those within the range of about -10 or -15 to +10 or +15 are considered normal and in balance. A DRIS index between -25 and -15 indicates a likely deficiency. Values greater than +25 may be an indication of possible nutrient excess. The greater the magnitude of the nutrient index, either positive or negative, the

Table 1. Critical nutrient values or sufficiency ranges for corn ear leaves at silking to tasselling.

Nutrient	Melsted et al. (1969)	Jones (1967)	Neubert et al. (1969)	UW Soil & Plant anal. Lab
N, %	3.00	2.76-3.50	2.60-4.00	2.76-3.75
P, %	0.25	0.25-0.40	0.25-0.50	0.25-0.50
K, %	1.90	1.71-2.50	1.70-3.00	1.75-2.75
Ca, %	0.40	0.21-1.00	0.21-1.00	0.30-0.60
Mg, %	0.25	0.21-0.60	0.31-0.50	0.16-0.40
S, %	--	---	0.21-0.50	0.16-0.50
Zn, ppm	15	20-70	50-150	19-75
B, ppm	10	4-25	15-90	5-40
Mn, ppm	15	20-150	34-200	19-75
Fe, ppm	25	21-250	21-250	50-250
Cu, ppm	5	6-20	8-20	3-15

Table 2. Interpretive ranges for plant nutrients in corn earleaf tissue at silking to tasselling as used by the Soil & Plant Analysis Lab, UW-Madison.

Nutrient	Deficient	Nutrient Concentration in Tissue			
		Low	Sufficient	High	Excessive
N, %	<1.75	1.76-2.76	2.76-3.75	>3.75	---
P, %	<0.16	0.16-0.24	0.25-0.50	>0.50	---
K, %	<1.25	1.25-1.74	1.75-2.75	>2.75	
Ca, %	<0.10	0.10-0.29	0.30-0.60	0.61-0.90	>0.90
Mg, %	<0.10	0.10-0.15	0.16-0.40	>0.40	---
S, %	<0.10	0.10-0.15	0.16-0.50	>0.50	---
Zn, ppm	< 12	12-18	19-75	76-150	>150
B, ppm	<2.0	2.0-5.0	5.1-40.0	41-55	>55
Mn, ppm	< 12	12-18	19-75	>75	---
Fe, ppm	< 10	10-49	50-250	251-350	>350
Cu, ppm	---	< 3	3-15	16-30	>30

< = "less than"

> = "more than"

Table 3. Nutrient sufficiency ranges for corn at several growth stages. (From R. B. Lockman, 1984. Personal communication.)

Nutrient	Whole plant, 24-45 days[1]	3rd leaf, 45-60 days[2]	Earleaf green silks[3]	Earleaf brown silks[4]	Earleaf mature[5]
N, %	4.0-5.0	3.5-4.5	3.0-4.0	2.8-3.5	2.5-3.5
P, %	.40-.60	.35-.50	.30-.45	.25-.40	.20-.30
K, %	3.0-5.0	2.0-3.5	2.0-3.0	1.8-2.5	1.6-2.5
Ca, %	.51-1.6	.20-.80	.20-1.0	.20-1.2	.20-1.5
Mg, %	.30-.60	.20-.60	.20-.80	.20-.80	.20-.80
S, %	.18-.40	.18-.40	.18-.40	.18-.35	.16-.35
B, ppm	6-25	6-25	5-25	5-25	5-25
Cu, ppm	6-20	6-20	5-20	5-20	4-20
Fe, ppm	40-500	25-250	30-250	30-250	30-250
Mn, ppm	40-160	20-150	20-150	20-150	20-150
Zn, ppm	25-60	20-60	20-70	20-70	16-50

1 Seedlings 6 to 16 inches tall; 24 to 45 days after planting.
2 Third leaf from top; plants over 12 inches tall, before silking.
3 70 to 90 days after planting.
4 Grain in developing stage up to "roasting ear."
5 Poor stage-sample; grain in dough stage, beginning to dent.

DEVELOPING A SOIL TESTING PROGRA[illegible]

by
Dr DOUBE Maurice
Department of Soil Science
Faculty of Agronomy-University of Dschang
for the Worshop on
EFFICIENT MARKETING OF FERTILIZERS IN CAMEROON

I. THE USE OF SOIL TESTS TO ASSES FERTILIZER NEED, METHODS OF ASSESSING SOIL NUTRIENTS AND ESTIMATING NUTRIENT NEEDS TO SATISFY YIELD TARGET.

WHY FERTILIZERS ?

Wherever efforts are made to raise agricultural efficiency and production, men most overcome soil deficiency, by improving its capacit[illegible] whatever plant is produced.

Because men want to produce more, natural conditions can not always stand repeated high demands of nutrients by plants. It becomes therefor a necessity to help that nature, by "artificially" incraising that "FOOD" which is necessary for plant growth.

Continuous use of a land without any restoration brings nutrient or "FOOD" deficiency. In order to correct the deficiency, we have to know what the soil has lost. Only soil testing can give valuable information on the present situation of soil nutrients. One of the most popular methods of correcting this deficiency is adding FERTILIZERS, which are chemical elements capable of increasing nutrient availability.

IS PLANT GROWTH ONLY RELATED TO NUTRIENTS ?

Soils are individuals and their chemical, physical and mineralogical composition may vary from one place to another, depending on various factors like the slope, the nature of the parent material, the weathering stage etc. It means, soils are not always alike. Some are naturally more fertile than others.

For a plant to grow well, some specific conditions are required from the soil and the environment. These conditions include several parameters summerized as soil qualities and soil characteristics.

WHY SOIL TESTING ?

A good soil must be fertile, and fertility can be considered as a dynamic state, changing with time, the way that soil is used, and highly depending on the type of crop we are cultivating or we want to cultivate.

To increase soil fertility, the first thing to do is to make a sort of diagnostic of soil qualities and characteristics.

As surelly said in previous interventions, plants needs elements like phosphorous, potassium, nitrogen, calcium, magnesium in great amounts and, in minor quantity, elements like cupper, zinc, molybdenum etc.

WHICH METHODS FOR SOIL TESTING ?

To assess soil nutrient status we use routine chemical analysis and specific analysis.

Routine analysis is the study of physico-chemical characteristics of soil samples. Following parameters are determined.

- Particle size analysis (clay silt and sand percentage)
- pH (water and KCL)
- Organic matter content
- Nitrogen, content
- C/N ratio
- Exchangeable cations (Ca, Mg, K, Na)
- Cation exchange capacity
- Base saturation
- Available phosphorous

Specific analysis are more detailed analysis and include the determination of followings :

- Total phosphorous
- Sulfate and Chlore

- Free iron and aluminium oxides
- Exchangeable acidity (aluminium and hydrogen)
- pF curve
- Bulk density

II. NUTRIENT UPTAKE EFFICIENCY.

Crop growth depends on a whole set of conditions in addition to the nutrient supply. The most important factors include :

-climate
-topography
-soil moisture, (drainage and water status)
-texture and structure
-soil stoniness
-soil depth
-soil surface activity (exchange capacity, base saturation, organic matter content)
-salt concentration if any
-soil reaction (acidity and alcalinity)
-plant disease insects and weeds
-hazards of floods and violent winds

According to its qualities (water availability, soil depth, salt deficiency, temperature regime, erosion hazard and management), according to its characteristics (physico-chemical conditions), any land can be classified as actually suitable, potentially suitable or not suitable for a given crop.

See table 1 : "RElationship between soil characteristics and soil qualities".

See table 2 : "Soil requirement for cocoa"

HOW CAN WE BEST USE FERTILIZERS ?

To increase fertilizers efficiency every land before utilization should be evaluated.

ordered minerals (allophanes) or free aluminium and iron is well known.

Nutrient uptake efficiency can be checked by foliar analysis.

III. FERTILIZER USE AND SOIL pH RELATIONSHIPS

Nutrients in soils are held in various degrees of availability to plants. Soil reaction which may be acid, neutral or alcaline depends on the proportion of hydrogen ions in its solution.

Soil reaction affects the availability of plant nutrients in various ways. Iron, maganese, copper and zinc are more available in acid than in alkaline soils. Availability of soil phosphorous is sharply reduced in very acid soils.

The pH of a soil may indicate the need for a soil amendment. It helps also in predicting toxicity when it is to low or micro-nutrients deficiency when it is to high.

IV. AVAILABILITY OF SOIL TESTING IN CAMEROON

Official laboratories in Cameroon for soil testing presently working are very few. The laboratory of the department of Soil Sciences of the University of Dschang and the IITA/USAID laboratory of Nkolbisson seem to be the only laboratories presently working. Due to lack of means, the laboratory of Ekona is having some difficulties. There hasn't been any temptation for any private laboratory.

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Fertilizers alone cannot help to overcome all handicaps especially when those are physical like surface soil stoniness or a shallow depth for penetration of roots.

Any land classified as not suitable, due to very severe limitations, cannot be "saved" by any kind of fertilizer application.

Even if a land is suitable, some specific care still has to be taken because, for a normal growth and development, plants need sufficient nutrients in proper balance.

Plants nutrients both aid and compete with one another in soil in entring into the roots and even in the plant.

An excess of potassium will tend to decrease the absorption of calcium and magnesium, especially in fruit and vegetable crops with a high magnesium requirement.

Conversly an increase in available calcium or magnesium may tend to decrease the absorption of potassium especially in soils low in available potassium.

On magnesium deficiency soil, the application of calcium depresses magnesium intake.

Many authors like SYS (1977) proposed a cation balance between the three most important elements (Ca, Mg, K) in tropical weathered soils to be 76/18/6.

The next table represents calculated cation balance of a soil sample.

Sometimes very high amounts of fertilizers may be applied but will not improve yield because those fertilizers form chemical complex with soils constituants. The case of phosphorous when added in a soil containing short range

Tableau 1 - Relations entre caractéristiques et qualités de terres

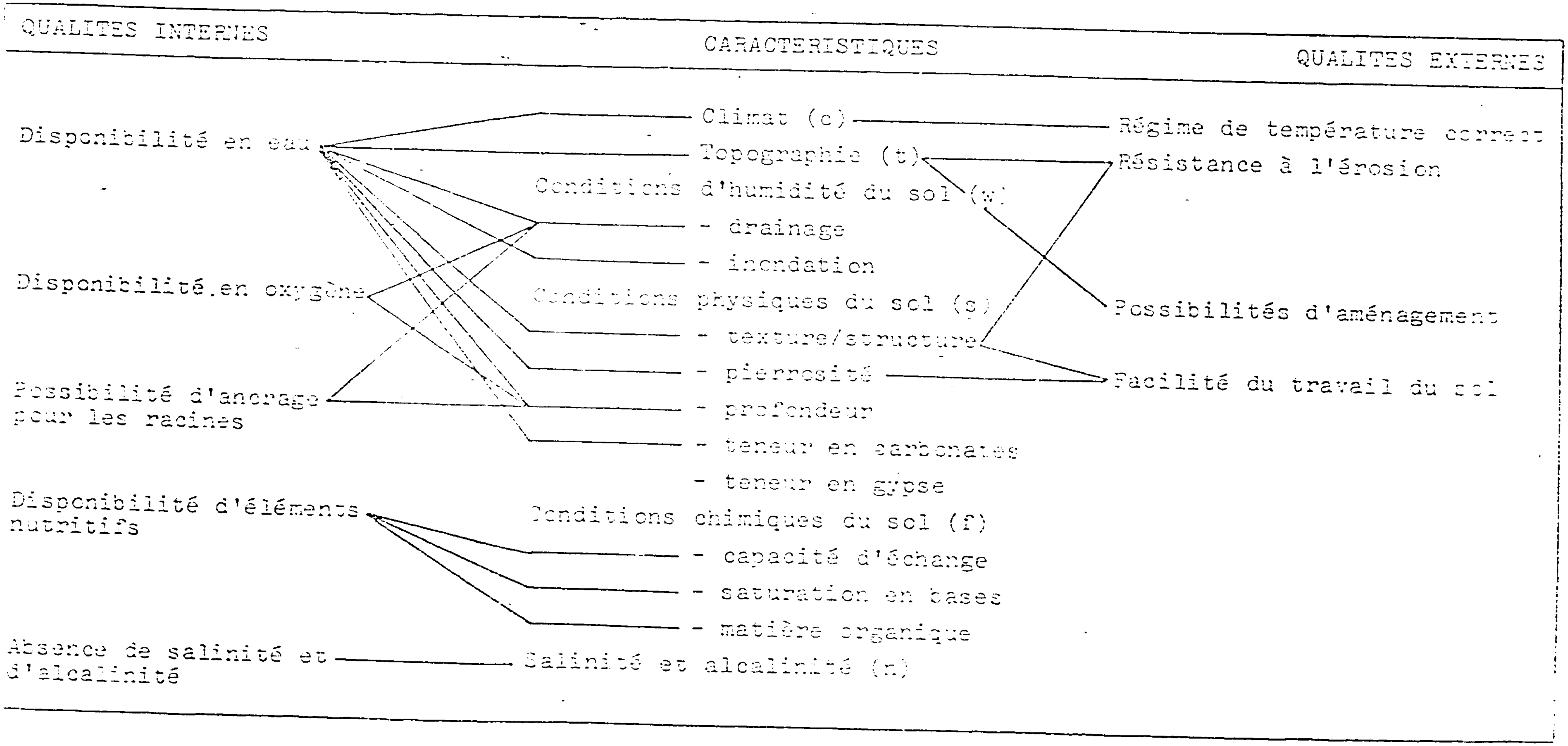

Tableau 2 : Exigences pédologiques du cacaoyer

CARACTERISTIQUES PEDOLOGIQUES	CLASSE PEDOLOGIQUE, DEGRE DE LIMITATION ET ECHELLE PARAMETRIQUE					
	S_1		S_2	S_3	N_1	N_2
	0	1	2	3	4	
	100 – 95	95 – 85	85 – 60	60 – 40	40 – 25	25 –
TOPOGRAPHIE (t)						
Pente (%)	0 - 4	4 - 8	8 - 16	16 - 30	–	> 30
CONDITIONS HYDRIQUES (w)						
Submersion	S_0	–	–	S_1	–	S_2 +
Drainage	bon, nappe phréatique > 150 cm	bon, nappe phréatique > 100 cm	modéré	imparfait	mauvais	très mauvais
CONDITIONS PHYSIQUES (s)						
Texture / structure	A-60s, Ao, LAF, LA, AL	A+60s, AS, L	LAS	LS, LF	–	Am, Av, SL, Sj, S, Sg
Eléments grossiers (vol. %)	< 3	3 - 15	15 - 35	35 - 55	–	> 55
Profondeur (cm)	> 200	200 - 150	150 - 100	100 - 50		< 50
CONDITIONS CHIMIQUES (f)						
CEC apparente (méq/100g d'argile)	> 24	24 - 16	< 16 (charges -)	< 16 (charges +)		
Saturation en bases (%)	> 50	50 - 35	35 - 20	< 20		
Carbone organique (%, 0 - 15 cm)	> 2,4	2,4 - 1,5	1,5 - 0,8	< 0,8		

Evaluation sur une profondeur de 150 cm.

CUDS/INADER - LABORATOIRE DE PEDOLOGIE - RESULTATS DES ANALYSES DES SOLS

ETUDE :	M. SIMEN Pierre Bangangte - Tsanki page 1	DATE :	07/06/1990

Echantillon	terre de surface
Profondeur	0-25
Code Labo 90/	358
pH-eau	5.4
pH-KCl	4.4
% Carbone organ.	1.47
% Matière organ.	2.5
N total (g/kg)	0.74
Rapport C/N	19.9
Cations échangeables	
Ca (méq/100g)	1.33
Mg	0.98
K	0.80
Somme (S)	3.11
H	0.06
Al	0.30
H+Al (AE)	0.36
CECE (S+AE)	3.47
S/CECE (%)	90
CEC7	7.1
S/CEC7 (%)	44
P-Bray 2 (ppm)	4.6
TEXTURE (%)	
Sable	71
Limon grossier	9
Limon fin	7
Limon total	16
Argile	13
Classe	Limon sableux

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CUDS/INADER - LABORATOIRE DE PEDOLOGIE - REDRESSEMENT CATIONS DES SOLS

ETUDE : M. SIMEN Pierre DATE : 07/06/1990
Bangangte
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Echantillon	Terre de surface
Profondeur	0-25 cm
Balance Cationique	
Ca (méq/100g)	1.33
Mg	0.98
K	0.80
SBE (Ca+Mg+K)	3.11
CEC7	7.1
SBE/CEC (%)	43.80
Ca/Mg/K (SBE=100%)	
Ca (%)	42.77
Mg	31.51
K	25.72
Richesse relative	
%Ca/76	0.56
%Mg/18	1.75
%K/6	4.29
Max.	K
Redress. 76/18/6 (RRC)	
méq/%	0.13
+Ca (méq/100g)	8.80
+Mg	1.42
+K	0.00
SBE (Ca+Mg+K)	13.33
SBE/CEC (%)	187.79
Possible?	non
Redress. Al éch. (RAE)	
Al	0.30
+Chaux	0.45
RAE>RRC?	non
SBE + Chaux	3.56
K/(SBE+Ch) (%)	22.47
FR K nécess.?	non
Excès K reste?	oui
+K	0.00
FR Mg nécess.?	non
FR Ca nécess.?	oui
+MgO	0.00
+CaO	0.45

CUDS/INADER - LABORATOIRE DE PEDOLOGIE - FUMURE DE REDRESSEMENT Ca/Mg/K

ETUDE : M. SIMEN Pierre DATE : 07/06/1990
Bangangte - Tsanki
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Echantillon	Terre de surface	
Profondeur	0-25 cm	
Couche arable :	profondeur (cm)	25
	densité apparente (g/cm3)	1.2
	poids (T/ha)	3000
Redress. 76/18/6		
CaO (kg/ha)	7405	
MgO	859	
K2O	0	
[Ca(OH)2 ou	10285	
CaCO3 et	13464	
MgSO4.H2O]	3067	
ou		
[(Ca,Mg)CO3 et	4294	
Ca(OH)2 ou	8496	
CaCO3 et	11122	
MgSO4.H2O]	0	
et		
KCl	0	
Neutral. Al éch.		
CaO (kg/ha)	379	
MgO	0	
KCl	0	
[Ca(OH)2 ou	526	
CaCO3	688	
ou		
[(Ca,Mg)CO3 et	0	
Ca(OH)2 ou	526	
CaCO3]	688	
et		
K2O	0	

Ca(OH)2 :	chaux agricole éteinte,	72% CaO
CaCO3 :	roche calcaire broyée,	55% CaO
(Ca,Mg)CO3 :	dolomie,	30% CaO,20% MgO
MgSO4.H2O :	kiesérite,	28% MgO
KCl :	muriate de potasse,	60% K2O

Interprétation des résultats d'analyse et conseils de fumure :

Texture : Le sol a une texture appelée 'limon sableux'. La proportion élevée en sable lui confère une bonne aération mais également un risque de lessivation élevé des engrais en cas de fumure importante.

MO et C/N : La teneur en matière organique est relativement faible tout comme les réserves en azote. Une fumure appuyée de ce nutriment de première importance sera nécessaire mais doit être fractionnée à cause de la texture légère du sol et du faible taux de matière organique.

Bases : Nous appelons bases échangeables les élément POTASSE, CALCIUM et MAGNESIUM. Leur somme est moyennement élevée mais le rapport entre ces éléments est disproportionné en faveur de la potasse et de la magnésie. Le calcium est en défaut.

Phosphore : Le sol est pauvre en phosphore et une fumure est impérative.

pH et AE : Le pH, appelé également la réaction du sol ou indice de l'acidité est faible. Il existe une faible quantité d'acidité échangeable (AE ou protons et aluminium) qu'il est souhaitable de neutraliser avec de la chaux.

CEC7 : La capacité d'échange cationique à pH 7 ou la capacité du sol d'emmagasiner et de retenir les éléments nutritifs lorsque le sol est à un pH neutre est moyenne à cause de la faible teneur en argile et en matière organique (les agents actifs). La CEC estimée à partir de la CEC7 et de la CECE indique des valeurs allant de 3.7 à 4.8 méq/100 g de terre. Cela classe votre sol parmi les sols à risque de lessivage des engrais en saison des pluies. Il est donc conseillé de fractionner les apports d'engrais et de chauler régulièrement (tous les ans).

Quel amendement faut-il donner ?

D'après nos calculs et en tenant compte des réalités agronomiques et économiques (nature du sol et coût de l'engrais) nous conseillons de donner au sol 550 kg de chaux éteinte ou 700 kg de calcaire broyé par ha. Il faut appliquer la chaux au moins deux mois avant le semis et bien incorporer et mélanger avec le sol.

Vu la richesse actuelle en potasse, une fumure en cet élément peut rester minimale pour cette année sauf pour les cultures de tubercules (pomme de terre, macabo, igname, etc...).

Le phosphore doit toujours être apporté soit sous forme d'engrais composé (20-10-10, 12-6-20, 10-30-10), soit sous forme de superphosphate. Il est préférable pour ce dernier de prendre le super double au lieu du super triple parce que le double contient encore du soufre. Le triple peut être utilisé à condition que vous fumer avec du sulfate de potasse (mieux pour les cultures maraichères mais malheureusement très cher) parce que cet engrais contient de large quantité de soufre. N'utilisez surtout pas le sulfate d'ammoniaque puisque cet engrais est fort acidifiant et vos sols sont déjà à la limite d'acidité.

L'azote peut être apporté sous forme d'engrais composé (20-10-10, 12-6-20, 10-30-10) et surtout sous forme d'urée (contient 46 % d'azote). A titre d'information le sulfate d'ammoniaque n'en contient que 21 % ce qui veut dire qu'il faut épandre plus que le double de cet engrais par rapport à l'urée pour avoir le même résultat.
Les quantités à apporter sont de l'ordre de 60 à 90 kg d'azote à l'hectare (130 à 200 kg d'urée); 60 kg de P_2O_5 (130 kg de triple ou 60 à 80 de double) et 30 kg à 60 kg de K_2O (50 à 100 kg de KCl ou 60 à 120 kg de sulfate de potasse).
Pour les légumineuses il suffit d'apporter une faible quantité d'azote pour démarrer (10 à 20 kg) et pour les tubercules les doses de potasse peuvent être augmentées.

Dr. M. DOUBE   Dr. J.M. PAUWELS

Chef du Laboratoire

UNIVERSITY OF DSCHANG

Price Policy Analysis and the Demand for Fertilizer in the Coffee Sub-Sector of Cameroon

MAIN REPORT

A Study by The Department of Agricultural Economics

Under the Leadership of
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VI. GENERAL SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary and Conclusions:

As it was stated at the beginning of this study, the coffee subsector is very important in the economy of Cameroon. This study has brought out some major findings whose macro and micro economic impact cannot be overlooked. The major conclusions can be summarized as follows:

1. The coffee farms in Cameroon are largely operated by old small framers with an average age (53 years) above the life expectancy (48 years). Farms are also old with an average of 26 years. The average size was found to be 0.50 and 0.70 ha for Arabica and Robusta, respectively. These characteristics largely explain the very low physical yield and the weak competitiveness of Cameroon coffee industry at the World and African levels.

2. The expansion of this subsector is constrained by several factors that vary according to the area. Thus, land is the major constraint in the West and North-West while in other areas like the Center and the East provinces, the major constraint is labor. This constraint has become more severe in these two provinces with the drastic fall in prices in 1998.

3. On the basis of past and current prices received by farmers it was found that the profitability is very low. Several producers have reacted by dropping this activity and moving into food and vegetable crops as it was confirmed by Kamajou and Nkwanou (1987).

4. The official prices paid to farmers are overestimated in two major ways. First, the producer has important hidden costs both in the acquisition of fertilizers and in the sale of his product. These transaction costs involve transport, time spent in traveling, fertilizer composition, grading and weighing. Second, he suffers a financial loss through the deferred payments especially as the opportunities for borrowing barely exist.

5. Potential production of coffee depends on the adjustment of invested capital in terms of new plantations and/or replantings. Deviations from this potential production are explained in the adjustment in the variable factors and by climatic fluctuations.

6. The producers are more responsive to the price of coffee than to the price of fertilizers. This response is more significant for Arabica that for Robusta. This difference in response can be explained partially by the better knowledge of fertilizer exhibited by arabica growers and also by their larger capacity to acquire this input.

Recommendations:

On the basis of the different results of the study, the following recommendations can be suggested:

1. Despite the current negative market prospects, it is important to take measures with a view to preserve and to improve the quality of coffee production. Coffee farms constitute indeed an important endowment of the Cameroon economy. Those measures should seek to create incentives for the youth to engage in coffee production. One of such measure lies certainly in the creation of a global economic environment where the producer takes a more active part. Another is the creation or the improvement of reliable and viable economic infrastructures such as marketing and processing.

2. The future viability of Cameroon coffee industry will have to come from the improvement of its competitiveness. If it is agreed that the authorities are not yet able to resolve the sensitive problem of overvaluation of the CFA franc, there are other areas where significant efforts should lead to a substantial improvement in competitiveness. One could mention for examples, the development and utilization of better planting material and modern inputs, cheap and better processing units, more aggressiveness in the markets, etc.

3. Payments to producers should be made in time or the deferred payments should take explicit account of the financial loss to be incurred by farmers on delayed payments. The real price on which producers base their decision are indeed lower than the nominal price they receive. The fertilizer liberalization program (FSSRP) will be justified only if it encompasses the sale of coffee and other products like cocoa.

4. In the present framework of government policy of liberalization, it is vital to have a good understanding of the behavior of the producers in the factor and product markets. It is encouraging in this respect to note that the Government is taking steps to disengage itself also from the marketing of the products.

5. Results of the analysis have shown that the adjustment of variables inputs as a response of the variation in the price of products is a short-term phenomenon. The long-term increase in output has come essentially from the adjustment of capital stock in trees. It is therefore important to elaborate efficient measures to promote such investments. The previous measure of paying allowances for the creation os new plantations fell short partly because of the value od the allowance which did not cover the farmers' expenses and other losses (Feze,1982).

7. The ultimate objective of FSSRP is to encourage and facilitate the use of fertilizers which was limited in the past by a policy of subsidies which required some rationing. The liberalization of this subsector which should lead to facilitating access to farmers, reducing government and economic costs, should be able to bring about a more intense utilization of this factor. It has been argued that FSSRP will lead to higher

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prices for fertilizers and consequently reduce its utilization. The results of the study have shown very clearly that the price the farmer receives for his product is more important in the purchase and utilization of fertilizer than the price of fertilizer itself. This result is of great importance because of its implications in the formulation of coffee price policy.

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FERTILIZER SUB-SECTOR REFORM PROGRAM

EFFECTS OF THE RECENT DEVALUATION OF CFAF ON FERTILIZER USE AND EXPORT CROP PRODUCTION

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DEVALUATION AND FERTILIZER USE

(By Rostand Longang, Economist/USAID-Cameroon)[1]

I - INTRODUCTION

My presentation will consist of four main points :

1. A background which will briefly review the macroeconomic context over the past nine years and define the concept of overvaluation;

2. A quick discussion on the rate of devaluation;

3. A recent analysis of the post-devaluation fertilizer prices, with special focus on their implication at the importer, distributor, and farm levels; and

4. Some suggestions that may be of use within the present and near-term economic environment.

[1] The author is responsible for ideas developed in this report.

II - BACKGROUND

It has always been said that the overvaluation of the CFAF was one of the most important factors affecting competitivity in Cameroon. In this respect, most studies have heralded that a nominal devaluation could be better for Cameroonian farmers involved in the production of export crops such as coffee. This section will quickly explain the causes of the present economic crisis, with a special attention to the definition and concept of overvaluation.

2.A. CAUSES OF ECONOMIC CRISIS

The current economic crisis is the result of a massive loss of competitiveness caused by an unfortunate combination of inappropriate domestic economic policies and major external shocks. Three factors are responsible for the loss of competitiveness:

1. inappropriate economic policies adopted during the commodity booms;

2. substantial decline in the terms of trade; and

3. the appreciation of the real effective exchange rate (REER).

- Inappropriate economic policies:

During the commodity booms, between 1979 and 1986, Cameroon followed quite expansionary macroeconomic policies. Hence, even before the external shocks of 1985-1986, Cameroon already had inflated and unsustainable cost structures. Civil service wage bills grew strongly during this period. Much of the high level of public investment was used to expand the public enterprise sector, large parts of which were uneconomic and accumulated substantial losses. When revenue increases slowed in the mid-80s as export led growth decelerated, Cameroon initially maintained expenditure levels through increased borrowing.

Decline in the terms of trade:

The competitiveness problem which existed in 1985 was aggravated by the subsequent collapse of the terms of trade. The terms of trade abruptly collapsed in the second half of the 1980s, falling by 40 % between 1985 and 1992, as the prices of major export commodities (coffee, cocoa, and oil) ropped sharply

- Appreciation of the REER:

In countries pursuing a flexible exchange rate policy, a substantial decline in the terms of trade would normally be compensated for by depreciating the real effective (i.e, the trade weighted and inflation adjusted) exchange rate to restore the profitability of domestic export industries. However, the opposite has happened in Cameroon. The appreciation of the REER was the result of:

a. the French Franc's appreciating by 70 % relative to the U.S dollar since 1985;

b. competing developing countries' in Asia, Latin America, and Africa depreciating their REER, in response to deterioration in their own terms of trade.

As a result of cost structure that was not competitive in 1985 and the subsequent decline in the terms of trade and appreciation of the REER, the CFA became increasingly overvalued.

2.B. OVERVALUATION AND NEED FOR DEVALUATION

As a result of the above development, a comprehensive economic reform program was needed to restore growth. One essential element of such a reform program was a devaluation. However, a devaluation is only the starting point of an arduous reform process. Cameroon chose internal adjustment measures as a way of resolving the current crisis. However, it has been impossible to make the needed adjustment solely through internal measures because of the downward rigidity of wages and prices. Since the prices of exports and import substitutes fell while prices of non-tradables (salaries, etc.) remained largely unchanged, the real exchange rate has appreciated rather than depreciated, reducing rather than increasing the incentives for producing tradeable goods (coffee, etc.).

Recent estimates by various analytical methologies indicated that by 1994 the CFAF was overvalued in real terms by at least 50 % on average in domestic currency terms. The massive loss of competitiveness has had a severe impact on the export and import substituting sector. Traditional exports had lost market share as competing countries expanded production in response to favorable domestic price incentives while the profitability of the same export sectors declined in Cameroon.

Currency realignment (devaluation), by providing new incentives for producers, will create the basic conditions for a renewal of productive activity. Producers will undoubtedly want to respond because their incomes have fallen so sharply in the past five years, particularly in the last two or three. For a devaluation to have its desired effects on production, at least three conditions must be met:

- enough of the gain in CFAF terms must be passed through to producers to allow them to invest ;

  Producers must be obliged to invest labor and working capital to rehabilitate their productive operations; and

- the private sector must be ready to respond to produce demand for agricultural inputs with adequate quantity offered at fair prices.

It is debatable how quickly and how fully rural producers will react to the incentives offered by higher CFAF prices for both exports and import susbtitutes. There are structural contraints in most of the export marketing chains which will dampen the positive effect of the devaluation in the short run. Unlike Arabica coffee, robusta coffee and cocoa are constrained by a restrictive marketing system that still attempts to stabilize prices with little or no risk to marketing and export agents. Producers of such commodities tend to lose income as a result. Recent neglect of productive capacity will require investment to renovate the productive resource after this change of parity. The expected reaction of export crops growers to the post-devaluation doubling of fertilizer prices will be widespread reluctance to purchase any until they have higher sales proceeds in hand.

III - THE NOMINAL DEVALUATION OF CFAF

3.A. FACTS

On January 12, 1994, meeting in Dakar, African Head of States and representatives, in conjunction with the International Monetary Fund (IMF) and France, decided to devalue the CFAF by 50 per cent.

Old parity :	FF1 = CFAF 50
New parity :	FF1 = CFAF 100

3.B. THE RATE OF DEVALUATION :

This is not the setting for me to expand on a theoretical discussion on the arithmetic sides of the rate of devaluation. However, I will just mention that if the CFAF is taken as the benchmark, then the CFAF was devalued by 50 percent, while the FF appreciated againgst the CFAF by 100 percent.

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No matter the true rate of devaluation, be it 50, 100, or even 150 percent, the most important point is that the parity was changed. This is what matters to business persons, and more specifically fertilizer dealers and export crop farmers whose revenues are directly affected by the recent change in parity.

IV - RECENT EVOLUTION OF FERTILIZER PRICES AND IMPLICATION AT VARIOUS LEVELS OF MARKETING CHANNEL.

The evolution of fertilizer prices will be presented at three different levels (see attached tables):

1. importer level;
2. distributor level; and
3. farm level.

4.A. IMPORTER LEVEL

As a result of the 50 percent devaluation, the immediate mechanical effect was a 100 percent increase in the CIF price of fertilizer (NPK 20 - 10 - 10 is taken here as an example as it represents about 55 percent of fertilizer imported under the FSSRP). A 33 percent increase in the port charges and handling, coupled with a drop of 25 percent in fixed cost and importers' margin, have led to an overall 85 percent increase in the wholesale price of fertilizer in Douala. This increase has been only slightly alleviated by the fertilizer subsidy, which now represents only 6 percent of the total delivered cost of fertilizer, down from 9 percent of the total delivered cost prior to the devaluation. Customs duties rates have been harmonized at five percent as an accompanying measure under the umbrella of the New UDEAC customs regime.

As can be seen in the table, the nominal devaluation is immediately negative for importers. Increased fertilizer prices will reduce its demand in the very short-term. The learning period could take at least 6-8 months. Only after that time would demand go up as fertilizer prices slowdown as a result of overall economic depression, coupled with general drop in revenues. As you can also see in the table, all accompanying measures will only be made at the level of customs duties and port charges. However, without an association of fertilizer dealers, I am afraid that accompanying measures at that level will take time with the acute liquidity crisis and the likely elimination of fertilizer subsidies. As a matter of survival, importers will have to strive for cost reduction, and improve their business skills. This can be facilitated by the creation of a fertilizer dealers association.

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4.B. DISTRIBUTOR LEVEL

The total cost for distributing fertilizers has increased by 28 percent, due partly to the increase of transportation cost and fuel. The end result is a 75 percent increase in the retail prices (in the West Province). The real economic cost of the fertilizer, which assumes no subsidy, has then increased only by 69 percent. Once again, distributors will have to set up a more efficient marketing system in order to lower their costs, thereby decreasing retail prices in an environment of economic depression and liquidity crisis.

4.C. FARM-LEVEL

At the farm level, the retail prices of fertilizer have increased by 75 percent as a result of devaluation. However, according to a recent analysis, the benefit/cost ratio of producing arabica coffee has increased by 47 percent to 3.51, from 2.38 prior to the devaluation. The post-devaluation benefit/cost ratio indicates the increased profitability of fertilizer application on arabica coffee. This is so because fertilizer represents only 10-15 percent of the total cost of producing arabica coffee. The most important cost involved in arabica coffee production is the cost of labor (which represent about 50 percent of the total cost) which has remained unchanged, or even dropped, due to the economic depression and recession. Data available through the Arabica Marketing Information System (AMIS) suggest that the prices of arabica coffee has increased by 110 percent and will normally increase by 145 percent, when the end-of-year bonus are paid. This is attributed to :

1. the mechanical effect of the devaluation ;

2. the full liberalization of the arabica sub-sector; and

3. the open competition backed by the newly-instituted arabica market information system.

If nominal wages increase can be contained, the arabica coffee production, as well as other export crops, when fully liberalized, could be permanently more profitable. The devaluation, although bearing a negative effect in the short run, is a tool which will help increase the competitivity of export crops, provided that the liberalization spirit remains and that fertilizer dealers and coffee exporters improve their efficiency in the marketing of their products.

V - SUGGESTIONS.

5.1. Involvement into coffee exports

As explained above, after a learning period, farmers will continue to apply fertilizers to their farms as long as they can get a higher price for their export crops and the benefit/cost ratio is maintained at a higher level. Fertilizer importers will continue importing fertilizer as long as they can get involve into coffee export. Moreover, with the present acute liquidity crisis, a barten system for fertilizer and coffee could be useful.

5.2. Creation of a fertilizer dealer association

Such an association is crucially needed for the following reasons :

a. The remoral of the Government from various activities in the sub-sector will leave holes that need to be filled. This is the opportunity for a fertilizer dealer association to be able to fill the gap and support various sub-activities such as information dissemination, training and workshops, etc.;

b. In the realm of accompanying measures, such association could be able to propose ideas and also carry out some lobbying activities in order to support policy reforms in the fertilizer sub-sector;

c. The association to support the present Marketing information unit of the TSU in order to disseminate information in various aspect of the sub-sector, with a special attention to world market price and retail prices at farmers levels (similar to the present information system in the arabica sub-sector (AMIS).

5.3. Improvement in market efficiency

The devaluation is a fact, and instead of insisting on its effects, it is now time to be more innovative, more efficient in business management, more responsive to your clients, and more importantly, look for room for cost reduction in all marketing channel. The devaluation has now exposed some institutional inefficiencies which now need to be taken care of. It is a matter of survival in the new environment created by the nominal devaluation, as well as in view of the total subsidy elimination. You will now be obliged to run your business, not let your business run yourself.

5.4. Investment in bulk blending facilities

TABLE 1: PRE- AND POST-DEVALUATION FERTILIZER COST
NPK 20-10-10
(FCFA / TON)

Nº	COST COMPONENT	PRE-DEVAL	POST-DEVAL	% INCREASE
1	CIF COST	56,000	112,000	100.00%
2	CUSTOMS DUTIES	5,600	5,600	0.00%
3	PORT CHARGES & HANDLING	3,000	4,000	33.33%
4	FSSRP SUBSIDY	(7,400)	(7,400)	0.00%
5	IMPORTER MARGINS & FIXED COSTS	7,800	5,800	-25.64%
6	WHOLESALE PRICE-DOUALA	65,000	120,000	84.62%
7	TRANSPORT & HANDLING	6,000	8,000	33.33%
8	DISTRIBUTOR MARGINS & FIXED COSTS	5,000	5,000	0.00%
9	RETAIL PRICE - WEST PR[illegible]	[illegible]	[illegible]	[illegible]
10	DELIVERED COST (UNSUBSIDIZED)	83,400	140,400	68.35%

TABLE 2: ARABICA COFFEE – DISTRIBUTION OF FOB PRICE FOR VARIOUS CHARGES AND TAXES (CFAF/KG)

Nº	COST & PRICE COMPONENT	1993 OCT	1993 NOV	1993 DEC	1994 JAN 3–7	1994 JAN 12	1994 JAN 10–14	1994 JAN 17–21	1994 JAN 24–28	1994 FEB	1994 MAR
1	NEW–YORK "C" PRICE (CIF)	524	540	524	500		1,024	958	1,054	1,025	1,084
2	THEORETICAL FOB PRICE – DOUALA	428	355	403	418		836	836	836	750	901
3	TOTAL TAXES AND FEES										
T	Stamps (bill of Lading)					DEVALUATION					
A	Transit charge										
X	Port Tax										
E	Sealing Tax										
S	Tool										
	Customs Tax										
&	Embarkation Tax										
	Export Tax										
F	Custom Fee										
E	Specific Tax										
E	Conditioning Tax										
S	Chem. Treatment Tax										
	General Fees										
4	EXPORTER MARGINS										
5	VALUE EX–FACTORY										
M	Warehouse Rental										
A	Insurance										
R	Interest Charges										
K	Storage Losses										
E	Handling & Transport										
T	Weighing Fee										
I	Calibration Charge										
N	Sorting Fee										
G	Milling Charges										
	Stamp Tax										
6	PRODUCER PRICE (AVERAGE)	200–250	200–250	200–250	200–250		400–524	400–542	400–532	400–532	475–536
	NPK 20–10–10 (FCFA / KG)				76		133	133	133	126	118

TABLE 3: EFFECTS OF CFAF DEVALUATION ON PROFITABILITY OF FERTILIZER ON COFFEE

YEAR	FERTILIZER COST (CFAF/TON)	ARABICA COFFEE PRODUCER PRICE (CFAF/KG)	ROBUSTA COFFEE PRODUCER PRICE (CFAF/KG)	ARABICA BENEFIT/COST RATIO	ROBUSTA BENEFIT/COST RATIO
1987/88	45,000	520	440	7.90	4.29
1988/89	56,400	475	440	5.93	3.60
1989/90	60,500	250	175	2.93	1.37
1990/91	66,300	250	155	2.70	1.19
1991/92	64,100	250	155	2.79	1.34
1992/93	66,300	220	100	2.38	0.72
1993/94	133,000	618	300	3.51	1.24
1994/95	144,600	637	309	3.43	1.07

Workshop on

Efficient Marketing of Fertilizers in Cameroon

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Quality control

by

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Introduction

Before one can speak of controlling quality, the words quality and quality control need to be defined.
Quality can be defined as a distinguishing attribute or characteristic. Quality control then is the process through which these distinguishing attributes or characteristics are ensured.

Quality control can be done at different levels in the fertilizer supply system and for different reasons.
In this paper we make a division between quality control in the industrial/production and commercial activities of the fertilizer supply system.

Quality control in industrial/production activities

It is at the production level that the quality of the fertilizer is instilled in the product. The manufacturer could have the following reasons for quality control at the production level:

- to provide the consumer with a quality product
- good quality control assures a profit
- good quality helps to build a solid reputation
- to obtain the quality that is needed to meet government regulations.

Quality control in the fertilizer industry can be achieved by:

- utilizing reliable equipment
- raw material control
- process control
- sampling and analysis
- training
- good management practices
- regulatory roles

After the quality is instilled in the product proper, quality control has to be used during the distribution, handling and warehousing of the fertilizer, to assure that the product will not degrade in quality.

Quality control in distribution, handling and warehousing can be achieved by:

- proper distribution, handling and warehousing techniques and control

Quality control in commercial activities

When a product changes hand, quality control can be called in again, to:

- ensure the buyer that s/he bought what s/he wanted to buy
- protect the manufacturer by ensuring the quality of the product s/he delivered

In the trading documents of the fertilizer transaction, the quality of the fertilizer should be stated. The document should leave no doubt about the desired quality of the demanded fertilizer.

A minimum set of fertilizer specifications is needed to define the product's quality:

a. Nutrient content
b. Nutrient form (e.g., ammoniacal, nitrate-N, water solubility of phosphates)
c. Particle size
d. Moisture content
e. Physical condition (prilled, granular, complex, bulk, free-flowing, dust-free, etc.)
f. Environmental safety or health restrictions or limitations
g. Analytical methods used to determine chemical and physical properties
h. Tolerance levels due to sampling, sample preparation, analytical variations
i. Penalties or discounts for deviation from the stated allowable variations or conditions
j. Packaging details

Organization of quality control

As explained before, quality control is done at different levels in the fertilizer supply system. The organization of the system sets the roles for the parties involved.

Government

Government has played, plays and can play a role in fertilizer quality control. Government's regulations:

- protect the consumer from an inferior quality or adulterated product
- protect the manufacturer from other less reputable organizations
- incorporate general environmental and health concerns (e.g., tolerated level of cadmium in the fertilizer, or maximum levels of nitric oxides emissions during the production process).

The structure of a fertilizer legislation usually encompasses most of the following:

1. Law, act, decree, or ordinance
2. Regulations
3. Definitions
4. Type of fertilizers which can be sold and their standards of composition
5. Licenses and registration requirements
6. Labeling requirements
7. Enforcement and administrative responsibilities
8. Inspection techniques
9. Sampling techniques

10. Analytical methods
11. Tolerance levels
12. Penalty system.

The grade of involvement of the government in the fertilizer supply system, fertilizer production, procurement and distribution, determines the role the government plays in the fertilizer quality and quality control, as well as it determines the roles of the producer and the trader/consumer.

In the case where the government is the producer and/or trader/consumer of the fertilizer, the government should be responsible for all the steps of the quality control. The quality and quality control can be specified in detail.

In a more privatized system government can set the framework for quality control in the production process and in the commercial activities through a suitable egislation. The producers, traders/consumers then operate within these set limits.

Control by independent agencies

An independent control agency (like e.g., SGS, Veritas) can be called in:

- *In production activities*
  to give the manufacturer a second opinion on the quality of the finished product and the quality control of the production process.
- *In commercial activities*
  to assure the buyer of the quality of the product s/he is going to buy.

The independent agency will be instructed on what to check and on how it should be checked (sampling and analysis methodes).
The demanding party set the rules for the demanding agency. On the level of fertilizer transactions technical fertilizer specifications (see page 2) could serve as guidelines in the independent control.
The report from the independent agency is then used in case of dispute between the user and the buyer. In the case of a disagreement, a third laboratory can be asked to handle the issue.

Appendix

Organization involved in quality control

There are numerous organizations around the world that have contributed, in some form, to improved fertilizer quality and quality control. A list of organizations and a brief description of their relationship to fertilizer quality and quality control follows:

1. American National Standard Institute (ANSI)/American Society for Testing Materials (ASTM) -- The development of standard methods and product specifications.
2. American Society for Quality Control (ASQC) -- A leader in the development, promotion, and application of quality and quality technologies for the quality profession, private sector, government, and academia.
3. Association of American Plant Food Control Officials (AAPFCO) -- an organization of United States fertilizer control officials. Their primary objective is to promote uniformity in all phases of fertilizer law enforcement. These phases are: (1) promote uniform and effective legislation, definitions, rulings, and enforcement practices; (2) encourage and sponsor the adoption of the most effective and adequate analytical methods for fertilizer by all member agencies; (3) develop high standards of fertilizer inspection techniques and procedures; and (4) promote adequate labeling and safe use of fertilizers.
4. Association of Official Analytical Chemists (AOAC) -- The development of sampling, sample preparation, and analytical methods for fertilizers.
5. British Standard Institute (BSI) -- The development of standard methods and product specifications.
6. Deutsches Institut fuer Normung (DIN-German Standards Institute) -- The development of standard methods and product specifications.
7. European Economic Community (EEC) -- The development of standard analytical methods and product specifications.
8. Food and Agricultural Organization (FAO) - of the United Nations (UN) -- Has done consultancy work and published literature on various quality control-related topics.
9. Gossudarstvenny Obstschessojusny Standart (GOST-Russian Standards Institute) -- The development of standard methods and product specifications.
10. Indian Standard Institute (ISI) -- The development of standard methods and product specifications.
11. International Fertilizer Development Center (IFDC) -- Published literature, done consultancy work, carried out research, and developed analytical methods on various quality control-related topics.
12. International Organization for Standardization (ISO) -- The development and adoption of international standards and procedures.
13. National Fertilizer Development Center (NFDC)/Pakistan Standards Institute (PSI) -- The development of standard methods and product specifications.
14. National Fertilizer and Environmental Research Center (NFERC) of the Tennessee Valley Authority (TVA) -- Published literature, done consultancy work, carried out research, and developed analytical methods on various quality control-related topics.
15. National Institute of Agro-Environmental Services (NIAES) of Japan -- The development of standard methods and product specifications.

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16. Standards Association of Australia -- The development of standard methods and product specifications.
17. United States Agency for International Development (USAID) -- Publishes a list of fertilizer specifications. USAID finances only those fertilizers that conform to these specifications.

2.79

Module [illegible]: Fertilizer Marketing

Workshop on

Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994

Bamenda, Cameroon

Introduction to Marketing Fertilizer

by

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Sponsored by
The Fertilizer Sub-Sector Reform Program
(Technical Supervisory Committee and USAID/Cameroon)

2 3 1

Introduction to Marketing Fertilizer[1]

During the last 30 years considerable progress has been achieved throughout the world in improving living standards and better satisfying people's needs and wants. It has not been progress which has been achieved easily, steadily, or evenly.

Developed countries, or more correctly, industrialized countries with relatively free markets, have progressed the most but even these countries have faced considerable difficulties such as inflation, stagnation, high unemployment, trade imbalances and economic readjustment.

The newly industrializing countries, primarily in Southeast Asia, have undergone rapid transformations from rural to increasingly urban societies which has resulted in increased social stress offsetting the improved economic well being of the people.

Countries with centrally planned economies have stagnated economically and now are faced with political and economic reform to satisfy the needs and desires of their populations.

In the least developed and developing countries of the world considerable progress has been made in increasing food production and raising incomes and living standards for the rural poor. Greater progress has been made in Asia and South America than in Africa, but recent years have exhibited a slowing in the rate of change and increased burdens of debt hamper the ability of many countries to progress as rapidly as they might.

In spite of the difficulties faced by all economic groupings the economic position of the vast majority of the world's population is better today than it was 30 years ago. The main reasons for the improvement have been the advance of technology and the development of marketing.

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1. For further reading see Marketing Management by Phillip Kotler, Prentice Hall, 1984, Englewood Cliffs, New Jersey 07632.

The fertilizer industry, as we know it today, and agricultural production are prime examples of the joint technology/marketing developments of the past three decades. This has not been just in the developing countries. The rapid development of the fertilizer industry in developed countries and the subsequent increased agricultural productivity only commenced in the early 1960's, at the same time as the developing countries.

The technology of the fertilizer sector that created the breakthroughs was related to production–ammonia and high analysis fertilizer production–and to the three technologies of the "Green Revolution"–high yielding varieties, nitrogen fertilizer and irrigation. The technology by itself though was not enough to create the revolution. Marketing was the other key ingredient. This includes not only fertilizer marketing but also crop marketing.

Marketing has been described as "the creation and delivery of a standard of living." The vicious cycle of poverty seen in a subsistence way of life cannot be broken without an effective marketing system. People will not produce for a market when there are no buyers, and there are no buyers in a subsistence economy because everyone is producing for their own needs. To break this cycle of poverty requires considerable effort on the part of governments to create a climate favorable to the marketing concept and a high degree of marketing skills for those people charged with developing markets.

Modern Marketing Concepts

To fully understand the role that marketing plays in economic development, it is necessary to appreciate the modern concept of marketing. There are many definitions of marketing, each with some merit, but all should include the following core concepts:

- Needs, wants, and demands;
- Products, values, and satisfaction;
- Exchange and transactions;
- Markets, marketing, and marketers.

Needs, Wants, and Demands

The starting point of marketing lies in human needs and wants. People need food, shelter, safety, belonging, and esteem. These needs are not created. They are part of the fabric of humankind. Wants, by contrast, are desires for specific satisfiers of these basic needs. Obviously we all need food, but we all have different desires with regard to the types of food we enjoy to satisfy our hunger and need for nourishment. Potatoes, rice, corn, and yams all supply basic carbohydrates, but our different desires for these basic foods determine our wants and these are influenced by the society, culture, and environment in which we live.

Demands are wants for specific products or services that are backed by the ability and willingness to buy them. Transportation offers a good example of how demands are related to the ability and willingness to buy. A resident of Bangkok may desire to travel by taxi but is only prepared to pay for a tuk-tuk or bus ride and therefore has no demand for taxis. An American business man may desire to fly the Atlantic by Concorde jet in three hours but is only willing to pay for the six-hour flight in a jumbo jet.

These distinctions illustrate that marketers do not create needs; needs pre-exist marketers. However marketers attempt to influence wants and demand by making products attractive, affordable, and easily available. Airlines, for instance, can persuade businessmen that a three-hour Transatlantic crossing will leave them more refreshed and ready for work than a six-hour flight, which, combined with the time saving, makes the extra cost worthwhile. An appeal to status may also influence demand in this case.

Products

People satisfy their needs and wants with products. Products do not just include physical objects. Products should be considered as anything that will satisfy a need or want. This includes all types of services and the benefits of product use. No one needs fertilizers. Fertilizers do not provide food or shelter or clothing. Fertilizers are a means of increasing income for farmers. It is the effect of the product that produces satisfaction not the product itself. Marketers look upon products as need satisfiers and their job is to sell the benefits or services built into the products rather than just describe the features.

Values and Satisfaction

The consumer, given a choice of products by marketers that might satisfy a given want, has to decide on the most satisfying product. How do consumers achieve this? The answer lies in the concept of value. Very rarely will products be absolutely ideal in satisfying consumers wants and the consumer therefore tends to judge alternative products by the perceived value of each product in providing satisfaction and then comparing that to the cost and convenience of obtaining the product. A rational choice by consumers would be based on the most value per dollar but rarely is this the only value concept applied. Modern theories on consumer preferences and product choice go well beyond purely economic rationale.

Originally it was thought that consumers could rationally rank a group of products giving weights to various beneficial characteristics and come to a product choice decision that optimized the value of the product choice to the consumer. This was called the theory of cardinal utility. It is now believed that consumers can only easily make a choice between two alternative products in terms of preference or express an indifference between two alternatives. This is a very important concept for marketers and, together with the concepts of value and satisfaction, forms the basis of marketing activities.

A useful way to consider these concepts is to place the identification of consumer needs at the center of marketing activities and provide goods and services in which value is added by the marketer for the benefit of the consumer. This consumer need and value-added approach is the core of the modern marketing concept. A very simple example in fertilizer marketing is product availability. Making fertilizer easily available through the provision of stock at the village retail level prior to farmer requirements adds value to the fertilizer compared to stocks at a regional center or, worse still, at the factory or port.

Exchange and Transactions

The essence of marketing is exchange. An exchange is the act of obtaining a desired product by offering something in return. Exchange requires five conditions to be met. These are:

1. There are at least two parties.
2. Each party has something of value to the other.
3. Each party is capable of communication and delivery.

4. Each party is free to accept or reject the offer.
5. Each party believes it is desirable to deal with the other.

If these conditions exist, then the potential for an exchange exists. The exchange becomes an actuality if both parties believe they will be better-off than before so that an exchange is a value creating process. Exchanges are processes rather than single events. The process involves communication and negotiation until a transaction is achieved. The transactions need not be monetary transactions for them to be considered as commercial transactions. Barter, counter-purchase, and some employment transactions are commercial transactions that do not necessarily involve money changing hands. The terms of a transaction are usually negotiated and to achieve a satisfactory outcome it is essential that both parties are aware of the wants of each other so that negotiation can lead to mutually acceptable terms. The awareness required is achieved through communication which is a two-way process. Marketing therefore involves both buyer and seller in communication. The seller must create awareness of a product's benefits to formalize the perception of value for the buyer and the buyer must communicate the value placed on the product benefits to the seller. The ultimate communication between both buyer and seller is the completed transaction.

Markets

The concept of exchange leads to the concept of markets. A market consists of all the potential customers sharing a particular need or want who might be willing and able to engage in an exchange to satisfy that need or want.

Economists usually refer to the market as a collection of buyers and sellers but in marketing the buyers only are usually considered as the market and the sellers constitute the industry. The relationship between the the industry and the market is shown in Figure 1. There are four flows connecting the two parties. These are flows of goods and services and communications from industry to the buyers and flows of information and money from the buyers to the sellers.

In a modern exchange economy markets abound but they fall into five major groups as shown in Figure 2. These are resource, manufacturers, middlemen, consumer and government markets. The exchange linkages between these markets form the basis of a modern economy.

Marketing and Marketers

Markets are dynamic and ever changing. There are no static markets. The marketing environment is ever changing and the forces of the market environment direct new perceptions of wants and desires on consumers. Buyers' needs and wants are constantly being revised and therefore human activity related to markets has to constantly change in order to effect successful exchanges. Marketers need to be aware of these changes and need to react to them accordingly. This is part of the process of marketing.

The speed of change in markets and marketing is ever increasing. The world is now well into the communication age; the global village is already here; time is compressed and the pressures for change increase daily.

For the marketers the process of marketing in this environment requires a wide range of skills, flexibility and insight into the human condition. Everyone should be able to market themselves, but this is often a difficult task and yet the professional marketer is expected to creatively perform the complex interacting tasks of marketing that are essential for economic development. There are available to marketers several marketing resources to meet the challenges. These resources are represented by the marketing mix and it is the management of these that creates good marketing.

Marketing Mix

The marketing mix is often referred to as the four P's of marketing·

- Product
- Place
- Price
- Promotion

The selection of the product – that package of goods and services that represents a desired value – requires the marketer to understand the requirements of the buyer and put together a product that contains value oriented benefits. This necessitates gathering information on the target buyers. The more well defined the target buyers are then the better able is the marketer to measure and then provide the desired benefits.

The use of place includes the physical distribution of product from one place to another, making it available to target customers when they need it. This also entails storage and marketing channels – wholesalers and retailers. Place functions require the estimation of demand to ensure that the right products are in the right place at the right time.

The pricing function represents a powerful marketing tool. Price represents the measure of value for a product to both the buyer and the seller. Remember that an exchange needs to be of value to both parties; the marketer needs to profit from the transaction and the buyer needs to obtain value in satisfying wants. The marketer can use price to influence demand and profitability, to change the target group of buyers. to position a product in the marketplace.

Promotion, including the use of advertising, personal selling, sales promotions, and publicity, is the marketer's communication process with the target market. Through promotion the marketer can make the potential buyer aware of the product value on offer.

Selecting the quantity, quality, and mix of these resources is entirely in the hands of the marketer. These are the controllable variables of marketing that need to be matched to the uncontrollable market variables of the market environment and the marketers objectives. How well the marketing mix is managed determines the success or otherwise of the marketing process. The concept of using the marketing mix as the link between the environment and the target customer is shown in Figure 3.

Marketing Management

Marketing management is the analysis, planning, implementation, and control of the marketing process. This can be considered as a six-part process:

1. Analyzing market opportunities.
2. Researching and selecting target markets.
3. Developing marketing strategies.
4. Planning marketing tactics.
5. Implementing marketing programs.
6. Controlling the marketing effort.

It is, however, far more than this for management involves getting work done through others. A marketing manager relies on the work of sales managers, sales representatives, advertising managers, marketing researchers, product managers, customer service managers, market development managers, distribution managers, and a host of others. Motivating and training, rewarding and reprimanding, and stimulating and controlling are all personnel tasks required by marketing management. Above all else marketing management involves staying in touch with the customer.

The Marketing Organization

The modern marketing concept has evolved over time through various stages and at least five different concepts of marketing can be identified. These are:

1. The production concept.
2. The product concept.
3. The selling concept.
4. The marketing concept.
5. The societal marketing concept.

The production concept is concerned with achieving a high production efficiency, low product costs, and a wide distribution coverage which permits low product prices to consumers. This approach to marketing is prevalent today with commodity products which are not easily differentiated and low consumer prices are required to achieve market share.

The product concept relies on product features that offer the most quality and performance. Often this approach leads to an undue concentration on the product rather than consumer need. The approach is often seen in new product development and marketing management falls into the new technology trap.

In the selling concept marketers believe that consumers need to be aggressively sold in order to stimulate sales. Usually this form of marketing is employed for discretionary products that the consumer may not normally think of buying and a whole range of selling and promotional tools are used to stimulate demand. Nearly all marketing firms at some stage use the selling concept to stimulate demand to reduce unwanted inventory, but this is not the same as positioning a product such as insurance for a continual "hard sell" approach.

The marketing concept challenges all of the previous approaches to marketing. The modern marketing concept is based on an organization achieving its objectives by determining the needs and wants of target markets and then delivering the desired satisfaction in the most efficient manner.

The distinction between selling and marketing was brought strongly into focus by Levitt (1960)[2]:

> Selling focuses on the needs of the seller; marketing on the needs of the buyer. Selling is preoccupied with the seller's need to convert his product into cash; marketing with the idea of satisfying the needs of the customer by means of the product and the whole cluster of things associated with creating, delivering and finally consuming it.

This distinction is also illustrated in Figure 4. The marketing concept also holds that the marketing function in an organization is the integrator between production, finance and personnel, with the customer as the controlling force. This concept is represented in Figure 5. Many arguments can be put forward to support this view but in reality there are very few organizations that have fully embraced the total marketing concept. Why should this be when the theory and the practical evidence is so strong? The answers appear to lie in the realms of organizational behavior. In the same way that marketers believe that marketing should occupy center stage the same holds true for production, finance and research and development. Within organizations there is constant competition between these functional areas and over the lifetime of an organization there are stages when one area will predominate over the others and often this is associated with a dominance of personality within the group. Marketing will frequently come to the forefront when sales decline, when there is slow growth or changing buying patterns or when there is increased competition. Nevertheless the marketing concept should be the focus of attention for any organization because an intrinsic feature is that customer need orientation enables an organization to recognize and adapt to the changing needs of its target customers.

Since the formalization of the marketing concept in the 1950's a more recent development has been the societal marketing concept in which a further requirement is added to the marketing concept. This requirement is that the marketing concept should not only fulfill the desired satisfactions of customers but should do this in such a way as

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2. T. Levitt, "Marketing Myopia," Harvard Business Review, July-August 1960, pp. 45-56.

to preserve or enhance the consumer's and society's well-being. In other words marketing should have a social responsibility. Currently throughout the developed countries there is growing political pressure being exerted by the public for greater social control over technology and business. Agriculture and the fertilizer sector are prime targets for these controls and both farmers and fertilizer marketers may be subject to stringent controls unless they recognize and adapt to the forces mounting against them. Marketing organizations that follow the marketing concept are well aware of these changes in the external environment and the need to adapt to the changes in a rational and logical manner.

Specific Characteristics of Fertilizer Marketing

Fertilizer use is essential for increasing food production but it is only one of many agricultural inputs required for the development of the agricultural sector. The importance of developing the agriculture sector in developing countries is now recognized as the best means of increasing income and promoting economic development. This importance is reflected in the level of government intervention in the agriculture sector throughout the world and this intervention is widespread in the fertilizer sector of developing countries, in production, trade, marketing, use and pricing. This characteristic dominates fertilizer marketing today but fertilizer marketing involves the universal marketing functions and the marketing concept so there is growing concern over the efficiency of government controlled allocative systems for fertilizers that fail to embrace the marketing concept.

There are, however, many specific characteristics of fertilizer markets and marketing that add considerable challenges to the marketing process. These are summarized below.

The level and growth in fertilizer demand depend on the size and growth of the agriculture sector. This in turn is dependent on overall government policies for agriculture. Fertilizer demand is a derived demand.

Individual fertilizer consumers are generally numerous, widely dispersed, and purchase in small quantities. This often leads to high marketing costs.

Fertilizer consumers are mainly resource poor and lack the ability to finance the purchase of fertilizer necessitating the need for credit systems.

The benefits of fertilizer use are not guaranteed; either in crop response or in crop output values and this increases the risk for users.

Fertilizer is a bulky product and thus creates a high demand for transportation facilities.

Fertilizer use is highly seasonal and large storage facilities are required to meet peak demand.

Fertilizers are generally commodity products with little opportunity for marketers to differentiate. This leads to an increased need for service to provide product benefits.

Fertilizer marketing in individual countries is difficult to isolate from the world fertilizer market in which there is increasing concentration of production and supply of fertilizer products and an increasing concentration of government ownership of production facilities.

Fertilizer marketing does not provide large profit opportunities for private sector firms and this combined with government intervention makes entry and operation into the marketing system difficult.

This combination of characteristics results in a unique marketing challenge throughout the world. Enormous progress has been achieved in the past 30 years in fertilizer marketing, but when this progress is examined in detail, it is obvious that the progress has been restricted to the development of fertilizer markets and marketing associated with the combination of high-yielding varieties of rice and wheat, irrigation, and nitrogen. Fertilizer marketing developments in the past have represented the easy part; the future will be more difficult. The further successful development of fertilizer markets will require even greater marketing skills and management than have applied in the past. This is the creative challenge for all involved.

Figure 1.

A SIMPLE MARKETING SYSTEM

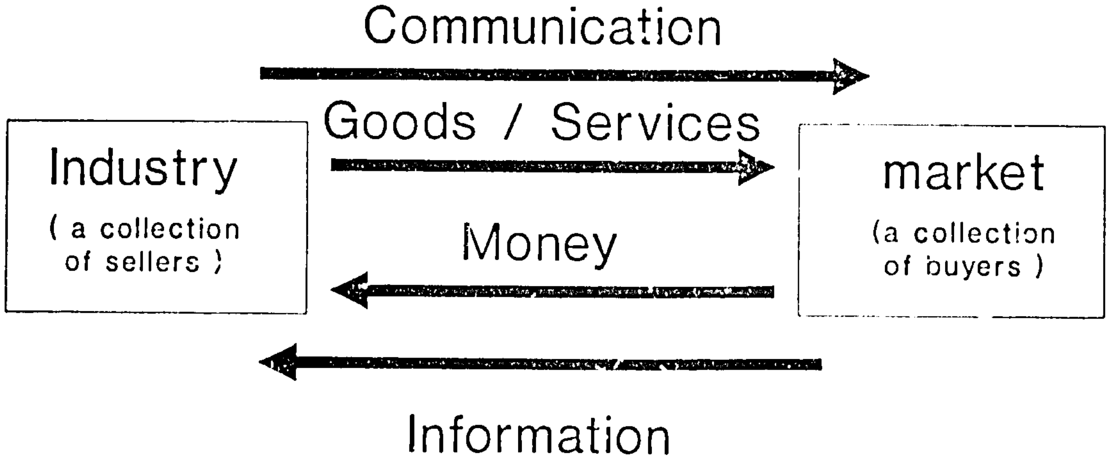
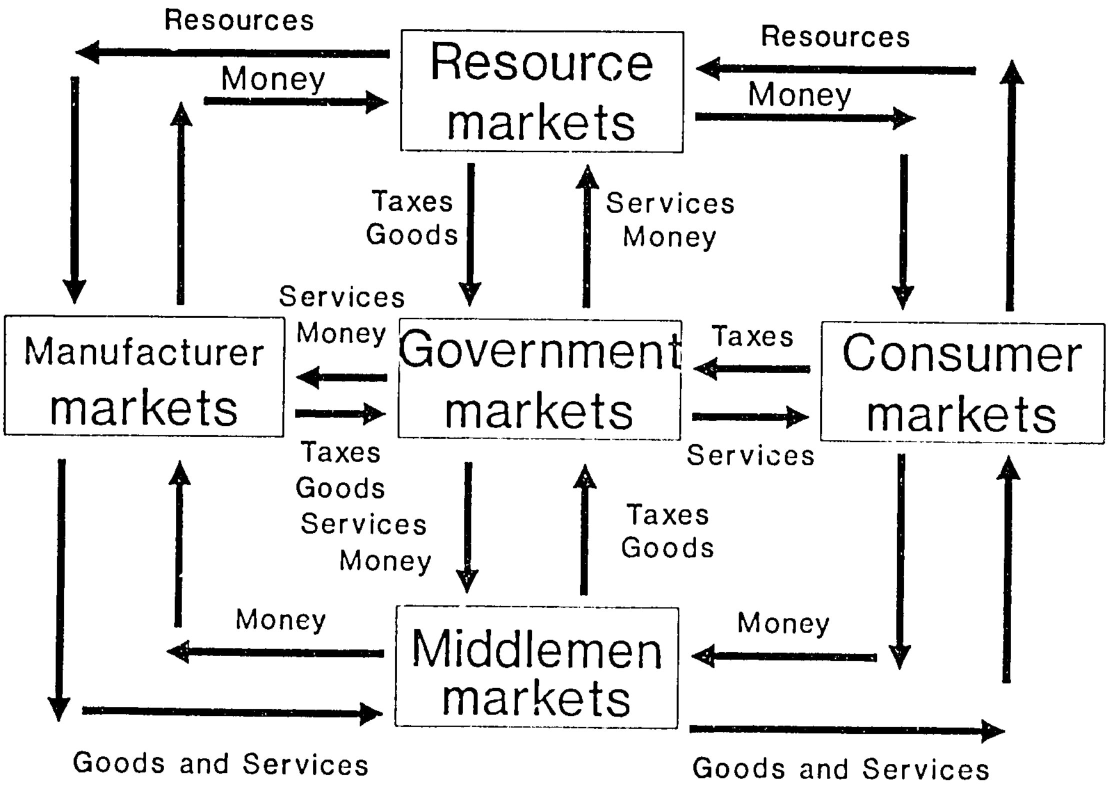


Figure 2.



Structure of Flows in an Exchange Economy

Figure 3.
The Marketers' Tools

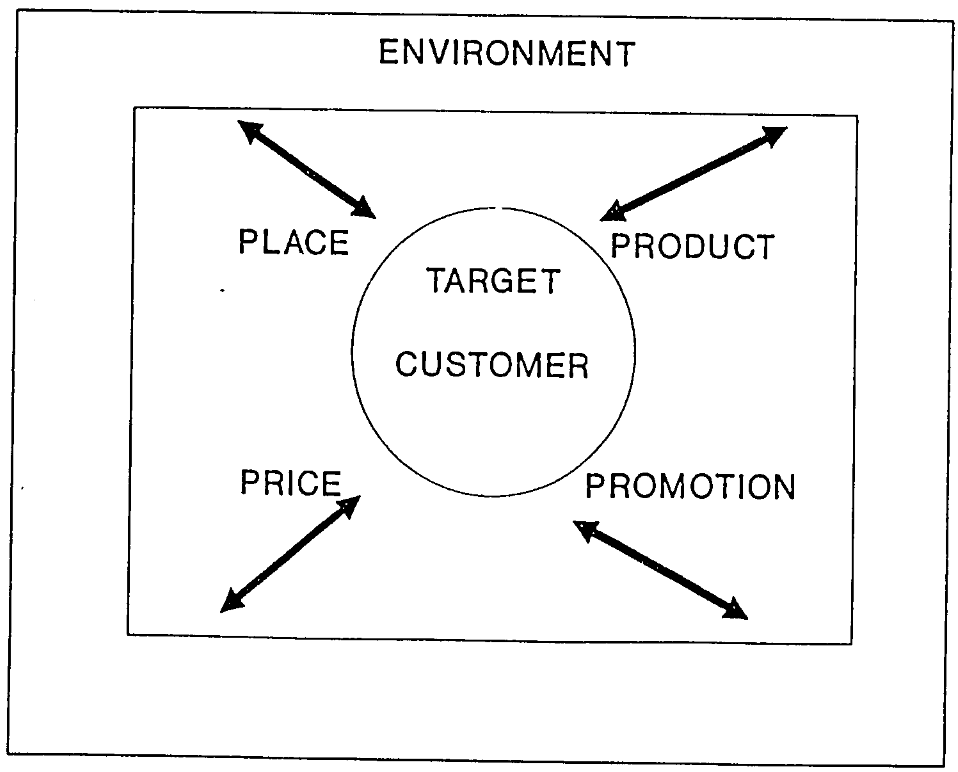


Figure 4.

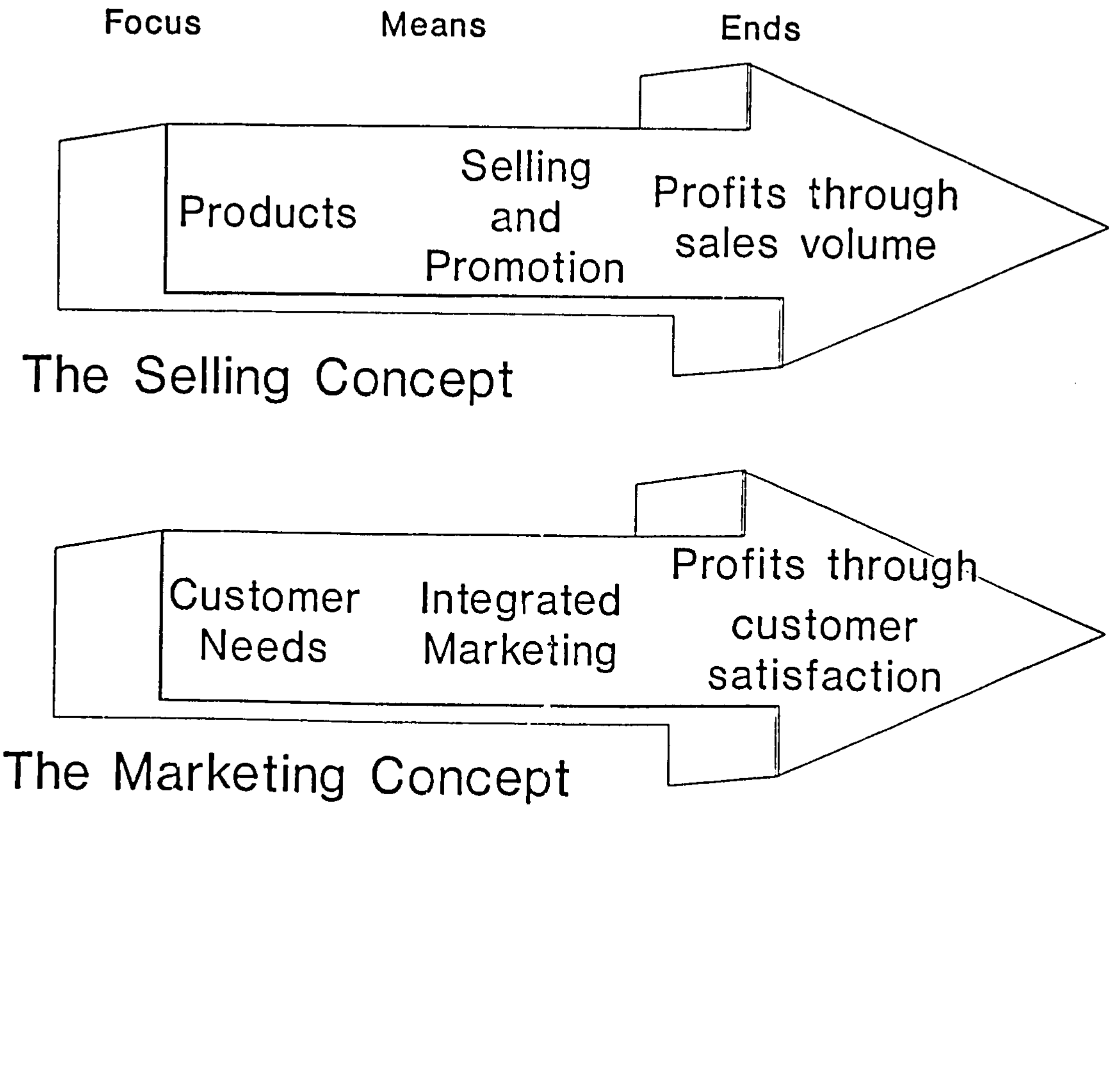

Focus
Means
Ends
Products
Selling
and
Promotion
Profits through
sales volume
The Selling Concept
Customer
Needs
Integrated
Marketing
Profits through
customer
satisfaction
The Marketing Concept

Figure 5.

The customer as controller, marketing as integrate

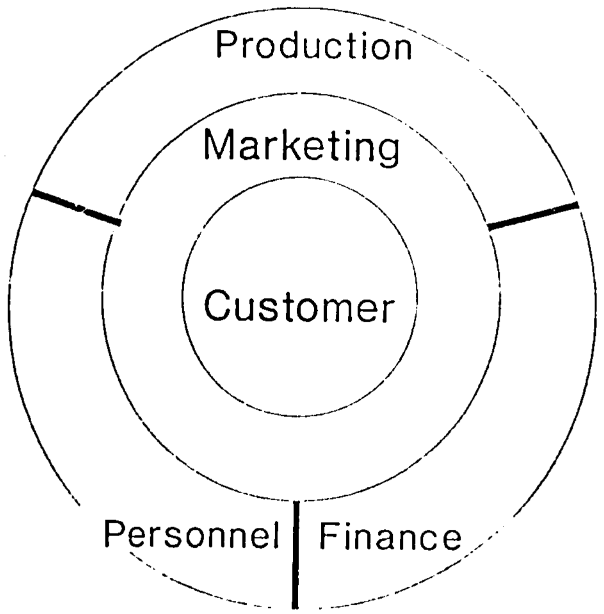
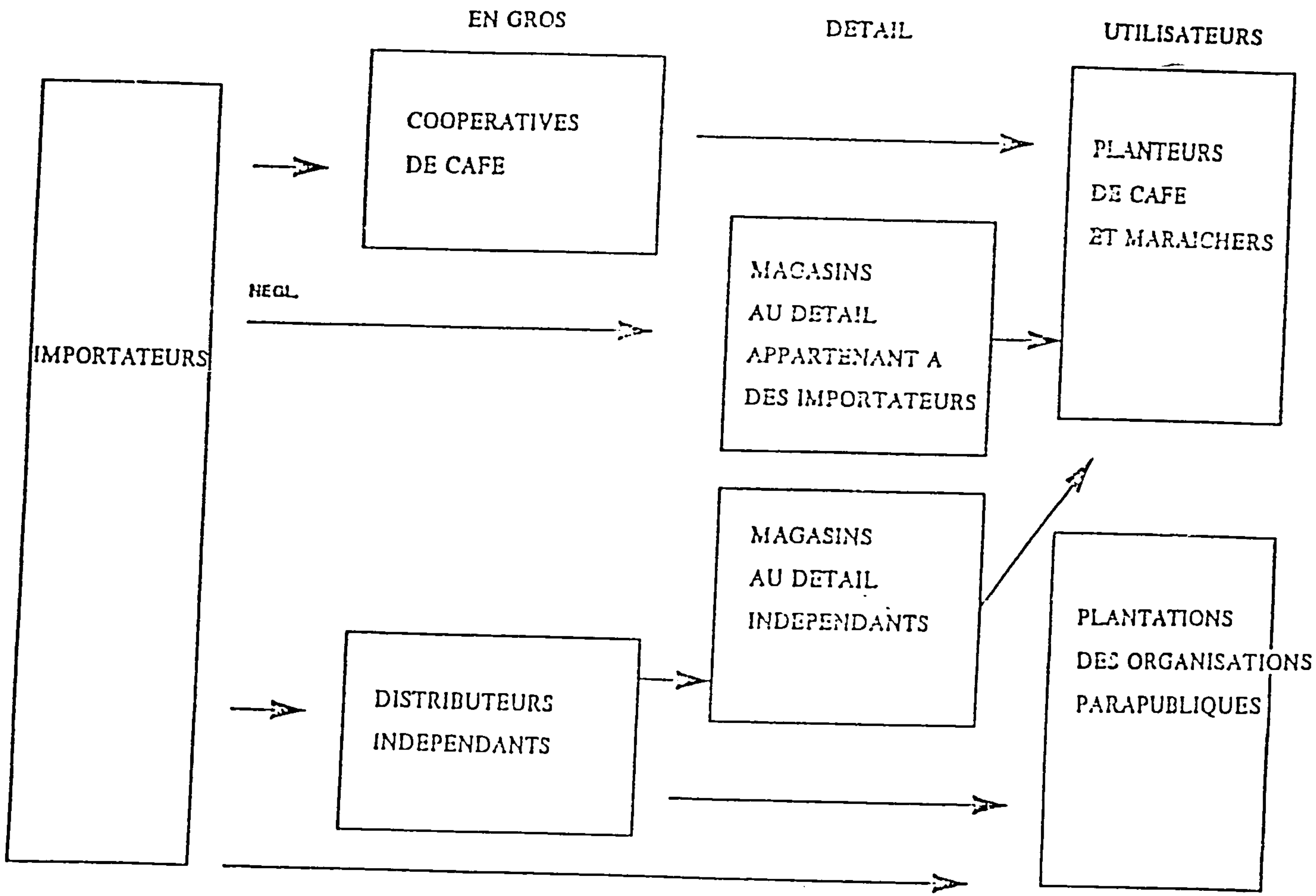


FIGURE 3 - FLUX DE DISTRIBUTION DES ENGRAIS



PROGRAMME DE REFORME DU SOUS-SECTEUR ENGRAIS

UNITE DE SOUTIEN TECHNIQUE

RESUME DE LA NOTICE D'INFORMATIONS GENERALES

<u>Naissance</u> : 29 Septembre 1987

<u>Objectifs</u> : Libéraliser et Privatiser l'importation et la distribution des engrais

<u>Organe d'Exécution</u> : Comité Technique de Supervision (CTS)

Il est composé de représentants des départements ministériels et organismes ci-après :

- Ministère du Plan et de l'Aménagement du Territoire (MINPAT) Président
- Ministère de l'Agriculture (MINAGRI), Rapporteur ;
- Ministère des Finances (MINFI), Représenté par la Caisse Autonome d'Amortissement, Contrôleur;
- Ministère du Développement Industriel et Commercial (MINDIC), Membre ;
- L'USAID, Membre.

Il élabore des Orientations du Programme, contrôle et suit la gestion des fonds.

<u>Système Financier du PRSSE</u> : 2 types de ressources

- Un Fonds de Crédit
- Un Fonds de Subvention

<u>Agents Financiers</u> :

- Banque Fiduciaire (BF) : Celle de 92/93 est en voie de sélection
- Banque Commerciale (BC) : Amity Bank, BICIC, CAC, CCEI, Meridien-BIAO, SCB-CL, SCBC et SGBC.
- Importateurs
- Distributeurs indépendants.

<u>Eligibilité aux programmes de Subvention et de Prêt du PRSSE</u> :

1. <u>Critères</u>

- Personnes morales ou physiques ayant au moins une fois depuis 1984 :
  . importé des engrais ou des produits chimiques agricoles,
  . distribué des engrais ou des produits chimiques agricoles ;

- Organismes de commercialisation ayant pour actionnaires soit des importateurs, soit des distributeurs ayant au moins une fois importé ou distribué des engrais ou des produits chimiques depuis 1984 ;

- Organisme de commercialisation capables d'apporter une valeur ajoutée importante aux engrais importés (Ex. : possession: - d'1 magasin de stockage de plus de 5 000 T - d'unités de mélange et d'ensachage - d'équipements de transport ;

2. <u>Procédure de détermination de l'éligibilité</u> :

La charge revient aux BC qui ensuite demandent l'assentiment de la BF.

PROGRAMME DE SUBVENTION DU PRSSE

- Accès : Etre éligible
- Taux :

88-89 : 33 %
89-90 : 22 %
90-91 : 20 %
91-92 : 17 %
92-93 : 15 %

Procédure de consignation (cf. tableau) : 90 jours

Ordre d'accès : Ordre de réception des demandes par la BF

Ouverture : Lettre de crédit : 30 jours après consignation

PROGRAMME DE PRET

Taux BC à la BF : 5 %
Taux Importateur/Distributeur à la BC : 8 %
Montant : 50 % prix CAF Douala Cargaison
Echéance : 180 jours avec possibilité de paiement par anticipation

BILAN DE LA CAMPAGNE 1991-1992 (cf. tableau)

- D'abord timide en début de campagne, les importateurs se sont bousculés aux portes du Programme au cours du dernier trimestre de la campagne.

Pour les mêmes raisons qu'en 1990-1991 à savoir :

- leur faible surface financière,
- l'extrême prudence des BC quant à leur engagement dans le Programme,
- le manque de trésorerie qui les caractérise,
- les arriérés dus aux planteurs, etc.

Très peu d'entre eux ont participé à l'importation des 32 000 T d'engrais tous types confondus (chiffre au 31 Juillet 1992).

Ces 32 000 T se répartissent ainsi qu'il suit :

Type	Tonnage	Prix CAF (F CFA/T)
NPK 12-6-20	4 400 T	52 500
NPK 20-10-10	21 050 T	58 750
Urée	5 250 T	55 850
Sulfate d'Ammonium	1 300 T	37 155

Le redressement du tonnage d'après la Revue Annuelle du PRSSE d'Avril 1992 semble être le fruit de la Nouvelle Politique Agricole dont le maitre-mot est la diversification de la production agricole.

En effet, les producteurs affirmaient déjà en 1991 que 40 % des engrais achetés pour le café allait aux cultures vivrières et cette tendance va croissant.

AUTRES ACTIVITÉS DU PRSSE AU COURS DE L'EXERCICE 91-92

* Analyse de la politique des prix et la demande d'engrais dans le Secteur Café

* Financement des Mémoires des Etudiants du CUDS

* Lancement de l'Enquête Engrais 1992 dans les 10 Provinces

* Analyse supplémentaire de la base de données des Recensements Agricoles 1984-1989.

FERTILIZER PROGRAMME UNDERTAKEN IN CAMEROON BY THE FOOD AND AGRICULTURE ORGANISATION OF THE UNITED NATIONS (F A O) IN COLLABORATION WITH THE FEDERAL REPUBLIC OF CAMEROON

:-:-:-:-:-:-:-:-:

1970

FERTILIZER DEMONSTRATION ON POTATOES

PURPOSES:

- To demonstrate to the farmer in his own field the effect to fertilizer use.
- To train the farmer to apply fertilizers rationally.
- To obtain more data, under as many conditions as possible, about the possibilities with and without fertilizers.

THE DESIGN: 5 plots

K_1	(red)	0-0-45	or 80 Kg/ha of M.P.
P_1K_1	(blue)	0-45-45	or 240 Kg/ha of S.S. + 80 Kh/ of M.P.
$N_1P_1K_1$	(yellow)	45-45-45	or 220 Kg/ha of S.A. + 240 Kg + 80 Kg/ha of M.P.
$N_1P_1K_2$	(green)	45-45-90	or 220 Kg/ha of S.A. + 240 Kg + 160 Kg/ha of M.P.
C	(white)	0-0-0	control - without fertilize

- Every " useful" elementary plot comprises 5 rows (ooooo) which receive fertilizers (except the control plot).
- Round each of those 5 rows there is a border row which does not receive fertilizer and does not intervene in the apprecia-tion of the fertilizer action.
- The order of the treatments (inscribed on the wood panels) varies from one demonstration to another, so one must refer to the annexed table which shows the order of the treatments (inscriptions) assigned to each trial.
- Each demonstration has its own serial number. The identification wood panels should therefore be placed in front of each elementary plot of the trial following the annexed table
- Total length of the trial : 25 m.
  Number of rows : 55
- Total width of the trial : 25 -
  Number of plants per row : 51.

Contd. P/2

SOIL SAMPLING:

One soil sample (15 - 20 cms deep) from the to. soil is to be taken before the application of fertilizers.

In order to make the sample representative of the soil it will be taken once every two steps along both the diagonals. When having no special tool to take this sample, one can use a matchet which is driven into the soil 10 - 15 cms. deep. A thin plate of the soil is extracted from the hole. Any particular spot (fire, orga nic heap) should be avoided. All the sub-samples belon ging to one trial are gathered and mixed. About one kil gramme of the resulting mixture is put into one small plastic bag.

Each sample must be identified by one cardboard label bearing the following data :

- The names of the Division
  of the Village
  of the Farmer
  of the Agricultural Officer
- the number of the trial
- the crop
- the date of sampling.

The sample will be dried in the shade.

All the samples should be gathered and sent to t Chief town of the Agricultural Division.

SOWING :

Spacing: 0,80 m. between rows - 0,50 m between plant on the row.

Variety: The same variety should be used in one tria

Time: According to the local agricultural calenda

Mode: Local methods

FERTILIZERS:

Form:

N	=	Sulphate of Ammonia	21 % N
P	=	Simple Superphosphate	18 % P_2O_5
K	=	Muriate of Potash	60 % K_2O

ABBREVIATIONS:

S.A.	=	Suphate of Ammonia
S.S.	=	Simple Superphosphate
M.P.	=	Muriate of Potash

Contd. P/3

SIMPLE STANDARD DOSE:

N_1	:	45 Kg/ha	- 220 Kg/ha of S.A.
P_1	:	45 Kg/ha	- 240 Kg/ha of S.S.
K_1	:	45 Kg/ha	- 80 Kg/ha of M.P.

DOUBLE STANDARD DOSE

K_2	:	90 Kg/ha	- 160 Kg/ha of M.P.

DOSES PER ELEMENTARY PLOT AND MEASURES (PLASTIC GOBLETS)

Treatments	S.A. Measures	S.S. Measures	M.P. Measures
(red) 0-0-K_1	-	-	1
(blue) 0-P_1-K_1	-	3	1
(yellow) N_1-P_1-K_1	2 8/10	3	1
(green) N_1-P_1-K_2	2 8/10	3	2
(white) 0-0-0	-	-	-

PREPARATION AND APPLICATION OF THE FERTILIZERS

Time of Application:

Immediately the emergence (90 %). Count the emer ed plants per plot.

Method of Application:

The coloured wood panels are to be placed in front of each plot before applying fertilizers, according to the order corresponding to the serial number assigned to the trial

- Place in front of the elementary plot to be treated a calebash, a basin or any other suitabl container and pour in the measures of fertilizers prescribed by the protocol.

EXAMPLE:

For the plot N_1 P_1 K_1 , pour into the container, 2 8/10 measures of S.A., 3 measures of S.S. and measure of M.P.

The plastic goblet measuring 10 cms. 8/10 of a measure correspond to 8 cms. from the bottom of the goblet.

- Mix thoroughly the fertilizers in the container in order to obtain an homogneou mixture.

- Open a circular drill f 5 cms. deep at 10 cms. around a plant destined to r ive the fertilizer.

- Divide the fertilizer (mixture in every elementary plot into 5 equal parts (5 rows to be treated), so as to apply the fertilizer in as uniform and equitable manner as possible.

SOWING OF REPLACEMENTS :

The farmer will be asked to replace the missing seed-holes 10 days after the first sowing.

Please indicate the number of missing seed-holes per elementary plot.

WEEDING:

Fertilizer are profitable to weeds as well as to potatoes.

When using fertilizers clearing and weeding are of the highest importance. The trial must be regarded by the farmer and the extension staff as a medel and pilot field, if not the trial misses its purpose.

Harvesting and weighing:

Harvest and weigh each elementary plot separately. Note carefully the results of the individual weights and then inscribe them in the cardboard form corresponding to the trial.

When weighing is finished the whole produce of the trial is given back to the owner.

DIAGRAM OF A FERTILIZER DEMONSTRATION ON POTOTOES

```
           4,80           24 m
0,50 m   x 00000 x 00000 x 00000 x 00000 x 00000 x
         x 00000 x 00000 x 00000 x 00000 x 00000 x
         x 00000 x 00000 x 00000 x 00000 x 00000 x
         x 00000 x 00000 x 00000 x 00000 x 00000 x
         x 00000 x 00000 x 00000 x 00000 x 00000 x
         x 00000 x 00000 x 00000 x 00000 x 00000 x
         x 00000 x 00000 x 00000 x 00000 x 00000 x
 25 m    x 00000 x 00000 x 00000 x 00000 x 00000 x
         x 00000 x 00000 x 00000 x 00000 x 00000 x
 51      x 00000 x 00000 x 00000 x 00000 x 00000 x
         x 00000 x 00000 x 00000 x 00000 x 00000 x
 p       x 00000 x 00000 x 00000 x 00000 x 00000 x
 l       x 00000 x 00000 x 00000 x 00000 x 00000 x
 a       x 00000 x 00000 x 00000 x 00000 x 00000 x
 n       x 00000 x 00000 x 00000 x 00000 x 00000 x
 t       x 00         x    0  x 0   0 x 00    x     0 x
 s       x 0     x    0  x       x       x       x
         x 0     x       x       x       x       x
         x 1     x 2     x 3     x 4     x 5     x
         x       x       x       x       x       x
         x       x       x       x       x       x
         x       x       x       x       x       x
         x       x       x       x       x       x
         x 00000 x 00000 x 00000 x 00000 x 00000 x

           0,80 m.
```

- 51 plants per row   0,50 m between plants in the row
- 31 rows   0,80 m between rows
- 5 rows per plot receiving fertilizers except the control p
- Total surface of the elementary plot : 25 x 4,80 = 120m2
- "Useful" surface of the elementary plot : 25 x 4 = 100m2
- Number of plants per " Useful plot : 51 x 5 = 255 plan
- xxxx border rows between plants which do not receive fertil

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FERTILIZER PROGRAMME F.A.O. - CAMEROON

1970

Demonstration on ....

Division ....

District ....

Village ....

Responsable (Agric. Assistant)...................

Order of the treatments (colours or inscriptions) assigned by randomization to the plots from left to right when looking at the demonstration.

Number of the plots

Village	N° of demonstration	1	2	3	4	5

PROGRAMME ENGRAIS

ENTREPRIS AU CAMEROUN PAR L'ORGANISATION DES NATIONS UNIES POUR L'ALIMENTATION ET L'AGRICULTURE (F.A.O.) EN COLLABORATION AVEC LE GOUVERNEMENT DE LA REPUBLIQUE FEDERALE DU CAMEROUN.

1966

- I N T R O D U C T I O N -

Il existe trois phases successives dans le processus qui conduit aux recommandations destinées à être pratiquées par les agriculteurs.

1°) - La recherche à l'aide d'essais précis, rigoureusement contrôlés et analysés.

Cette première phase est le propre des Centres et Stations de Recherches Agronomiques.

2°) - Les conditions de sol, de climat, de milieu au sens large, propre à chaque centre que font les résultats qui y sont obtenus ne sont pas nécessairement valables pour toutes les situations dans lesquelles ces résultats devraient être mis en pratique.

La seconde phase consistera donc en une vérification de ces résultats à l'aide d'essais établis en dehors des Centres de Recherche, dans les différentes régions auxquelles les recommandations sont destinées.

3°) - Si les essais conduits en dehors des Centres de Recherche confirment les résultats obtenus dans ces Centres, alors seulement on entre dans la troisième phase qui consiste à procéder à des démonstrations dans ces champs des agriculteurs de façon à introduire dans la pratique l'amélioration considérée.

Le programme que nous entreprenons ensemble correspondra pour une bonne part à la deuxième phase (pour les premières années, c'est-à-dire qu'il aura pour objectif principal la collecte des données nécessaires pour l'adoption de formules appropriées par culture et par région). En même temps, en dehors des essais simples ainsi entrepris, une série de démonstrations simples d'engrais sera établie dans les champs des agriculteurs pour sensibiliser le plus grand nombre possible de planteurs à l'utilisation des engrais en tant que facteur d'augmentation des rendements et de conservation de la fertilité du sol.

Les phases 2 et 3 s'y trouveront donc représentées.

- ETABLISSEMENT DU PROGRAMME - LOCALISATION DES EMPLACEMENTS -

L'objectif premier du programme étant de porter l'utilisation des engrais à la connaissance des agriculteurs, le programme s'adressera d'abord aux cultures vivrières, pour lesquelles le recours aux engrais est peu usité ainsi qu'aux cultures industrielles annuelles (coton).

Le moniteur agricole est tout indiqué pour la localisation des emplacements parce qu'il connait mieux sa zone d'action.

Il connait les villages et les planteurs, la distribution des sols et leur potentiel.

La localisation des emplacements devrait s'inspirer des quelques principes suivants :

- Les grands villages dont le potentiel de production est élevé seront désignés en premier lieu. L'action s'étendra aux autres villages par la suite.

- Les emplacements seront choisis chez les planteurs et de préférence
- Chez les animateurs ruraux.
- Chez les planteurs les plus progressistes.
- Dans les champs collectifs.
- Autant que possible, les essais et démonstrations seront répartis judicieusement sur l'ensemble des terres donnant lieu à la production du village choisi et ne seront point groupés au même endroit.

Le choix du village se fera de préférence lors des réunions régionales du personnel de l'Agriculture.

- CHOIX DU TERRAIN -

Le choix du terrain revêt une importance primordiale puisque de lui dépendra pour une bonne part la valeur d'enseignement et de démonstration désirée.

- L'emplacement sera choisi dans les champs même des planteurs, et de préférence chez les animateurs ruraux.

- L'emplacement doit être représentatif de l'ensemble des terres environnantes au point de vue topographie, nature du sol. Seuls les types de sol les plus représentatifs seront envisagés.

- Le terrain doit être ;

- uniforme et homogène - l'observation de la végétation naturelle donne de bonnes indications à ce sujet. Des plages de fertilité particulière sont souvent repérables à la densité et à la vigueur de la végétation naturelle qui s'y développe. Eviter les endroits où il y aurait eu des cases, les termitières, les emplacements de feux en tas . . . .

- plat de préférence - de pente extrêmement faible s'il n'y a pas d'autre possibilité.

- uniforme quant à l'épaisseur de la couche arable; les bancs de latérite dont la proximité de la surface varie ne peuvent être décelés que par sondage e peuvent enlever toute valeur à un essai où à une démonstration.

- Eviter de choisir un terrain trop près d'un village vu les risques de dégâts de la part des animaux domestiques.

Il est nécessaire que la culture à laquelle s'adressent les essais et démonstrations se trouve à sa place dans la rotation locale.

- Lors du choix du terrain, il est utile d'interroger le planteur sur l'histoire de son champ et d'en prendre note.

- n'y a-t-il jamais eu de village ?
- quand y-a-t-on cultivé pour la dernière fois et de quelle culture s'agissait-il ?
- Le champ a-t-il déjà reçu des engrais et quand ?
- n'y a-t-il pas de risque d'inondation ou d'accident d'autre nature ?

Lors du choix du terrain, le planteur sera informé des objectifs du programme et du rôle qu'il y joue.

Il est nécessaire d'assurer qu'il ne peut y perdre en aucun cas étant donné que les engrais lui sont fournis gratuitement et que la récolte lui appa: tient.

Autant que possible, les Chefs de Circonscription ou les Chefs de Postes Principaux devraient accompagner les moniteurs lors du choix définitif des ter· rains.

L'expert de la F.A.O. visitera lui même le plus grand nombre possible d'emplacements avant le départ de la campagne.

- PREPARATION DU TERRAIN -

Le planteur préparera lui-même le terrain selon les habitudes locales sauf pour ce qui est de l'incinération en tas.

Afin d'être prêt à temps il lui sera demandé de commencer par l'emplacement retenu.

Dans le cas où la végétation naturelle est habituellement incinérée, ell se fera à feu courant sur toute la surface de l'emplacement.

Si le planteur désire incinérer des coques d'arachides, cette opération doit se faire uniformement sur toute la surface en évitant à tout prix l'incin ration en tas.

Quel que soit le mode d'ameublissement, charrue ou houe, l'uniformité de travaux reste la règle.

- PIQUETAGE DEFINITIF -

Dans la mesure du possible, cette opération sera contrôlée par le person nel de l'Agriculture.

- la première chose à faire sera le choix de l'orientation des lignes.

Dans le cas d'un terrain plat, meilleure orientation des lignes sera Est Ouest O = = = = = E afin de permettre la même quantité d'insolation pour toute les parcelles.

Dans le cas d'un terrain en pente légère, ce qui entraîne souvent une variation de la fertilité, le point le plus fertile se trouvant au point le pl bas, il est indispensable dans un essai d'orienter les lignes dans le sens de pente afin que chaque niveau de fertilité soit représenté dans chacune des par celles constituant l'essai ou la démonstration.

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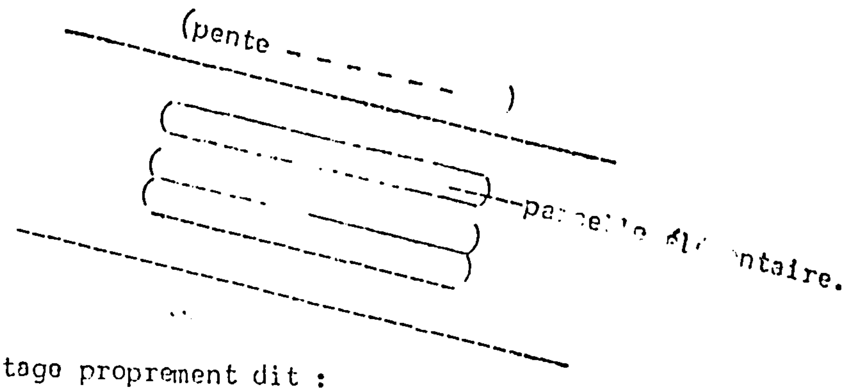
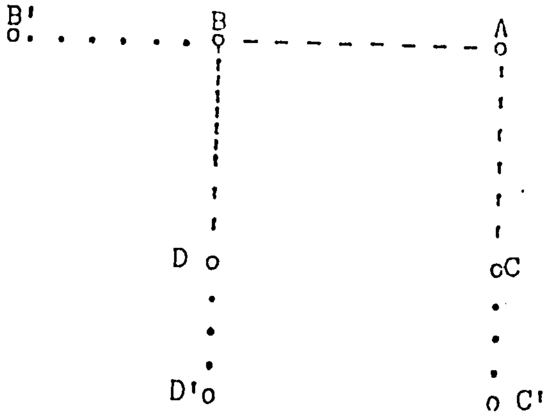


- Piquetage proprement dit :

- <u>Avec équerre optique, pantomètre</u>, ...



- placer l'appareil . . .. et faire placer un jalon en B' selon un premier alignement que se donne après avoir déterm l'orientation de l'essai.

- tendre une corde de A en B' et y porter AB à l'aide d'un ruban ou décamètre conformément aux dimensions reprises au protocole.

  Placer un jalon en B.

- Elever la perpendiculaire AC' et y porter AC selon le protocole. Placer un jalon en C.

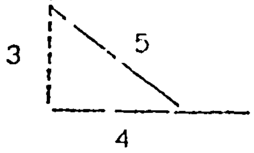
- placer l'appareil en B.

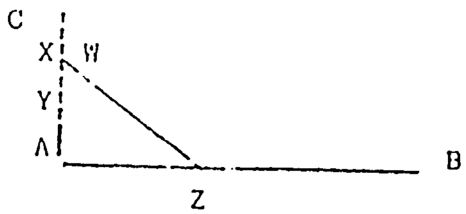
Viser le jalon A et élever la perpendiculaire BD' y porter BD à l'aide décamètre lelong d'une corde tendue entre B et D'.

- Si l'opération a été bien effectuée, en plaçant l'appareil en D et en tirant sur B, C doit se trouver sur l'alignement DC.

- <u>Sans Appareil</u> :

On utilise la méthode basée sur le principe du carré de l'hypoténuse du triangle rectangle égal à la somme des carrés de deux autres côtés. (Cette méthode est la plus employée).





$5^2 = 3^2 + 4^2$

Soit à élever la perpendiculaire AC sur AB.

Préparer une corde non extensible en faisant des noeuds ou en plaçant des tiges de fer en X, Y, Z, W. comme ci-dessous :

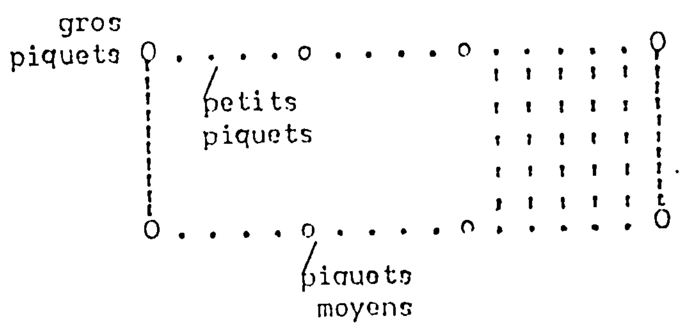
X 3m Y 4m Z 5m W
o-------o---------o-------------o

Placer deux jalons en A et B distants de la longueur imposée par le protocole et tendre une corde entre A et B.

Placer le noeud Y au jalon A et le noeud Z sur la corde joignant A e
Rassembler les noeuds X et W et placer un jalon à cet endroit. Placer un jalon en prolongement de A - XW et porter la distance voulue sur cet alignement.

Cette première opération terminée, on matérialise les sommets de l'em placement par de gros piquets si possible.

Afin de faciliter les semis, il est recommandé de piqueter toutes le lignes à l'aide de petits piquets pour les lignes traitées et de piquets de pl fort diamètre pour les lignes de bordure qui ne reçoivent pas d'engrais.



PRELEVEMENT D'UN ECHANTILLON COMPOSITE DE SURFACE

L'échantillon de sol prélevé est destiné à l'analyse. Il doit donne une idée moyenne des caractéristiques du sol sur lequel est établi le disposi et permettre certaines interprétations au point de vue de la réponse des engr

Etant donné l'intérêt des renseignements que l'on peut en tirer, il importe que ce prélèvement soit effectué avec soins et conscience.

Si l'on dispose d'une sonde creuse, il suffit de l'enfoncer de 20 à 25cms et de placer le cylindre de sol que l'on retire dans le sachet destiné l'échantillon.

On repète cette opération tous les 2 à 3 pas en cheminant le long des deux diagonales du quadrilatère constitué par l'essai ou la démonstration.

Tous ces prélèvements sont placés dans le même sachet et constituent donc l'échantillon moyen du sol relatif à l'emplacement considéré.

Cet échantillon atteindra au moins le poids d'un Kg. [illegible] defaut de sonde on peut utiliser la machette. On l'enfonce à 20 - 25 cms et par un mouvement d'avant en arrière, on ouvre le trou sur une face duquel on prélève une lame de sol que l'on place dans le sachet. Le reste du processus est le même qu'avec la sonde.

- IDENTIFICATION -

Dès le prélèvement terminé, placer une étiquette en carton à l'intérieur du sachet, en y mentionnant :

- le nom du planteur ;
- le nom de la Circonscription, Département, District ;
- le nom du village ;
- la date ;
- la nature du dispositif : D Mil : Démonstration Mil ;
  E Mil : Essai Mil etc...
- le n° de l'essai ou de Démonstration.

- SECHAGE -

Cet échantillon doit être séché à l'ombre dans un local où il ne risque pas d'être l'objet de dégâts de rats ou autres déprédateurs. Autant que possible, l'échantillon est étalé sur du papier jusqu'à parfaite dessication. On peut alors le replacer dans un sachet que l'on avait laissé sur l'échantillon pendant le séchage.

Avant de ferme le sachet, on place à l'intérieur l'étiquette d'identité de l'échantillon, on ferme et on attache la même étiquette à l'extérieur.

- CENTRALISATION -

Les échantillons seront remis au Chef de la Circonscription Agricole qui se chargera, lorsqu'il sera en possession de tous les échantillons de sa Circonscription de les faire parvenir au Chef-lieu de la Région d'où ils seront dirigés vers Yaoundé. Les échantillons seront stockés provisoirement au Chef -lieu de la Région en attendant que des dispositions soient prises pour leur acheminement vers Yaoundé.

- RECOMMANDATIONS -

Ne pas faire de prélèvement à un endroit où seraient accumulées des matières organiques, ce qui ne représente pas l'ensemble et donnerait une idée fausse de la teneur du sol en matière organique.

- effectuer le prélèvement avant l'application des engrais.
- veiller à ne pas utiliser pour cet échantillon un sachet ayant contenu de l'engrais. Eviter toute contamination possible de l'échantillon.

- SEMIS -

Le nombre de plants par parcelle étant un facteur important de la production, il importe :

- que le nombre de plants se rapproche autant que possible du nombre de plants requis par le protocole.

- que le nombre de plants soit le même autant que possible dans toutes les parcelles élémentaires.

- dans les essais et démonstration sur riz la quantité de semence par parcelle sera identique dans le cas d'une semis à la volée ou en ligne. Le nombre de plants sera le même pour toute les parcelles dans le cas de repiquage.

S'il n'est pas ainsi, on pourrait assister au cas extrême de voir une parcelle sans engrais fournir un rendement par plant inférieur mais un rendement global supérieur à celui d'une parcelle avec engrais si dans cette dernière parcelle le nombre de plants est inférieur.

De là l'importance de respecter le nombre de lignes par parcelle et le nombre de plants par ligne imposé par le protocole.

L'utilisation de cordes à noeuds, de rayonneurs sont de moyens d'y parvenir et connus de tous.

Dans le cas de semis mécanique, il importe de régler le semoir de façon à respecter les écartements et densités demandés.

Le semis s'effectuera à la date optimale propre à chaque terroir et les agriculteurs seront sollicités afin que les semis débutent par la parcelle d'essai ou de démonstration.

Si le semis sur billon est de coutume locale, le nombre de billons sera égal à celui du nombre de lignes indiqué par ce protocole.

Les semences utilisées seront autant que possible les meilleures semences utilisées localement.

PLACEMENT DES ETIQUETTES METALLIQUES (ou en Bois) D'IDENTIFICATION.

S'effectue lors du semis.

Dans le cas de démonstration : les plaques sont colorées en différentes couleurs et doivent être placées comme il est indiqué au protocole en tête de parcelle (entre ces deux lignes centrales si le nombre de lignes est pair, devant la ligne centrale si le nombre de lignes est impair).

Dans le cas d'essais, les plaques (8 à 11) doivent être disposées comme sur le protocole en respectant l'ordre des traitements figurant au protocole.

– A T T E N T I O N –

Chaque essai ou démonstration a un protocole propre et différent des autres. Il faut donc bien consulter le protocole que l'on a affecté à l'emplacement en présence.

– PREPARATION ET APPLICATION DES ENGRAIS –

PREPARATION :

Les engrais nécessaires sont envoyés dans les Inspections Agricoles d'où ils sont ventilés dans les différents Départements et Districts selon les besoins. La préparation de mélange devrait être effectuée par chacun des moniteurs prenant part au programme, pour ce qui regarde les essais et démonstrations dont il assume la responsabilité.

Se conformer strictement aux directives et méthodes reprises dans les protocoles afférents aux démonstrations et essais.

L'expert en charge du programme aura d'ailleurs l'occasion de passer dans les différents districts et circonscriptions afin de donner toutes explications utiles.

– A P P L I C A T I O N –

Se conformer strictement au protocole.

– SUITE DE REMPLACEMENT –

Sauf dans le cas d'une très mauvaise levée où le semis devrait être recommencé entièrement, les plants manquants seront complétés et remplacés aussitôt que possible.

VISITE -

Lors des visites des villages dans lesquels sont installés les essais et démonstrations chacun de nous se rendre en priorité aux essais et démonstrations pour en observer l'évolution et l'entretien.

Le paysan sera intéressé et éclairé sur les différences qui apparaîtront pendant la période végétative et en temps opportun, des visites seront organisées pour les autres paysans du village.

- RECOLTES -

La récolte appartient au planteur mais il sera tenu de laisser les produits de récolte dans leurs sacs respectifs jusqu'à ce que les pesées aient été effectuées.

Il serait souhaitable que le Chef de Poste procède lui-même aux pesées en présence du moniteur local, ce qui donnerait lieu à deux lectures, l'une contrôlant l'autre.

- RAPPORT -

Il serait souhaitable que chaque moniteur constitue un dossier "PROGRAMME ENGRAIS" contenant toutes les notes, protocoles et correspondance échangée.

Les résultats et observations seront consignés dans les formulaires qui leur seront remis prochainement. Ces formulaires remplis ainsi que tout autre document seront remis par la voie hiérarchique à l'Inspection Agricole qui les remettra en mains propres ou les fera parvenir à l'expert : Mr G. Lambrinides - Expert F.A.O. - Direction de l'Agriculture B.P. 1073 - YAOUNDE -

Afin d'éviter tout risque de perte, les expéditions devraient en être faites par recommandé ou bien l'ensemble pourrait être remis en mains propres.

Pour n'encourir aucun risque de perdre le fruit de tous les efforts consentis, chaque moniteur devrait consigner les résultats et observations dans un cahier ad hoc et le conserver dans les archives de la zone dont il a la charge.

YAOUNDE, Juin 1966

G. LAMBRINIDES.
Expert F.A.O. (O.N.U.)

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In Africa, Avoidable Disaster

By Richard Critchfield

WASHINGTON — Practical men, John Maynard Keynes reminded us, are usually the slaves of some defunct economist.

Maybe this is what ails the World Bank's embattled "structural adjustment" program of radical reforms, which grew out of hard-nosed insistence in the Reagan-Bush era that Africans open up to foreign trade and investors and adopt free-market policies.

This has meant, among other things, ending 25 years of fertilizer subsidies in more than 40 sub-Saharan African countries. Fertilizer use in Africa, always minuscule, edged up in the 1980s but has now dropped precipitously. As a result, so has food production.

At a recent workshop on African farming in Cotonou, Benin, I heard agriculture ministers speak of a "breakdown" and use words like "disaster."

[illegible]

... he said, "we would all be for fertilizer subsidies. But extension, research, roads, schools, it's all being cut back. You have to make choices." So scientists and economists, all practical men, are having a knock-down debate on what choices to make.

Ghana, for instance, used nearly 100,000 tons of fertilizer a year from 1977 to 1983, a period when subsidies ran from 60 to 80 percent; this year it imported just 12,000 tons. Tanzania was unable to import any fertilizer and can meet less than 40 percent of its needs.

The most outspoken scientist on the subject is Norman Borlaug, 79, the Nobel Peace Prize laureate whose high-yield grain revolutionized agriculture in India and China in the 1970s. Dr. Borlaug and his associates have, since 1986, tested new seeds and fertilizer on about 200,000 small farms in seven African countries.

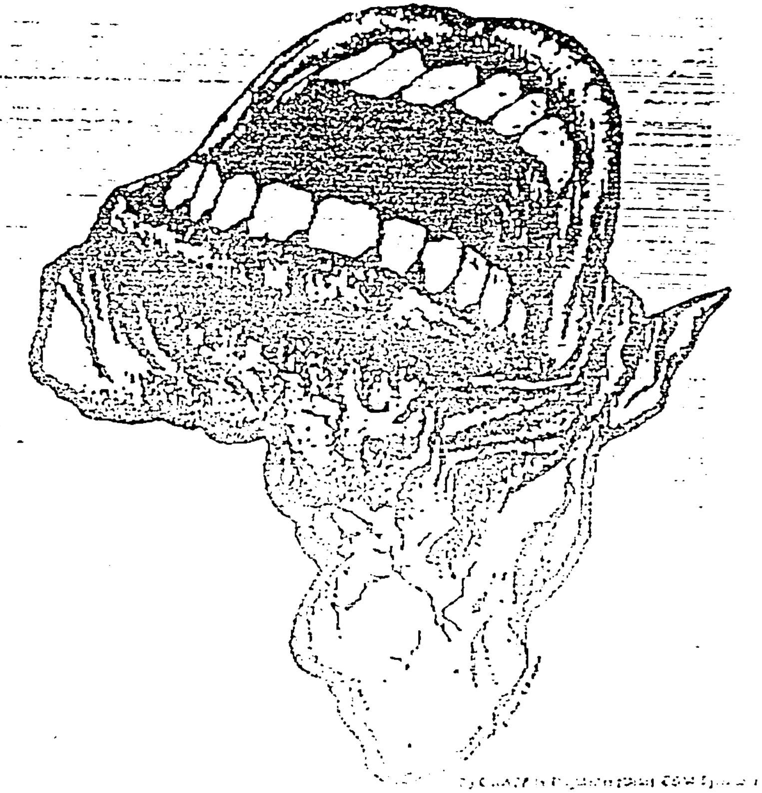
[illegible]

... land. I say, rather than subsidize imported food in the cities, subsidize fertilizer for the small cultivator."

Former President Jimmy Carter, also at the Cotonou workshop, said that African countries were being forced to import fertilizer at world market prices while having to compete with rich countries that subsidize their own agriculture at rates up to 72 percent (Japan) while dumping surpluses in Africa as food aid.

B. T. Kang, an Indonesian at the International Institute of Tropical Agriculture, in Ibadan, Nigeria, is considered a preeminent authority on African soils. He told me that most African soils need 45 to 60 kilos (100 to 132 pounds) of nitrogen a year. "If you can put organic matter it's best," he said. "But usually you must supplement it with chemical fertilizer, and for most poor Africans it has to be subsidized."

Mr. Cleaver's figures show that Africans now use just 7 to 8 kilos per hectare (2.5 acres) of chemical fertilizer, [illegible]



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IBE President Silverston with P. M. Achidi Achu

IBE : Forging Ahead

The story of the largest non-oil American Company in Cameroon, threatened by unscrupulous local businessmen who are only too anxious to grab everything for themselves and the absence of legislative incentives.

By NOUCK PROTUS B.

THE IBE GROUP INC COMMENCED operations in Cameroon in March 1993, with the importation of over 11,000 metric tonnes of urea and ammonium sulphate fertilizers. Their office in Douala, which is also Africa Headquarters, is one of fifteen affiliates and representative offices around the world, with the majority of them in the former Soviet Union and Eastern Europe.

IBE is a multi-million dollar company that deals in various interests ranging from air and water pollution controls through the production and marketing of fertilizers, to trade in cranes, trucks, telex equipment, crude oil, sugar, computer hardware, etc.

In spite of the attitude of the American government not to encourage further foreign investments in Cameroon following the irregularities related to the 1992 October presidential election, IBE decided to bring its expertise to Cameroon. According to available information, IBE concerns in Cameroon may be almost insignificant compared to the company's total share capital. But they have been in Cameroon for just under one year. According to Laura Stotz, the Managing D[illegible]ctor for Africa, IBE sets as its goal to help C[illegible]roonians while also getting help from C[illegible]roonians. Miss Stotz believes that "the [illegible]e successful IBE is, the more [illegible]meroonians too will prosper." The benefit for Cameroonians will include employment possibilities, the creation of revenue for local distributors and, by extension, to their immediate economic partners, provided of course, that the company can operate in an atmosphere that permits it to sustain a profitable presence in the Country.

Among the initial projects programmed within the framework of the company's expansion in Cameroon is to dredge and revitalise the Douala port. It is not excluded that other ports in the country may be considered. In this wise, IBE has opened discussions with the World Bank and the Cameroon Ports Authorities in view of a joint effort. Studies are also underway on the possibility of creating a urea and ammonium production plant utilizing natural gas burned or flared off in local oil production. This plant shall be capable of producing over 1,500 metric tonnes of ammonia and close to 1000 metric tonnes of granular urea per day. It is worth mentioning that financing for the 50 million dollar project has already been guaranteed by some of the biggest American industries specialised in the field. Should the project be implemented along with a fertilizer blending and bagging facility, several thousand direct and indirect job openings would be created.

But a group of agents who were entrusted with the management of such an ambitious enterprise thought it opportune to run down the finances and moral credibility of the company through high scale swindling, extravagance and even an attempt to steal the whole company. What is interesting is that this group was led by one Peter Luma (who passes for Pierre Louma at other times) a Cameroonian who profited from his close association with presidential circles and got himself among the visibly pro-government delegation that claimed to have struck the deal with IBE President Sheldon Silverston during the inaugural week of President Bill Clinton in January, 1993.

To wipe out such counter-productive practices, the IBE initiated legal action and has since been involved in twelve court cases, which Miss Stotz describes as "bee hives". All the judgements passed so far, have been in the favour of the IBE but execution of such has not been forthcoming - partly due to a strike by the judiciary. Stotz wonders: "If you can't get court decisions enforced, how can you expect to get a building permit for a new project?" As a result of the failure of the Cameroon authorities to enforce court decisions, some of IBE's immediate projects have been put on hold? A ship load of fertilizers that was due to arrive Douala in January had to be delayed because the company's funds are blocked, pending the publication of a written version of judgement passed on the IBE vs Group one case. The Douala-based Africa Managing Director holds that her headquarters in New York is not prepared to sink another two million dollars into Cameroon when there is no incentive for and protection of foreign investment.

Laura Stotz took over as Managing Director of the Africa Headquarters in July 1993 following the dismissal of Peter Luma. The IBE does sales and procurement in eleven African Countries, namely: Tanzania, Sierra Leone, Morocco, Tunisia, South Africa, Zambia, Sudan, Uganda, Kenya, Malawi and Cameroon. Headed by the founder and major share-holder Sheldon Silverston the IBE Group includes four principal companies. Silverston's main partners are in the former Soviet Union.

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"We Need Constitutional Safeguards"

- Mr. SHELDON SILVERSTON

In the following two exclusive interviews, CAMEROON LIFE tries to find out from President Silverston and IBE Director Bill Grant what steps have been taken to ensure a neat and profitable management of the business in Africa and also what short and long term benefits the average Cameroonian can expect from the IBE Group of Companies.

Cameroon Life : How did it occur to you to set up business in Cameroon?
Sheldon Silverston: We were approached by a friend of my son who indicated that he had relationships in Cameroon that would enable us to establish business there with an open door to profitable investments if we could show the benefit of such investments to the Government and people.

C.L: Was there a protocol agreement between IBE and Cameroon? If so, what were the terms?
S.S : A bi-lateral trade and payments agreement was signed by the government of Cameroon and IBE.

C.L: In ten months of presence in Cameroon, would you say that IBE has attained its initial objectives?
S.S : We have not obtained our initial objectives as most of our time has been spent in Court trying to recover our assets and investments from a group of thieves.

C.L: You recently initiated and won a legal suit against a certain Peter Luma. What, exactly, was amiss?
S.S : Pierre Louma (also known as Peter Luma), Dele Olanubi, and Emmanuel Okomono all diverted funds for their own purposes, illegally delivered merchandise that belonged to IBE to third parties, threatened our personnel with bodily harm, harassed our people to such an extent that we had to employ security guards, blatantly stole our merchandise and assets claiming them as their own, etc. Although Louma and Olanubi are now in hiding they cannot hide forever and eventually will be punished for their crime.

C.L : What are some of the major problems facing IBE in Cameroon?
S.S : Forgery was committed and though proven we have not been able to collect payments for merchandise that belonged to us. The court process, where we have won each and every action, has been slow, and enforcement, even after judgement, has been even slower.

"Our future in Cameroon depends on the people and the Government of Cameroon. If the Government aggressively supports the decisions of the courts, punishes criminals, encourages foreign investment, supports business and makes decisions that have both long and short range economic benefits to the nation, then IBE has a fine future here."

C.L:We understand that the activities of the IBE group INC. i Cameroon are presently at a near-standstill. How do yo explain this state of affairs?
S.S : We have taken a "wait and see" attitude. If the people an the Government take action to protect us and enforce the cou decisions we are prepared to continue and restart an aggressi investment program. The prime judgement on our part regar ing investment is profitability + benefit to the host country.

C.L:IBE was already becoming a reference company in t fertilizer market. What is being done to promote this image
S.S : IBE's world-wide fertilizer shipments total in excess o million tons per year. As such we are a factor in the glob market. Our success depends on our ability to deliver consi ently competitive prices and our good reputation.

C.L:Have you ever consi ered pulling out Cameroon, particular following the uncoveri of a racket within the co pany?
S.S : While there are tho within senior manageme who have recommend pulling out, I do not wi to do so unless the Gove ment makes it clear t they have no interest in p tecting foreign investm and pursuing criminals.

C.L:What contribution do you expect from Cameroon a Cameroonians toward the success and continued stay here IBE?
S.S : We expect an environment that encourages business inve ment, one that is thoughtful to development and one that assi us in judging which investments and business would be m beneficial to Cameroon.

C.L:Are there any tangible benefits that the average Cameroon can expect from the presence here of IBE?
S.S : In addition to increased direct employment provided IBE, there will be increased indirect employment for th providing goods and services to IBE and to the employees of I (who would have been unable to purchase such without the j

provided). One should not underestimate the value of training and learning obtained from working for and with us, taking assistance from us in ventures where we provide expertise and capital and local energetic and honest people provide the work force and operations, etc. Further, transactions under the bilateral trade and payments agreement certainly yield substantial benefits to the people of Cameroon. Other American potential investors in particular will look to IBE's experience in deciding on whether or not to invest in business, plant and equipment in Cameroon.

C.L:Does your experience in Cameroon encourage you to venture into other parts of Africa?
S.S : We do not believe countries have identical traditions, economic conditions, business ethnics, or government policies just because they are located in the same continent. Certainly the economics of doing business in the Sudan is quite different than in Cameroon. In addition the resources of the two nations are different so that one cannot judge investment in one and relate it to the other. Thus far our experience in Cameroon, started with such optimism, is not a happy one. Nonetheless we believe that if the Government encourages investments and enforces court decisions our experience can become a model of what can and should be done.

C.L : How do you see the future of the IBE Group Inc. in Cameroon and Africa?
S.S : Our future in Cameroon depends on the people and the Government of Cameroon. If the Government aggressively supports the decisions of the courts, punishes criminals, encourages foreign investment, supports business and makes decisions that have both long and short range economic benefits to the nation, then IBE has a fine future here. If the Government turns its back on those of us investing and allows the thieves to flee without retribution, IBE's future here is bleak and will not last too much longer. This would be a great sorrow as our experience cannot be kept secret and it will affect other potential investments/investors.

C.L : IBE is one of only two non-oil American companies in Cameroon. English-speaking Cameroonians are wondering whether you have intentions of setting up business in their own part of Cameroon.
S.S : Our initial concept was to expand and penetrate all areas of the Cameroon with not only our presence but also investments and guidance. Refurbishing one of Cameroon's ports, following further study of the geographical and technical elements of the project, remains one of our highest priorities. Bringing new life to the port of a region revitalizes the economy of that region. All this is now being held in abeyance pending our viewing enforcement of the court's decisions.

C.L:Is the recent devaluation of the CFA Franc good news to you?
S.S : The devaluation of the CFA hurts us in so far as the value of bank accounts and accounts receivable has been halved. Nonetheless, we applaud the devaluation as it is essential. Over valued currency leads to de-facto rationing. If what we envisioned for Cameroon can be brought about one might find in some years to come that the Government creates its own rescription of free floating currency cutting loose from the drag of other Central African economies that are less developed.

Cameroonians Should Stop The "Chop Broke Pot" Attitude

- BILL GRANT

Laura Stotz (Managing Director IBE Africa), American Ambassador Isom and IBE Director Bill Grant.

Cameroon Life:Is there any special relationship between the Republican Party and the IBE Group of Companies?
Bill Grant : Sheldon Silverston, President of the IBE Group of Companies, is one of the largest individual contributors to the Republican Party and to the Party's many candidates for national office. I am a former Republican U.S. Congressman.

C.L:How big is IBE financially?
B.G : IBE is a world-wide company with international offices in New York. It is also represented on the other continents with particular emphasis in Europe, Africa and the Far East.

C.L : IBE already had agencies in Zambia, Kenya, Malawi, Uganda, Tanzania, Morocco and Tunisia. What motivated the choice of Cameroon as Africa headquarters?
B.G : Cameroon has a Port at Douala. That, its geographical access to West Central Africa, and the bi-lateral trade agreement we initially signed with the Government led us to choose Cameroon as our headquarters. And we had signals of a willingness to conduct proper business that drew us directly to your country. It is our company's creed that for us to prosper, others should prosper with us... that the creation of capital increases the quality of life. If business is conducted properly and with integrity, children can be educated, homes can be built and lives will be enriched.

C.L:What are some of the major difficulties, if any, that IBE has faced in Cameroon?
B.G : Yes, we have experienced problems in Cameroon. Import and export is less feasible because the port at Douala needs to be dredged to allow the passage of deeper-draft vessels. And we initially had trouble with some fraudulent activities by a few employees and a couple of distributors. Of course, it is always easy for an outsider to find fault. But having invested substantial capital and resources in Cameroon, we hope we're earning trust and some small claim to make constructive suggestions.

Cameroon desperately needs either better highway facilities or a railroad from the interior to the coast. It will not matter how productive Cameroonian farmers can become or how great the dreams are of an agricultural revolution if there is no way to get products to the ports and no harbor deep enough to bring in the size vessels needed for a true exporting nation. If there is to be real infusion of major, meaningful capital from outside Cameroon (which will be needed for necessary value-added industry) then there first needs to be in place some kind of enforceable, perhaps uniform, commercial code. Shared capital will never find you unless there is a guarantee of expatriating those investments. It is absolutely critical.

Equally significant, I believe, is the need for implacable constitutional guarantees of individual rights and liberties. It is my belief that such guarantees will rapidly facilitate the demise of a lingering "chop broke pot" attitude found among some people.

Having said that, I want to emphasize our appreciation for the marvelously proud and helpful citizens of Cameroon... and our awe of the magnificent natural inheritance of your country. You have been blessed. It is time to take your birthright and enhance it. We hope we can be partners with you in fulfilling your national destiny.

C.L:It would appear that some of your major buyers in Cameroon are not prompt in paying for their supplies. Can you confirm this?

B.G : As in all businesses, there will be some hard times. Not all our buyers have been prompt in paying. In fact, a couple have been downright criminally fraudulent. But we are pursuing those debts. For us to continue, those must be collected and the individuals prosecuted.

C.L:Despite the problems IBE faced, you must have had reason to be satisfied in some respects, that is in connection with some of the company's initial objectives.

B.G : We want to greatly enlarge our investment in Cameroon. We want to create jobs and help build the economy. But we must first receive help in stopping the criminal activities that beset u... ... and we must be paid by those people who have withheld payment from us; which I count the same as withholding hel... to all of Cameroon in the form of business and jobs.

"IBE will not be ruined by any individuals in Cameroon. But investment into Cameroon could be. We have filed civil and criminal actions in those cases where necessary. Judicial proceedings have moved painfully slow."

C.L:We understand that th... IBE Group Inc. was nearl... ruined by certain individu... als in the Douala offic... Has any action been take... against the said individu... als? What is being done t... prevent such situation... from occurring again?

B.G : IBE will not be ruine... by any individuals in Cam... eroon. But investment in... Cameroon could be. W... have filed civil and crim... nal actions in those cas... where necessary. Judici... proceedings have move... painfully slow. I have a saying that applies to the prevention ... re-occurrence of fraud to IBE... "If you fool me once, shame o... you. If you fool me twice, shame on me!

C.L:You are an experienced politician and a confirmed busines... man. How do you appreciate the approach to business ... Afri... and the prospects of economic development in the continent...

B.G : If criminal interference and gross personal greed could ... harnessed in Africa's business intercourse there is absolutely ... doubt in my mind that in its Sub-Saharan regions Africa cou... be one of the bread-baskets of the world. With proper transpo... tation infrastructure, a strong commercial code and judicio... applications of fertilizers (presently Africa fertilizes at only 1... the rate of the rest of the world), Africa could feed itself, and ... major portion of the globe... and at the same time lift itself o... of relative economic malaise, create jobs educate its children a... take for its nations positions of strength in the world commu... nity.

(Interviewed by Nouck Protus ...

IBE: Staying Power

MANY A STORY HAS BEEN TOLD OF Foreign companies that just fold up and leave because they cannot cope with the local pressures of adjusting to doing business Cameroonian style.

IBE's, is a different story. When its saga will be written only two words could characterize it ... STAYING POWER.

As of date, IBE has done more litigation than business. It has been in court with every Cameroonian it has had to deal with. The sad fact is, our country and its citizens can only be shammed in the process. Yes, IBE chose who to deal with! ... so should good faith and "giving everyone a chance" be blamed?

IBE Africa Cameroon was created without conforming with local law, through the fault of dishonourable Cameroonians. Result? Litigation in Buea High Court. The local partners then tried to take over the company. Result? Litigation in Buea and Douala courts. The IBE agent in charge of stevedoring, etc SEBAMS (now in liquidation) extorted high customs dues and further attempted to hike up the amount of rents due. Result? - Litigation in Douala Court of First Instance. Its sales agent Group One, tried to deviate the proceeds of sale of fertilizer to CAMSUCO. Result? Litigation in Yaounde High Court and Court of First Instance.

Another agent tried to benefit from what appeared to be confused situation by trying to withdraw coffee deposited against an unpaid delivery of fertilizer. Result? Litigation - 3 suits in the Douala Court of First Instance.

Earlier it took a court order to move Mr. LUMA (or is it LOUMA) Peter (or is it Pierre) who had locked all the offices and declared "I AM IBE". IBE fired LUMA and later moved out after having paid the landlord rents covering even periods of non-occupation. Surprise, surprise, no litigation. ...fore moving into new premises, IBE was ag... accosted by another Bailiff or Huissier with a st... of a debt LOUMA (LUMA) had supposedly c... tracted in the name of the company. IBE paid o... 2.000.000 Francs CFA. Result? No litigation. ... which jurisdiction yet has to be visited by IBE? T... labour courts. That almost happened, but w... avoided by an out of court settlement with one... its former employees, (a relative of LUMA - or LOUMA).

On one shipment of fertilizer all this!! What ... encouragement to foreign investors, Cameroon... ...rot IBE certainly has been under heat and is ... "In the kitchen". Those wise guys who calcula... to run IBF out of Cameroon failed to realize t... had to reckon with a certain Sheldon Silvers... How much longer IBE remains in the "Kitchen" ... henceforth depend on the role our institutio... decide to play in protecting foreign investmen...

A...

BEST AVAILABLE COPY

Sheldon Silverston, President
Bill Grant, Director
Laura Stotz, Managing Director

The IBE Group of Companies

— Growing with Cameroon —

OUR VISION: To establish IBE as a permanent presence in Cameroon by providing a consistent supply of high quality fertilizer and agricultural products, anticipating the evolving requirements of the local market, and maintaining the most affordable prices.

OUR STRATEGY: With our willingness to fully finance our operations and our control of several of the factors of production, IBE's comparative business advantage lies in our ability to import a high quality product at the lowest possible price in response to the changing needs of the Cameroonian farmer.
We believe that the market knowledge of several independent local distributors, and their existing relationships within the community of farmers and agribusiness leaders, complement well our company's primary strategic advantages.
In short, IBE seeks to blend our strengths with those of Cameroonians to deliver the most affordable products to our customers.

OUR PROJECTS: The short-term objective is to increase our 1994 fertilizer imports at least 200% over our 1993 totals. If successful with initial sales, we will seek to bring in upwards of 30,000 tons of fertilizer for distribution both nationally and continentally to cooperatives, independent farmers, brokers, and parastatals.
Cameroonian famrers' requirements well exceed their present access to affordable supply even though world market prices and exporters' pricing systems provide little incentive for sufficient fertilizer application.
We're trying to bridge that gap .. to supply fertilizer at reasonable prices so that a farmer's investment will be more than warranted by his increased production. Furthermore we are working to establish a raw material commodity purchase and barter program to give farmers and cooperatives alternative sales outlets.

While IBE is a relative newcomer to the Cameroon fertilizer market, our company enjoys international respect as one of the largest suppliers of high-quality fertilizer in the world, at more than 2 million tons a year. As we become better acquainted with the Cameroon market, we seek to be good neighbors to the farmers and businessmen of this country. We are steadfast in our belief that only by helping the people of Cameroon to prosper will IBE too succeed.

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COMPANY PROSPECTUS
and
FERTILIZER MARKETING PLAN

April 1, 1994

The IBE Group: Principal Operating Companies

The IBE Group Inc.
IBE International Corporation
IBE Trade Corporation
TranSov Corporation

Affiliates and Representative Offices

Moscow, Russia
Kiev, Ukraine
Odessa, Ukraine
Lutsk. Ukraine
Lvov, Ukraine
Sofia, Bulgaria
Budapest, Hungary
Tashkent, Uzbekistan
Rio de Janeiro, Brazil
San Jose, Costa Rica
Mexico, D.F.
Hong Kong
Santo Domingo, D.R.
Guayaquil, Ecuador
Douala, Cameroon

Nations Where Sales and Procurements Are Made

The United States
Canada
Mexico
Guatemala
El Salvador
Costa Rica
Honduras
Panama
Colombia
Ecuador
Venezuela
Brazil
Paraguay
The Sudan
Zambia
Malawi
Uganda
Kenya
South Africa
Morocco
Tunisia
Tanzania
Sierra Leone
Cameroon
India
Pakistan
The C.I.S.
China
Japan
Korea
Philippines
Italy
Germany
France
Holland
Belgium
Bulgaria
Romania
Hungary
Spain
Sweden
Finland
Portugal
Poland
Denmark
United Kingdom
Austria
Switzerland
Norway
Taiwan
Indonesia
Dominican Republic
Haiti
Jamaica

Management Statement of Goals and Strategy

For more than twenty years the IBE Group of Companies has been assisting nations, provinces, states and entities with their long-term economic development requirements through its expertise in technology, production, logistics, computerized procurement programs, global marketing strategies, and financing.

The Group's diverse projects have included infrastructure improvement, construction, modernization of existing plant and equipment, the provision of new plant and equipment, and production. IBE finances its projects through innovative arrangements such as trade finance, barter, and bi-lateral trade and payments agreements.

Products of the IBE Group of Companies

Air Pollution Controls
Alum
Aluminum
Ammonia
Ammonia Arms
Ammonium Nitrate
Ammonium Sulphate
Cobalt
Diammonium Phosphate
Furfurol
Iron Ore
Mono Ammonium Phosphate
Titanium Dioxide
Urea
Urea Condensators
Water Pollution Controls
Water Treatment Chemicals

Barges
Brick Factories
Ceramic Tile Plants
Construction Equipment
Conveyors
Cranes
Earth-moving Equipment
Fork Lifts
Loading Facilities
Oil By-products
Oil Production Products
Oil Transmission Technology
Pipelines
Port Maintenance Equipment
Road-building Equipment
Roof Tile Factories
Spare Parts
Trucks

Benzene
Cement
Cereals
Coal
Coffee
Computer Hardware
Computer Software/Networking
Cotton
Crude Oil
Diesel Fuel
Edible Oils
Foodstuffs
Grains
Methanol
Rubber
Steel
Sugar
Telex Equipment

Industrial Development:
Plant, Equipment and Modernization

IBE undertakes turn-key projects and also provides equipment and upgrading as needed in existing facilities. Our guiding philosophy is that each project, installation, product supply or other must be a showcase; implemented to the complete satisfaction of the customer and in accordance with the technical capacity of the host nation. The continued rapid growth of our business is testimony to the results we have delivered around the world.

A large percentage of the IBE Group's present projects are being conducted in Russia and the C.I.S. nations because urgent industrial production is so important to those countries. Our factories include brick, ceramic tile and roof tile factories at Togliati, and brick production factories at Krasnoyarsk, Sevrodonetsk, Beresniki and Kuybishev. And, we are building 25 more brick and tile plants in the former Soviet Union, including 3 for the oil industry. We oversee the construction of each plant from the initial phases until the point it becomes fully operational.

The Group's other projects of which we are especially proud include the first agricultural development project under Title IV, Public Law 480 for India; a livestock development program financed under the Cooley Title Law in the Philippines; and the first private bilateral trade and payments agreement with Zambia.

Logistics

Having capacity in finance, technology, commodities and marketing is not enough if there is not the ability to deliver what is needed in a timely manner and at the lowest cost to the customer. The IBE Group maintains a full-time ship chartering operation in which vessels are hired both for single voyages and time charters. The Group charters more than 75 tanker and dry cargo vessels per year and prides itself on its transport efficiency.

IBE and Cameroon

In March 1993, the IBE Group Inc. commenced operations in Douala, Cameroon with the importation of more than 11,000 metric tons of Urea and Ammonium Sulphate fertilizers.

After just six months of business, the company established a larger and more permanent branch office, and named Cameroon as its headquarters for the whole of its expanding Africa operations. As we build a partnership of opportunity with the people of Cameroon, there are several locally-based projects that the company is considering.

First, IBE seeks to dramatically expand its commodities trading program. This prospectus will explore in some depth the long-range objectives for fertilizer importation. We also have begun exportation of arabica coffee, and are researching other crop markets for future purchases.

In October of last year, IBE reopened discussions with Cameroonian Ports Authorities and World Bank officials in Washington, D.C. and Yaounde on the subject of a joint effort to dredge and revitalize Douala Port. We remain encouraged by the progress of continued negotiations on this potential venture.

IBE is also exploring the feasibility of erecting a urea and ammonium production plant utilizing natural gas burned or flared off in local oil production. This $150 million project, for which the largest U.S. producer of nitrogen-based fertilizers has already pledged financing and technical support, would be capable of producing 1,300-1,600 MT of ammonia and 600-1,000 MT of granular urea per day.

We continue, as well, to review the possibility of building a fertilizer discharge, blending and bagging facility in Douala.

Fertilizer Program Objectives

Vision:

To establish IBE as a primary fertilizer importer to Cameroon, and eventually, to all of sub-Saharan Africa, by providing a consistent, high quality supply, anticipating the evolving requirements of the local market, and maintaining the most affordable prices.

Strategy:

With our ability to fully finance our operations, and with our control of several of the factors of production, IBE's comparative business advantage lies in our ability to import a high quality product at the lowest possible price in response to the changing needs of the Cameroonian farmer.

We believe that the market knowledge of several existing distributors and their relationship with farmers and agribusiness leaders complement well our company's primary strategic advantages.

In short, IBE seeks to blend our strengths with those of Cameroonians to deliver the most affordable products to our customers.

Projects:

We have already begun constructing a network of associates with brokerage rights to existing stocks of fertilizer. We anticipate that this system will develop into a comprehensive distribution effort which will ultimately encourage even more independent agents to become involved in fertilizer marketing.

IBE's goal for the 1994 campaign is to increase our fertilizer imports at least 200% over our 1993 totals. If successful with initial sales, we plan to bring in upwards of 20,000 tons of fertilizer for distribution both nationally and continentally to cooperatives, brokers, private corporations and parastatals.

Our indepth review of the available market research, in addition to field trips and discussions with fertilizer users, suggests that Cameroonian farmers' requirements well exceed their present access to affordable supply. But world market prices and the produce-buying system itself currently provide little incentive for farmers to invest much money in fertilizer.

We're trying to bridge that gap . . . to supply fertilizer at reasonable prices so that a farmer's investment will be more than warranted by his increased production. And at the same time, as outlined above, we are attempting to establish a consistent raw material commodity purchase program to give farmers and cooperatives alternative sales outlets.

Tactics:

Our initial marketing efforts are targeting 22 of Cameroon's largest cooperatives, unions, distributors and agribusinesses. Provided that we secure signed sales contracts demonstrating sufficient customer interest, we will commence in mid-April with purchasing a commensurate quantity of fertilizer for late May importation. As we have previously noted, our 1994 goal for the Cameroon market is to prepare at least two ships of more than 10,000 tons each.

Summary:

While IBE is a relative newcomer to the Cameroon fertilizer market, our company enjoys international respect as one of the largest suppliers of high-quality fertilizers in the world. As we become better acquainted with the Cameroon market, we seek to be good neighbors to the farmers and businessmen of this country. We are steadfast in our belief that only by helping the people of Cameroon to prosper will IBE too succeed.

WORKSHOP ON

EFFICIENT MARKETING OF FERTILIZERS IN CAMEROON

March 28th - April 8, 1994,

Bamenda, Cameroon

PRESENTING: NORTH WEST COOPERATIVE ASSOCIATION LIMITED (NWCA LTD)

BY

MUNANG SAMUEL MUFUA
CHIEF OF SUPPLY SERVICE
NWCA LTD

ORGANIZED BY
INTERNATIONAL FERTILIZER DEVELOPMENT CENTRE
P.O. BOX 2040
MUSCLE SHOALS, ALABAMA 35662, U.S.A.

SPONSORED BY
THE FERTILIZER SUB-SECTOR REFORM PROGRAM
(TECHNICAL SUPERVISORY COMMITTEE AND USAID/CAMEROON)

NORTH WEST COOPERATIVE ASSOCIATION LIMITED

The North West Cooperative Association Limited is an Association of Cooperative Unions which was formed in 1959 as Bamenda Cooperative Marketing Association Limited (B.C.M.A. LTD). All the Cooperative Unions affiliated to her marketed their produce through her.

In 1968 when the member Unions decided to market their produce directly to the Produce Marketing Board, the name was changed from B.C.M.A to Bamenda Cooperative Association (B.C.A.) The Association was coordinating the activities of the Cooperative Unions and operated the Supply Service as well as maintaining the operation of the common property of the Unions e.g. Coffee Mills.

FROM B.C.A. TO N.W.C.A. Ltd.

The Bamenda Cooperative Association at an Extraordinary Meeting on 29th March, 1978 resolved that B.C.A. be transformed into North West Cooperative Association Limited (NWCA Ltd).

The N.W.C.A. Limited is made up of eleven Cooperative Unions. These Unions are:-

1. Kom Area Cooperative Union Limited
2. Nso Area Cooperative Union Limited
3. Santa Area Cooperative Union Limited
4. Nkambe " " " "
5. Bamenda " " " "
6. Ndop " " " "
7. Bali " " " "
8. Pinyin " " " "
9. Moghamo " " " "
10. Oku-Noni" " " "
11. Mbengwi " " " "

The eleven Cooperative Unions are made up of 73 Primary Societies with about 40,000 farmers.

./2

The Objectives of N.W.C.A. Limited:

The objectives of NWCA Limited are to:-

(a) Process and market the produce of member Unions at the best prices possible.

This includes:- Coordination of Crop estimates;
- Contract management:
- Quality standards and quality control;
- Providing a wide variety of coffee/produce information;
- Stock control;
- Phytosanitary treatment in stores etc.

Diversify into other activities beneficial to the members after proper feasibility studies have been carried out and the approval of Board and General Body received.

(b) Provide Internal Audit Services to Association, affiliated Unions and their member Societies with a view to providing reliable information and ensuring that accounts of all her affiliates are externally auditable at competitive prices.

(c) Provide engineering and transport service to the Association affiliated Unions and their member Societies with a view to ensuring quality processing at the lowest cost possible.

(d) Provide a Farm Support Service. This involves bulk purchasing and disbursement to member Unions and users of all agricultural inputs at more competitive prices.

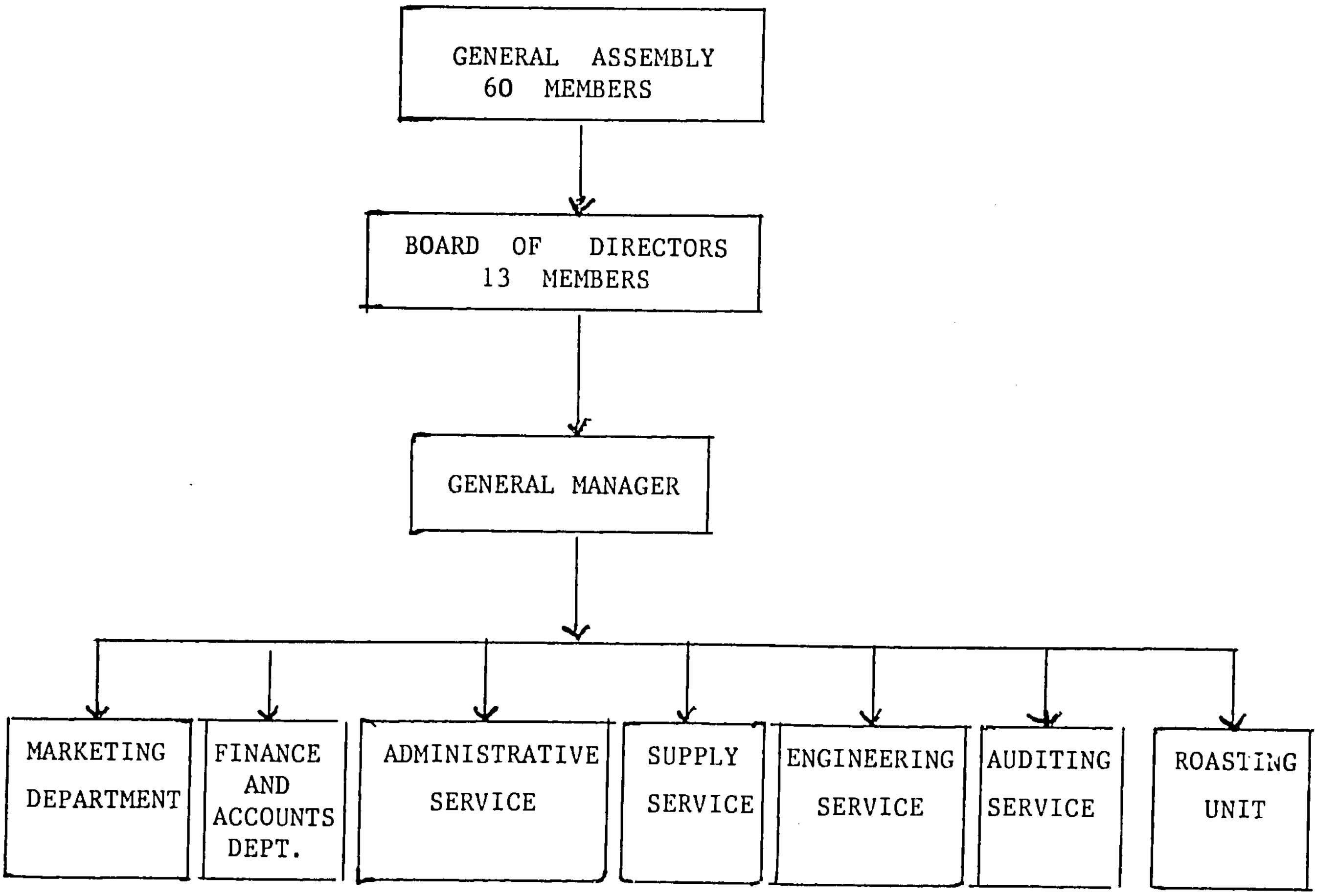
(e) Transformation and sell some of its green beans with a view to encouraging coffee consumption.

The N.W.C.A. Limited is the mouth-piece and the resource pool for advice to affiliates. To achieve this objectives it may acquire, set-up use and manage offices, stores, processing machinery necessary and where within its area of operation she may conclude business agreements or any type of Agreement and carry out transactions with a view to achieving the objectives of the Association.

The Organisational Structure of N.W.C.A. Limited:

The General Assembly which is the supreme authority of the Association is made up of 60 members headed by an elected President.

The Board of Directors is made up of 13 Board Members. There is a General Manager who is responsible to the Board of Directors and he implements the Board's decisions.



N.W.C.A. Ltd. has a Staff strength of about 35 members. It is divided into seven Service as follows:

(a) Marketing Department;
(b) Finance and Accounting Service;
(c) Engineering Service;
(d) Administration;
(e) Audit Service;
(f) Supply Service;
(g) Roasting Unit.

N.W.C.A. Limited markets Arabica Coffee, Robusta Coffee and Cocoa but quantity of cocoa is insignificant.

NWCA Production for the Past Years:

YEAR	ARABICA COFFEE TONNAGE	ROBUSTA COFFEE TONNAGE
1989	5,714,109	1,195,122
1990	2,722,851	529,767
1991	2,209,659	66,070
1992	4,609,117	676,954
1993	2,670,425	276,073
1994	2,624,215	225,833

N.W.C.A. Limited started the marketing of Arabica Coffee in the World Market only in 1990. However, we are improving in the arabica coffee marketing every year in terms of quality. For now we are marketing Robusta Coffee locally since our quantity is very small.

Supply Service of NWCA Limited:

N.W.C.A. Limited procures farm inputs in bulk and disburses to member Unions and users at more competitive prices. At the beginning of the season each Union estimates how much fertilizer and other farm inputs they may need. After getting the requisition from our Unions, we procure the farm inputs, make sure that we take care of users who are not members.

Fertilizer Procurement for the Past Years:

Year	N.P.K. 20:10:10 Tons	Sulphate of Ammonia Tons	Urea 40% Tons	TOTAL Tons	SUPPLIER
1988	5.300	1.000	700	7.000	CAMATREX
1989	-	2.200	600	2.800	"
1990	2.500	-	-	2.500	IBEX
1991	-	-	-	-	"
1992	2.700	-	-	2,700	PELENGET
1993	-	-	500	500	COMPLEXE JBN
1994	-	247	-	247	IBE
	10.500	3.447	1.800	15.747	

Before 1994 gets to an end, we may likely order about 2,000 Tons of N.P.K. 20:10:10 and 500 Tons of Urea 46% depending on the reaction of our farmers and requisition from our Cooperative Unions.

PROBLEMS:

1. Poor Road Infrastructure - fertilizer is unable to reach farmers at the grass root at certain areas due to poor road infrastructure especially in the rainy season.

2. High Prices of Fertilizers:

   Due to devaluation of the franc CFA, prices of fertilizer have doubled and as such small farmers cannot afford fertilizer especially food crop farmers.

To end, we thank the Organizers of this Se[illegible] marketing of fertilizers in Cameroon and we wish that more of such Seminars should be organised in future.

THANK YOU VERY MUCH.

[illegible]: NORTH WEST COOPERATIVE ASSOCIATION LIMITED,
P.O. BOX 41, BAMENDA,
TEL. NO. 36 12 12

36 21 35

FAX No. (237) 36 12 12

Workshop on

Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994

Bamenda, Cameroon

Fertilizer Procurement

by

Souleymane Diouf
Marketing Specialist
IFDC-Africa

Organized by
International Fertilizer Development Center
P.O. Box 2040
Muscle Shoals, Alabama 35662, U.S.A.

Sponsored by
The Fertilizer Sub-Sector Reform Program
(Technical Supervisory Committee and USAID / Cameroon)

Introduction

The subject is very large and complex. My objective is not to give you an academic course on fertilizer procurement but to introduce practical points of discussions on the subject. I hope that these points will be useful for you, dealers, the main target of this training.

Fertilizer procurement must be handled in good conditions in view to have a good quality product. My analysis will be particularly based on maritime transport, the main transport used in international fertilizer trade.

It is important for the buyer to have different sources of procurement which can allow him to compare product's quality and prices.

The buyer should also know the trade terms which are the key elements of contracts of sale, since they tell the parties when each of them has to support costs and risks.

I take the liberty to focus my speech on these elements because my small experience of eight (8) years in African fertilizer business showed me that their lack of understanding or ignorance can involve a lot of problems between buyer and seller, and consequently a waste of time and a financial loss. I will add some other important issues.

For a question of methodology, I want to separate the subject into 2 parts:

- Part I: Before the purchase/contract/shipment
- Part II: After the purchase/contract/shipment

I. Before the purchase/contract/shipment

Things which I think important are :

1) *To be sure that the product has a good quality*

In view to have a product with a good quality, after the choice of fertilizer type, it is essential for the buyer to set the product's specifications that have to be met by the supplier. The specifications have to be precise.

In Cameroon for example in the past, when governmental agencies like MINAGRI and FONADER were the main importers of fertilizer, the type of fertilizer which was currently used excepted in cotton crop was NPK complex 10-30-10.For cotton crop, NPK SB (complex) 15-20-1+6+1 and 22-10-15 +5 +1 are still used. Specifications like the nutrient form (e.g.: N based on ammonia or nitrate, P_2O_5 solubility) have an effect on fertilizer prices: in the case of NPK 10-30-10, the finished product with N coming totally from ammonia and a great solubility of total P_2O_5 should be more expensive than the one with N based on nitrate and a less solubility of total P_2O_5.

"It is very important to define the requested fertilizer products, with a minimum set of technical specifications that guarantee a good product and that do not limit the number of suppliers. In order to avoid segregation, buyers should protect themselves by defining not only the range (as it is done in Mali and Burkina Faso), but also the variation in particles sizes. For blended fertilizers, the maximum tolerable moisture content may differ as well as the one specified for the complex" (Diouf and Gerner, 1993)(3)

The quality control must be done by an independent surveyor. The well known surveyors in African fertilizer business are SGS and VERITAS. Generally, the control is handled before loading (during production and loading) and during unloading.

For much details, kindly refer to my presentation on quality control dated March 31.

2) *A good knowledge of different sources of procurement:*
The main sources of fertilizer supply for Central Africa are Europe, West Africa (Côte d'Ivoire, Sénégal, and Nigeria) and now South Africa after the lifting of embargo.
The solid fertilizer capacity production in West Africa:

- Côte d'Ivoire: A factory with a capacity of 110,000 T per year of NPK (complex and blend)
- Sénégal: A factory ....250,000 T per year of NPK (complex) and simple fertilizer (MAP, TSP) and DAP.
- Nigeria: - Two (2) granulation plants:
  - one with 100,000T of SSP per year
  - one 750,000T of urea and DAP per year and produces NPK (15-15-15, 20-10-10, 25-10-10).

  - Four (4) operating blending plants with a total capacity of about 650,000T per year.

Nigeria exports only urea while Côte d'Ivoire and Sénégal sell many of their production in the other African countries.
Concerning the last SODECOFON tender closed in July 1993, Côte d'Ivoire and Sénégal were the main competitors. The tender was finally awarded to Côte d'Ivoire:
- 1,000T of 10-30-10 in bags at 1271.90 FFR CIF Douala
- 7,500T of 15-20-15+6S+1B in bags at 1275.00 FFR CIF Douala
- 7,500T of 22-10-15+5S+1B in bags at 1325.00 FFR CIF Douala.

The recent devaluation of FCFA will increase the prices.

The existence of different sources of procurement should promote open and competitive fertilizer markets.
IFDC-Africa's main objectives for the fertilizer trade in the region are:

- competition among suppliers
- strengthening of national capacity on the collection and analysis of information on the fertilizer trade
- transparency of the market
- reduction of the costs.

For achieving these objectives, IFDC-A has three (3) technical tools: the African Fertilizer Trade and Marketing Information Network (AFTMIN), the monthly bulletin "African Fertilizer Market" (AFM) and the African Fertilizer Trade and Information Service (AFTIS). These tools are vital information for use by traders, exporters and policy makers.

3) *The contract form:*
How you want to buy?

- by spot contract?
- long term contract? (e.g., phosphoric acid contract for 15 years between the Senegalese plant and Indian buyers). The period of deliveries and the quantity of each shipment have to be specified.
- barter (e.g., rice/fertilizer, oil/fertilizer.
- tender (Annex 1).

4) *How much in quantity and in what packing ?(annex1).*

- prices depend on quantity. If the quantity is important, the price should be more interesting (saving in costs production and in freight rates).
  In general, it is considered that 5,000T are a minimum for a complex plant to have reasonable costs which involve competitive prices and for maritime transport to obtain good freight rates.For the blending process , small quatities can be produced at almost no additionnal costs.

- the packing chosen (bulk or bag) may have financial advantages according to port handling, storage, infrastructure, etc.
  It is difficult for bulk fertilizer to have a precise quantity (5,000T) ;there is always a variation (plus or minus 5% or 10% in practice). This variation can be on one party's option (buyer or seller).

5) *The trade terms: Incoterms (see annex2*

Incoterms are international trade rules established by a non-governmental organization: the International Chamber of Commerce (ICC) which is based in Paris.
The role of incoterms is to unify the trade terms, particularly in international trade.
The reference of incoterms in a contract of sale contributes to avoid a misunderstanding related to parties' obligations
Incoterms define when the property of the product is transferred from the seller to the buyer. Transfer of property means transfer of responsibility and consequently of risks. However, in fertilizer business, this rule has to be taken with less severity, for example, if the product which is in the buyer's warehouse is segregated despite the seller's guarantee, his responsibility is engaged. The fertilizer price varies according to the trade term applicable: ex works price is different to C+F price.
In annex, I presented the incoterms usually employed in the fertilizer trade.
In Africa, the practice shows in some cases, the reference of terms different from incoterms: FIW (franco-in wagon), it is said "rendu à destination non déchargé" i.e., delivered at destination in wagon. This practice is not a constraint if buyer and seller have the same understanding of the term used.

6) *<u>Governing law, settlement in the case of conflict, definition of force majeure.</u>*

7) *How do you want to pay? (L.C .TT), cash or credit.*

Important to make a linkage between the payment and the respect of technical specifications and quantity by the seller.

II. After the purchase/contract/shipment

1. How to receive the cargo? (shipping documents{annex 4}, preparation of port/berth, stevedores arrangement according to position of sale {FOB ,C+F}
2. Confirmation of quality and quantity (see 7 of Part 1)
3. Settlement of despatch and demurrage
4. Cargo damage claim if any (problem of insurance).

3,5V

Conclusion:

As indicated in the introduction, I was interested to focus your attention not to all matters regarding fertilizer procurement (a very wide topic which may take several days and may be presented for PHD) but to show you and discuss with you some of the area I thought important.

A lot of literature exists concerning how to handle carefully international trade. This material has to be available in your Chamber of Commerce. Kindly note that for all issues related to fertilizer, IFDC, and particularly it's Division for Africa called IFDC-Africa , will give you with pleasure expert advises.

In west and central Africa , the majority of farmers has no access to fertilizer. A major problem is that a good regional marketing system for fertilizers does not exist. A good marketing system begins with a suitable source of supply. In this order, many dealers have to put their demand of fertilizer together and negotiate competitive prices with suppliers.

References :

(1) : Guide to incoterms 1990, ICC , No 461/90

(2) Visker HJM , Fertilizer selection and technical fertilizer specifications: the basis for a quality Product, IFDC-Africa, Togo, 1993.

(3) : S. Diouf and H. Gerner : Bulk Blending in Sub-Saharan Africa, IFDC-Africa , AFM , November 1993.

Landbouw, Natuurbeheer en Visserij

Voedselvoorzieningsin- en verkoopbureau

Burg.Kessenplein 3 Postadres: Postbus 960 6430 AZ Hoensbroek (gem.Heerlen)
Telefoon: 045-238383 Fax: 045-222735 Telex 56396 Vibnl
Banken : Amsterdam-Rotterdam Bank N.V., Heerlen, rek no 43.00.73.569
Nederlandsche Middenstands Bank N.V., Heerlen, rek no. 67 32 10.162
Rabobank Nederland, Utrecht, rek no 30 00 22 360
Postbank no 3 900 000

Hoensbroek, 7th March 1989

TENDER FERTILIZER NO. 43/89

Subject: general tender conditions for delivery of fertilizers under Netherlands development aid programme.

We hereby inform you that if we in future invite you to submit offers for delivery of fertilizers with particular tender conditions we will always refer to the following general tender conditions.

I. QUALITY TERMS FERTILIZERS

The quality has to meet the terms which are mentioned in E.E.C. regulation 76/116/EEC.

II. QUALITY TERMS PACKING

- new woven polypropylene outer bags provided with polyethylene inner bags containing 50 kg net plus 2% spare bags;
- the polypropylene bags have to meet the following quality specifications:
  a. 900 x 900 denier,
  b. min. 12 x 12 tapes per square inch,
  c. tensile strength before illumination: lowest value in length and width direction 350 N according to grabtest astm d 1682, drawing speed 30 cm/min,
  d. tensile strength after illumination: average strength at least 70% after 200 h. illumination in the weather-o-meter according to method ccc-t-191-b 5804,
- polyethylene inner bag min. 0.07 mm thickness;
- inner bags should be sealed separately, while outer bags should be sealed with acid-proof thread.

III. ORIGIN FERTILIZERS

- The Netherlands or one of the other countries mentioned on the list of eligible source countries,
- The country of origin has to be mentioned in your offer.

IV. PRICE

- per metric ton net in dutch guilders on the basis of the delivery terms mentioned in the particular tender conditions;
- in case of bulk-shipment 0.5% goodweight has to be supplied, free of charge.

V. TENDERS

- Tenders submitted by telex, telefax or by mail in sealed envelopes will be accepted. The tender has to refer to the number of the tender with the particular tender conditions.

- Manufacturer's certificate:
  each tender must be accompanied by a cable, telex, telefax or letter of the manufacturer of the fertilizer which must be mailed by the manufacturer directly to us, authorising the bidder (if an other than the manufacturer) to tender the manufacturer's product.
  This manufacturer's-certificate must state:

  - name and address of the manufacturer;
  - name and address of the bidder;
  - available quantity and product;
  - number of the particular tender conditions and statement that the manufacturer can meet all terms mentioned in the particular tender document, especially terms concerning the availability of the product, quantity, quality, packing and delivery terms.

- Bid/performance bond.
  Offers must be accompanied by a bid/performance bond.
  This bond (bankguarantee according to V.I.B.-terms, deposited by a Netherlands bank which has an agreement with V.I.B.) has to amount to not less than two percent (2%) of the bid price and shall indefinitely be in favour of V.I.B. and collectable by V.I.B. upon the failure of the bidder to hold his offer open and/or fulfil all his obligations in accordance with the terms mentioned in the general and particular tender conditions.

  The bond will be released by V.I.B.:

  - within 10 days after bidder is informed that he will not receive a notice of award;
  - otherwise: within 10 days after we have received and approved the required documents mentioned in point IX. and any required documents mentioned in the particular tender conditions.

- Tenders not conforming to these specifications will not be accepted.
  The tenders will be read out in public at our office at 13.30 hrs (local time) on the closing date of the tender.
  The results of the tender will be forwarded to those tenderers who offered in conformity with the tender conditions. In case no award is made the results of the tender will not be published.

- The adjudication is with all proper reserve.

VI. VALIDITY OF THE TENDERS

During three weeks after closing date.

VII. After adjudicication we will send the successful tenderer (hereinafter called the supplier) a contract according to the tender conditions. The Netherlands law shall apply to this contract. In case of disputes a Netherlands court will have exclusive jurisdiction.

VIII. INSPECTION

- If shipment takes place from a Dutch or Belgian harbour inspection will be carried out by V.I.B. on weight, quality and loading of the vessel. During inspection samples will be drawn for quality analysis.
- If shipment takes place from a developing country inspection will be carried out by an independant inspection company for account of buyer, at port/place of loading on weight, quality and loading of the vessel/ truck/wagon.
  During inspection samples will be drawn for analysis.
  We reserve the right to have the samples analysed in the Netherlands.
- Inspection-certificates will be issued soonest after completion of loading of the cargo.
- Inspection and analyses take place in accordance with the E.E.C. regulations 77/535 and 79/138.
- We reserve the right to reject any quantity failing to comply with E.E.C.-regulation nr. 76/116/EEC and the general and particular tender conditions and any rejected quantity should immediately be replaced without any additional payment.

IX. DOCUMENTS

- transport document:
  - 3/3 original bill of lading plus 3 copies in case of shipment by seavessel. The bill of lading must be signed by the master. If transport by land is contracted and follows the seatransport 3/3 original "combined transport" bill of lading plus 3 copies is required;
  - 1 set original waybill plus 3 copies in case of shipment by train and/or truck;

  The transport document must state:

  a. net weight and product;
  b. gross weight;
  c. number of bags and spare bags;
  d. marks and numbers;
  e. consignee and notify address;
  f. clean on board (in case of shipment by train and/or truck: a declaration that the goods are loaded/taken over in apparent good order and condition);
  g. freight (pre)paid;
  h. final place of delivery (if other than port of discharge);
  i. reference to number and date c/p (in case of shipment by seavessel)
- true copy charterparty plus 2 copies (in case of shipment by seavessel).
  The c/p must state our minimum conditions which are available at our office;
- certificate of origin plus 4 copies;
- original invoice plus 8 copies;
- pro forma-invoice plus 4 copies;
- b-form;

- inspection, weight and quality certificate (to be provided by or on behalf of V.I.B.);
- insurance certificate plus 4 copies (in case of C.I.F. delivery).

All documents have to be made out in the name of the consignee who will be mentioned in the particular tender conditions and have to be forwarded to our address. Inco-terms 1980 are applicable.

X. TRANSPORT BY LAND

If in the particular tender conditions transport by land is required, the total costs of this transport will be paid after presentation of the required documents and receipt of a bank guarantee (V.I.B.-terms):

- covering 10% of the total amount for transport by land in case a "fiata through b/l" is applicable;
- covering 100% of the total amount for transport by land in case any other forwarding document is being used for transport by land.

The bankguarantee will be released after supplier has fulfilled all obligations concerning this delivery and after we have received a taking-over certificate signed by the consignee.

XI. PAYMENT

Payment will take place by the NIO-bank within 14 days after we have given our approval to the documents mentioned in point IX. and any required documents mentioned in the particular tender conditions.
Any commission or other bankexpenses are for account of the supplier.

XII. LIABILITY

Except in the event of force majeure supplier is liable for all costs, damages and interests arising as a result of his failure to honour his obligations.

XIII. PENALTY CLAUSE

Except in the event of force majeure, the supplier, without prejudice to his liability for all costs, damages and interests arising as a result of his failure to honour his obligations, shall in addition pay a penalty of max. 2.0% of the contract value over any quantity of product not delivered in compliance with the terms.

However, if the fertilizer arrives at its destination later than a fortnight after the period specified in the particular tender conditions a penalty is due of max. 4% of the contract value of the goods which have not arrived in time.

XIV. CANCELLATION OF CONTRACT

If shipment by seavessel, train or truck is delayed for more than a fortnight after the stipulated period buyer has the right to cancel the contract.
The penalty clause is applicable in case of shipment after the period stipulated in the particular tender conditions.

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XV. <u>FORCE MAJEURE</u>

In case of force majeure the V.I.B. determines, in consultation, the measures the V.I.B. considers necessary in the given circumstances.

VOEDSELVOORZIENINGSIN- EN VERKOOPBUREAU.

INCOTERMS 1990

Please note that the abbrevations in three letters given for each Incoterm are a standard reference agreed upon by the ICC and the Economic Commission for Europe of the United Nations.

INCOTERMS 1990

Les abréviations de trois lettres données en tête de chaque Incoterm constituent un code standardisé adopté conjointement par la CCI et la Commission Economique pour l'Europe des Nations Unies

→ 9 Big categories in the FERTILIZER sector + 2 sub-categories

- For any carrier

1) EX WORKS (EXW)

2) DAF (Delivered At Frontier)

    DDP

    DDW

3) CFR (Cost & fret)

4) CIF (Cost Insurance Fret)

- **Ship carrier:**

- At arrival
  - 5) DES (Delivered Ex Ship). Before 90
    = Free Out
  - 6) DEQ (Delivered Ex Quay). Before 90
    = Liner Out
- At loading
  - 7) FAS
  - 8) FOB

- **Railway carrier (at arrival):**

  9) FIW = Free In Wagon

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Documents

Bill of lading

Charter Party

Pro forma Invoice

Invoice

Certificate of Origin

Inspection Certificate

Other Documents

chemimex fertilizer services b.v.

fertilizers and fertilizer raw materials

n van der heijdenstraat 16
261 le oud-beijerland

o. box 1521
260 ba oud-beijerland
e netherlands

lephone (0)1860 - 19844
lex 25624 c ;e nl
x (0)1860 - 19886

v.k. dordrecht 60407

ankrelatie H. Albert de Bary & Co N.V
tterdam - nr. 26 54 79.339

PRO FORMA

Ministère de l'Agriculture
et de l'Elevage
Service des Intrants et la
Mecanisation Agricole
B.P. 7005
Ouagadougou

oud-beijerland,
the netherlands 13th of December 1991

our ref.

ur ref. invoice no.3084
file no.1237/91

Shipped per m.v."VARINA" from Morocco to Abidjan

Marks	Description	Amount
<u>One side :</u>	1.490 mt D.A.P.	
for 500 mts dap:	packed in 50 kg wpp/pe bags	
donation neerlandaise	+ 2% empty open mouth sparebags	
engrais		
dap		
ouagadougou burkina faso		
poids net 50 kg		
n'utilisez pas de crocs (red capitals)		
for 990 mts dap:		
donation neerlandaise		
engrais	AT THE PRICE OF Hfl. 492,16 pmt	
dap	C + F F.O. Abidjan =	Hfl. 733.318,40
bobo dioulasso burkina faso		
poids net 50 kg		
n'utilisez pas de crocs (red capitals)		

<u>Reverse side for both quantities:</u>
chemimex fertilizer services b.v.
oud-beijerland
pays bas
+ emblem

PRO FORMA

<u>One side :</u>
for 300 mts tsp:
donation neerlandaise
engrais
tsp
ouagadougou burkina faso
poids net 50 kg
n'utilisez pas de crocs (red capitals)

700 mts T.S.P.
packed in 50 kg wpp/pe bags
+ 2% empty open mouth sparebags

for 400 mts tsp:
donation neerlandaise
engrais
tsp
bobo dioulasso burkina faso
poids net 50 kg
n'utilisez pas de crocs (red capitals)

AT THE PRICE OF Hfl. 405,31 pmt
C + F F.O. Abidjan = Hfl. 283.717,--

<u>Reverse side for both quantities:</u>
chemimex fertilizer services b.v.
oud-beijerland
pays bas
+ emblem

Total C + F F.O. Abidjan Hfl. 1.017.035,40

Origin: Morocco

Supplied under The Netherlands Development Aid Programme.

Payment:
by telegraphic transfer to our Account No. 26.54.79.399, with our bankers H. Albert de Bary & Co.N.V., Rotterdam, The Netherlands

chemimex fertilizer services b.v.

fertilizers and fertilizer raw materials

n der heijdenstraat 16
e oud-beijerland

ox 1521
ba oud-beijerland
therlands

one (0)1860 - 19844
25624 cxe nl
1860 - 19866

dordrecht 60407

elatie H. Albert de Bary & Co N.V
dam - nr. 25.54.70 339

VIB
Posthus 960
6430 AZ HOENSBROEK

oud beijerland,
the netherlands 13th of December 1991

ef.

f. invoice no.3084
file no.1237/91

Shipped per m.v."VARINA" from Morocco to Abidjan

Marks	Description	Amount
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bobo dioulasso burkina faso		
poids net 50 kg		
n'utilisez pas de crocs (red capitals)		

Reverse side for both quantities:
chemimex fertilizer services b.v.
oud-beijerland
pays bas
+ emblem
origin

onsignor

F.I.B.
BURG. KESSENPLEIN 3
6431 KM HOENSBROEK
THE NETHERLANDS

FBL copy NL

FENEX

NEGOTIABLE FIATA
COMBINED TRANSPORT
BILL OF LADING

issued subject to ICC Uniform Rules for a Combined Transport Document (ICC publication 298)

onsigned to order of

MINISTERE DE L'AGRICULTURE ET DE L'ELEVAGE
SERVICE DES INTRANTS ET LA MECANISATION
AGRICOLE
B.P. 7005, OUAGADOUGOU

otify address
MINISTERE DE L'AGRICULTURE ET DE
L'ELEVAGE SERVICE DES INTRANTS ET LA
MECANISATION AGRICOLE
B.P. 7005
OUAGADOUGOU

Place of receipt
ABIDJAN

Ocean vessel | Port of loading

Port of discharge | Place of delivery
OUAGADOUGOU

Marks and numbers	Number and kind of packages	Description of goods	Gross weight	Measurement
ONE SIDE: DONATION NEERLANDAISE ENGRAIS DAP OUAGADOUGOU BURKINA FASO POIDS NET 50 KG N'UTILISEZ PAS DE CROCS (RED CAPITALS)	500 mt DAP packed in 10.000 bags + 200 empty bags		502.000 kgs	

REVERSE SIDE
CHEMIMEX FERTILIZER
SERVICES B.V.
OUD-BEIJERLAND
PAYS BAS
+ EMBLEM

FREE OUT ABIDJAN UNTILL FOR ON RAIL
CONSIGNEE'S WAREHOUSE, NOT DISCHARGED, CUSTOMS CLEARED,
EXCLUDING IMPORT TAXES AND RIGHTS

COPY

according to the declaration of the consignor

The goods and instructions are accepted and dealt with subject to the Standard Conditions printed overleaf.

"This document may be issued only by a member of an organisation affiliated to the Federation of Dutch Forwarding Agents' Associations (FENEX)."

Taken in charge in apparent good order and condition, unless otherwise noted herein, at the place of receipt for transport and delivery as mentioned above.
One of these Combined Transport Bills of Lading must be surrendered duly endorsed in exchange for the goods. In Witness whereof the original Combined Transport Bills of Lading all of this tenor and date have been signed in the number stated below, one of which being accomplished the other(s) to be void.

Freight amount | Freight payable at | Place and date of issue
ROTTERDAM | ROTTERDAM, [illegible]

Cargo insurance through the undersigned | Number of original FBL's
THREE

For delivery of goods please apply to

FTB

Daniel C. Griffith (Holland) B.V.

International Commodity Samplers and Analytical Chemists

Our ref.: V/N39861
31st December, 1991

Stolle 2
3191 KE Hoogvliet Rt
P.O. Box 475
3190 AK Hoogvliet Rt

Telephone (010) 4720355
Telex 28710 F
Telefax (010) 4169044
Chambre of Commerce:
Rotterdam 115669

REPORT OF INSPECTION

Client	: TO WHOM IT MAY CONCERN
Material	: TRIPLE SUPERPHOSPHATE IN BAGS (T.S.P.)
Tender no.	: 198/91
Vessel	: m.v. "VARTHA"
From	: Port of Safi (Marocco)
To	: Abidjan

We hereby confirm having effected inspection of 700,000 kgs. (SEVEN HUNDRED THOUSAND KILOGRAMS) of Triple Superphospate in bags.

We confirm also that the product was free of any foreign matters.

INSPECTION

CONDITION OF CARGO : The holds of the vessel were inspected prior to loading and found suitable to load the material in bags and that hatchs covers were found free of rust or other contaminants.

WEIGHT : 700 Metric Tons as determined by draft survey.

ANALYSIS RESULTS :

P2O5	49,90 %
Soluble in water	86,4 %
Soluble in water+citrate	89,4 %
Moisture	1,50 %

For and on behalf of,
DANIEL C. GRIFFITH (HOLLAND) B.V.

BILL OF LADING

TO BE USED WITH CHARTER-PARTIES
CODE NAME: "CONGENBILL"
EDITION 1978

ADOPTED BY
THE BALTIC AND INTERNATIONAL
MARITIME CONFERENCE (BIMCO)

Conditions of Carriage.

(1) All terms and conditions, liberties and exceptions of the Charter Party, dated as overleaf, are herewith incorporated. The Carrier shall in no case be responsible for loss of or damage to cargo arisen prior to loading and after discharging.

(2) General Paramount Clause.
The Hague Rules contained in the International Convention for the Unification of certain rules relating to Bills of Lading, dated Brussels the 25th August 1924 as enacted in the country of shipment shall apply to this contract. When no such enactment is in force in the country of shipment, the corresponding legislation of the country of destination shall apply, but in respect of shipments to which no such enactments are compulsorily applicable, the terms of the said Convention shall apply.

Trades where Hague-Visby Rules apply
In trades where the International Brussels Convention 1924 as amended by the Protocol signed at Brussels on February 23rd 1968 – the Hague-Visby Rules – apply compulsorily, the provisions of the respective legislation shall be considered incorporated in this Bill of Lading. The Carrier takes all reservations possible under such applicable legislation, relating to the period before loading and after discharging and while the goods are in the charge of another Carrier, and to deck cargo and live animals.

(3) General Average.
General Average shall be adjusted, stated and settled according to York-Antwerp Rules 1974, in London unless another place is agreed in the Charter.

Cargo's contribution to General Average shall be paid to the Carrier even when such average is the result of a fault, neglect or error of the Master, Pilot or Crew. The Charterers, Shippers and Consignees expressly renounce the Netherlands Commercial Code, Art. 700, and the Belgian Commercial Code, Part II, Art. 148.

(4) New Jason Clause.
In the event of accident, danger, damage or disaster before or after the commencement of the voyage, resulting from any cause whatsoever, whether due to negligence or not, for which, or for the consequence of which, the Carrier is not responsible, by statute, contract or otherwise, the goods, Shippers, Consignees or owners of the goods shall contribute with the Carrier in general average to the payment of any sacrifices, losses or expenses of a general average nature that may be made or incurred and shall pay salvage and special charges incurred in respect of the goods.

If a salving ship is owned or operated by the Carrier, salvage shall be paid for as fully as if the said salving ship or ships belonged to strangers. Such deposit as the Carrier or his agents may deem sufficient to cover the estimated contribution of the goods and any salvage and special charges thereon shall, if required, be made by the goods, Shippers, Consignees or owners of the goods to the Carrier before delivery.

(5) Both-to-Blame Collision Clause.
If the vessel comes into collision with another ship as a result of the negligence of the other ship and any act, neglect or default of the Master, Mariner, Pilot or the servants of the Carrier in the navigation or in the management of the Vessel, the owners of the cargo carried hereunder will indemnify the Carrier against all loss or liability to the other or non-carrying ship or her Owners in so far as such loss or liability represents loss of, or damage to, or any claim whatsoever of the owners of said cargo, paid or payable by the other or non-carrying ship or her Owners to the owners of said cargo and set-off, recouped or recovered by the other or non-carrying ship or her Owners as part of their claim against the carrying Vessel or Carrier. The foregoing provisions shall also apply where the Owners, operators or those in charge of any ship or ships or objects other than, or in addition to, the colliding ships or objects are at fault in respect of a collision or contact.

For particulars of cargo, freight, destination, etc. see overleaf.

CODE NAME: "CONGENBILL". EDITION 1978

BILL OF LADING

TO BE USED WITH CHARTER-PARTIES

B/L No. 1.

Reference No.

Shipper

Chemimex Fertilizer Services B.V.
P.O. Box 1521
3260 BA Oud Beijerland
The Netherlands

Consignee

SOAEM - Abidjan
01 BP 1727
Rond Point de Nouveau Port
Abidjan - Cote d'Ivoire

For account of: Ministère de l'Agriculture et de l'Elevage
Service des Intrants et la
Mecanisation Agricole
B.P. 7005
Ouagadougou

Notify address

Ministère de l'Agriculture et de l'Elevage
Service des Intrants et la
Mecanisation Agricole
B.P. 7005
Ouagadougou

Vessel: "VARINA"

Port of loading: Morocco

Port of discharge: Abidjan

Shipper's description of goods

one side:

1.490 mt DAP packed in 29.800 bags + 596 empty bags - grossweight

Gross weight: 1.495.960 mts

for 500 mts dap:
donation neerlandaise
engrais
dap
ouagadougou burkina faso
poids net 50 kg
n'utilisez pas de crocs (red capitals)

for 990 mts dap:
donation neerlandaise
engrais
dap
bobo dioulasso burkina faso
poids net 50 kg
n'utilisez pas de crocs (red capitals)

Reverse side for both quantities:
chemimex fertilizer services b.v.
oud-beijerland
pays bas
+ emblem

" CLEAN ON BOARD "

" FREIGHT PREPAID "

(of which X X X on deck at Shipper's risk, the Carrier not being responsible for loss or damage howsoever arising)

Freight payable as per CHARTER PARTY dated 28th November 1991

FREIGHT ADVANCE

Received on account of freight

Time used for loading ... days ... hours

SHIPPED at the Port of Loading in apparent good order and condition on board the Vessel for carriage to the Port of Discharge or so near thereto as she may safely get the goods specified above.

Weight, measure, quality, quantity, condition, contents and value unknown.

IN WITNESS whereof the Master or Agent of the said Vessel has signed the number of Bills of Lading indicated below all of this tenor and date, any one of which being accomplished the others shall be void.

FOR CONDITIONS OF CARRIAGE SEE OVERLEAF

Freight payable at: Freight prepaid

Place and date of issue: Morocco, 12th December 1991

Number of original Bs/L: 3/THREE

Signature

By authority of Owners:
Visser & Visser Chartering B.V.
(as agents only)

Printed and sold by Wyt & Zonen B.V., Rotterdam by authority of The Baltic and International Maritime Conference (BIMCO), Copenhagen

Workshop on
Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994
Bamenda, Cameroon

Fertilizer Pricing
Theory and Practice

by

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Senior Specialist – Marketing/Financial Analyst
IFDC

Presented by

Souleymane Diouf
Marketing Specialist
IFDC-Africa

Organized by
International Fertilizer Development Center (IFDC)
P.O. Box 2040
Muscle Shoals, Alabama 35662, U.S.A.
Sponsored by
The Fertilizer Sub-Sector Reform Program
(Technical Supervisory Committee and USAID/Cameroon)

Fertilizer Pricing
Theory and Practice

Introduction

"How much is it?" This question always brings buyers and sellers together with buyers defining how much they are prepared to pay and sellers defining how much they are willing to accept for a product or service. The convergence of buyer's and seller's needs and wants through the pricing mechanism is a fundamental aspect of marketing. Price, along with product, place, and promotion, is a marketing management tool that should be used by marketing managers to achieve their marketing objectives.

Price has been formally described as "a communication to the buyer of the terms under which an exchange can be made." However, the price that is communicated for a product or service must be acceptable to the buyer and must provide the seller with a margin sufficient to promote capital renewal for business growth.

In fertilizer marketing, price is a principal determinant of fertilizer use but not the only one. Fertilizer products per se are not being sold to farmers. The results of fertilizer use are being sold. This can be termed "effect marketing." Farmers will not use fertilizer in the absence of sufficiently favorable fertilizer crop responses and attractive value cost ratios. A rule of thumb applied to developing countries is that average value cost ratios need to be 2:0 or more to provide sufficient incentive for farmers to buy and use fertilizers. This ratio can be altered by adjusting either the fertilizer or crop price or both. In an effort to keep consumer food prices low, most developing countries have elected to adjust fertilizer prices by subsidizing fertilizer production or marketing activities, including procurement. As a consequence, government intervention in determining fertilizer prices is the norm in most developing countries with governments often exercising indirect and direct control of fertilizer prices. The role of developing country fertilizer marketing managers in determining prices, whether in public, private, or cooperative sectors, has been constrained by government action. Often insufficient attention has been paid to pricing strategy.

The development of subsidized fertilizer markets creates an open-ended increasing budgetary expense for national governments and there is an increasing need to curtail such annual expenses especially in those countries where the fertilizer market has been significantly developed. In these circumstances the adjustment to less government regulation and more competitive marketing requires a full understanding of financially efficient pricing principles and strategies. The theory of these will be examined from the viewpoint of the economist, the accountant, and the marketing manager before examining practical pricing decisions.

The Economist's Viewpoint

Economists have done more work on pricing than any other group and have given us the theoretical background which helps us to understand the process.

A simple element of economic theory is that in a situation of *perfect competition* there will be a going price level which fixes the price that a company entering the market can charge. This means that if the company charges a price above the going price it will not sell anything and, if it charges below the going price, it will be able to sell all that it offers – but could sell the same amount at the going price. This situation is represented in graph form in Figure 1.

In defining perfect competition the economist expects the following conditions to hold:

1. That the product or service is homogeneous.
2. That there is a large number of buyers and sellers, such that no one buyer or seller is large enough to significantly alter the pattern by either restricting demand or supply or increasing supply or demand.
3. Buyers and sellers are in close touch with one another.
4. There is no preferential treatment.

Perfect competition is theoretical. The act of marketing seeks to alter at least two of the parameters. Firstly, the homogeneous nature of the product or service and secondly, the treatment of customers. The purpose of marketing is to take the demand curve and lift it and tilt it. The demand curve then looks more like that shown in Figure 2.

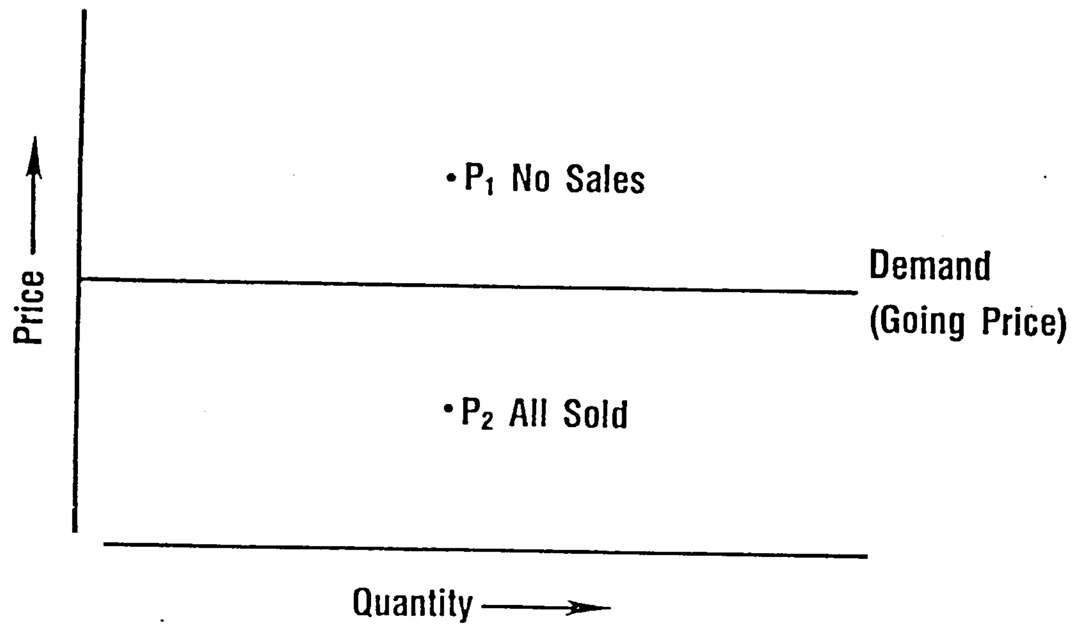

Figure 1. Going Price Concept.

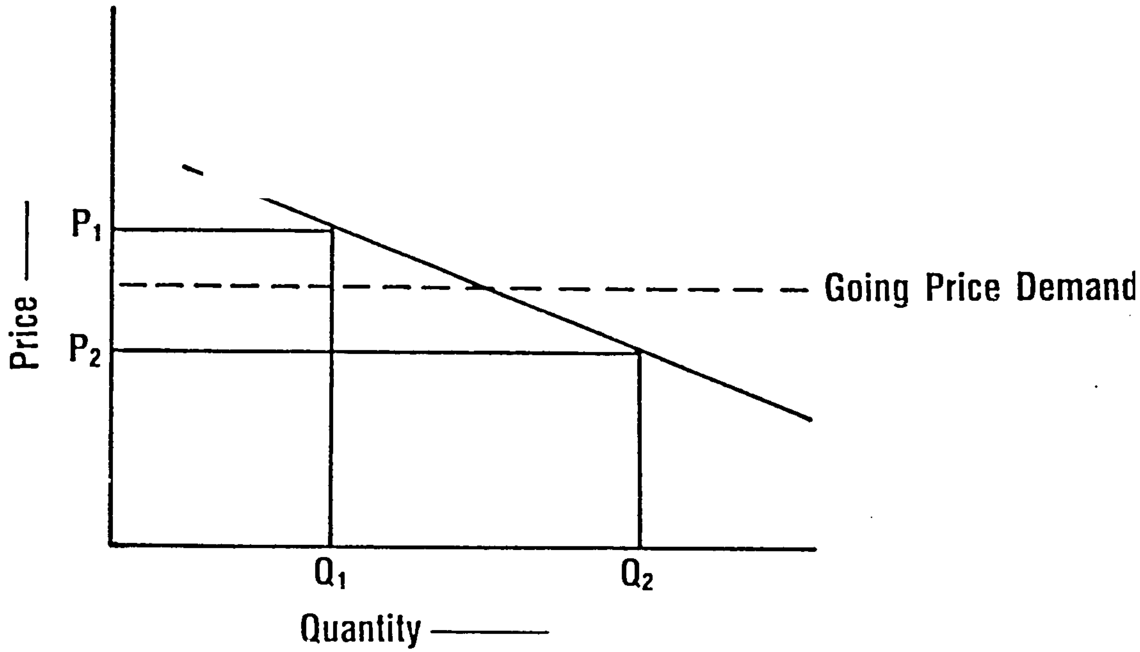

Figure 2. Marketing Demand Curve.

Given this demand curve, the marketing manager is now in a position to have a pricing policy. If he charges a higher price (P_1) he will tend to sell a relatively small amount (Q_1); if he charges a lower price (P_2) he will tend to sell more (Q_2).

This introduces another main concept of economists, that of *demand elasticity.* This is a measure of the relationship between two sets of changes which are interdependent. The first is a change in price level, the second a subsequent change in the amount demanded. If we have a fertilizer priced at $10 per bag and sell 10,000 bags and alter the price to $9 per bag to discover that we now sell 13,000 bags, we can work out the elasticity of demand for the product.

Remember that we are measuring two changes. The first, price, changes from $10 to $11 – an increase of 10%. The second, the number of bags sold, changes from 13,000 to 12,090 – a reduction of 7%. Elasticity of demand at this point is then -0.7; a 10% higher price gives a 7% decrease in sales. Elasticity of demand is the percentage change in demand divided by the percentage change in price.

If we now do the same sort of manipulation but assume a different market response – say an increase in demand of 5% for a 10% reduction in price – the elasticity of demand becomes -0.5. If the factor is greater than 1 this is called elastic demand, if less than 1, inelastic demand. The slope of the curve is a reflection of the elasticity or inelasticity of demand. Graphically it can be represented as in Figure 3.

In the elastic demand situation a small drop in price results in a significant increase in sales and therefore sales revenue. A similar price reduction with an inelastic demand does not significantly alter the amount purchased. Conversely, if demand is relatively inelastic, raising prices will not result in a high loss of sales.

There is a particular relevance here for the marketing manager. The most creative task in marketing is to make the demand for a product or service relatively more inelastic, primarily through product and promotional strategies.

Products which have a low price elasticity of demand, inelastic demand, are usually those which are staple necessities for users and have few or no substitutes. For example, in a rice consuming country price has little effect on rice demand. Products

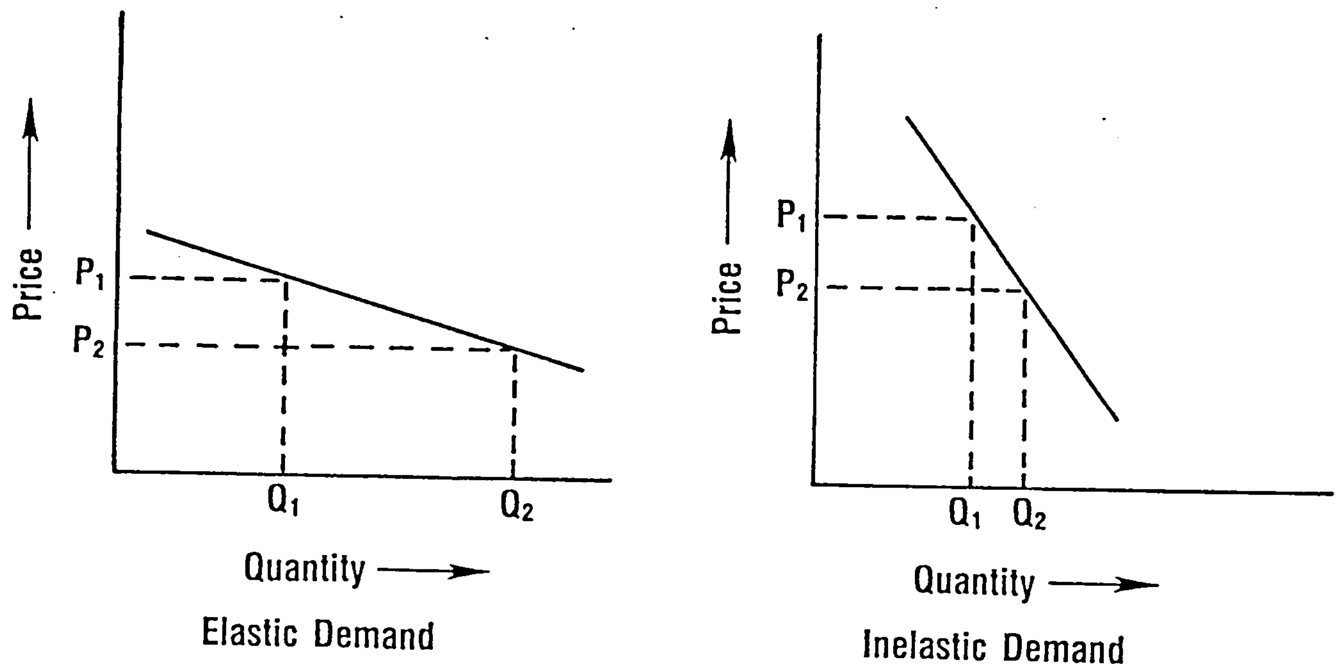

Figure 3. Elasticity of Demand.

which exhibit high demand price elasticity, elastic demand, are usually those with many substitutes or are not essential products for the consumer.

The marketing process can move products towards greater inelasticity, which provides greater flexibility in setting prices, by employing product and promotional strategies which differentiate them, rendering them less prone to substitution. A promotional strategy that assists in developing greater reliance by the customer on a product or service reduces elasticity.

The converse of price elasticity of demand is *income elasticity of demand*. This concept measures percentage changes in demand as a function of percentage changes in income (or purchasing power). Products or services for which demand does not increase with increased purchasing power are income inelastic such a staple food items, basic clothing needs, and shelter while most consumer goods are income elastic.

For fertilizers the general situation is that income elasticity of demand is higher than price elasticity of demand. In other words farm income has a greater effect on fertilizer use than fertilizer price. The two concepts can, and should, be linked by using the *real fertilizer price* as the measurement criteria. The real fertilizer price is measured by the ratio of actual on-farm crop output price to fertilizer price. This is the Crop Fertilizer Price Ratio or CFPR. When this ratio is used for calculating demand elasticity then both price and income effects on demand are taken into account. As an illustration Table 1 shows the evolution of official paddy procurement price, urea retail price, and the CFPR in Bangladesh. Thus in 1982/83, although urea prices increased by 12% the CFPR only increased by 6%. In developing countries the fertilizer elasticity of demand measured in this way has generally been shown to vary between -0.3 and -0.6 in the short run and -1.5 to -3.0 in the long run. The short run is meant by the immediate or impact elasticity and long run means the final adjustment of demand response to a price change. The initial reactions of farmers to price changes are constricted by many factors and it takes time to adjust to new circumstances. In general, a 1% increase in real fertilizer price will reduce fertilizer demand by between 0.3% and 0.6% in the short run and 1.6% to 3% in the long run, although most elasticity estimates have not taken account of nonprice factors and therefore tend to be overestimated.

Table 1. Evolution in Official Paddy Procurement Prices, Urea Retail Prices, and the Implied Price Ratios in Bangladesh

Fiscal Year	Procurement Paddy Price	Estimated Urea Retail Price	FCPR
	------------ (TK/md)	------------	
1972/73	33	43	1.3
1973/74	45	65	1.4
1974/75	77	109	1.4
1975/76	77	109	1.4
1976/77	78	130	1.7
1977/78	84	130	1.5
1978/79	84	152	1.8
1979/80	110	196	1.8
1980/81	115	239	2.1
1981/82	124	287	2.3
1982/83	135	322	2.4

Source: Mudahar (1984).

The level of demand elasticity reflects many factors and not just price. The actual price effect is a reflection of the underlying crop fertilizer response function and the farmer's aversion to risk. Availability of credit to purchase fertilizer, availability of markets to sell crop output, farmer knowledge, and perception of fertilizer benefits and farmer commitment to fertilizer use all affect the demand elasticity. Therefore, over time demand elasticity changes with the maturity of market segments and at any one time demand elasticity varies with the magnitude of real fertilizer price changes.

For the moment it will be useful to try to link our notions of elasticity with the real world in which the marketing manager has to operate by examining the financial background to pricing.

The Accountant's Viewpoint

The traditional base for pricing is the system known as "cost plus." In this system, all the costs involved in producing, or procuring, and marketing a product are calculated and then a sum, either fixed or as a percentage of costs, is added, which gives the price charged. It is useful to note that because all prices are derived from basic costs plus some addition, the essential feature of the "cost plus" system is that costs plus the additions are the only considerations in arriving at a price. Many retailers still arrive at a price by adding a fixed percentage to the price charged to them by the manufacturer. This ignores any market or marketing considerations.

It is important to recognize that the accountant has objectives which differ in many cases from those of the marketing manager. The accountant is concerned with accounting for all organization costs in as reasonable a way as can be found. This usually includes the arbitrary allocation of overhead costs to individual products or services to calculate a *fully absorbed cost* for each item sold.

Table 2 illustrates a fully absorbed costing method and cost plus pricing calculation for a fertilizer marketing organization in a developing country. For the sake of simplicity it is assumed that only two products are sold, urea and DAP.

Table 2. Fully Absorbed Costing and Cost Plus Pricing for Urea

	Urea	DAP
	----- ($/ton) ----	
f.o.b. cost (bulk)	110	200
Freight	25	22
Port discharge	15	15
Bags	10	10
Direct labor for bagging	10	10
Bagging overheads	2	2
Distribution freight costs	35	35
Warehousing overheads	8	8
Interest for 3 months @ 15%	8	11
Marketing overheads	15	15
Administration overheads	5	5
Total costs (fully absorbed)	243	333
Marketing margin @ 12.5%	30.4	41.6
Selling price	273.4	374.6

At the selling prices shown in Table 1, assume that 20,000 tons of urea and 5,000 tons of DAP are sold. The total costs and revenue to the organization will be as shown in Table 3.

Table 3. Total Costs and Revenue for 20,000 Tons Urea, 5,000 Tons DAP

	Urea	DAP	Total
	--------	($ million)	-------
Fully absorbed costs	4.86	1.665	6.525
Marketing margin	0.608	0.208	0.816
Revenue	5.468	1.873	7.341

There are two major problems with this "cost plus" approach from the marketing decision point of view. Firstly, the calculated price has been arrived at without reference to market conditions. Secondly, the allocation of overheads can easily obscure the genuine contribution which a product is making to the organization.

The Marketing Manager's Viewpoint

From the marketing point of view only two product pricing characteristics are required. These can be simply represented as:

$$\boxed{\text{Market Response}} \quad \text{X} \quad \boxed{\text{Contribution}}$$

Market response represents the likely response in the marketplace to a given unit of marketing effort placed behind each product. In economists' terms this is the elasticity of response.

Contribution represents the contribution to overhead (or fixed) costs and profit which each product makes after meeting the costs *directly associated with that product.*

The definition of costs is important in understanding the concept of contribution analysis. Several terms are used interchangeably for three types of cost:

Variable or direct costs.
Fixed or indirect or overhead costs.
Total or fully absorbed costs.

Variable costs vary directly with the level of production or marketing volume.
Fixed costs are costs that do not vary with production or marketing volume.
Total costs are the sum of variable and fixed costs, which when applied to individual products, incorporate an allocation of fixed costs to each product.

Contribution is defined as selling price minus variable cost and it is the contribution to fixed costs and profit. Using the contribution concept the original costs in Table 2 break down into two components – variable and fixed costs – as shown in Table 4 from which contributions can be calculated as in Table 5.

Table 4. Variable and Fixed Costs

	Urea	DAP
	($/ton)	
Variable costs	213.00	303.00
Fixed costs	30.00	30.00

Table 5. Contribution

	Urea	DAP
	($/ton)	
Price	273.40	374.60
Variable costs	213.00	303.00
Contribution	60.40	71.60

Contribution can now be seen as relative not only to profit, but also to the fixed costs. It can be expressed as a percent of the selling price; 22% for urea and 19% for DAP. Note that these contribution percentages are in reverse order of the marketing margins originally calculated in the "cost plus" pricing calculation.

If this is now related back to the original market demand the picture is as follows in Table 6.

Table 6. Total Tons, Revenue, Direct Costs, and Contribution

	Urea	DAP	Total	% Revenue
Tons Sold	20,000	5,000	25,000	
Revenue, $ million	5.468	1.873	7.341	
Variable costs, $ million	4.26	1.515	5.775	(79%)
Contribution, $ million	1.208	0.358	1.566	(21%)

Sales cover the direct costs, the allocated overheads, and the marketing margins. The average weighted contribution is 21%.

Contribution analysis allows one to calculate the *breakeven sales* – that is the sales revenue that has to be generated to cover the direct and overhead costs only. This calculation is simple once the contribution percentage has been calculated. In the above example total overheads are $750,000 and the weighted contribution is 21%. The breakeven sales are $0.75 million ÷ 0.21 = $3.516 million. Put another way, this says that $3.516 million sales with an average contribution of 21% yields $0.75 million contribution, which covers all overhead costs.

The simple sum can also be used to find the necessary sales to generate not only a breakeven figure but also a given marketing margin or profit. In the same example, to generate the original profit of $0.816 million this amount is added to the total overheads of \$0.75 million and the resulting sum of \$1.566 million is divided by the contribution percent of 0.21 viz. $\frac{1.566}{.21} = \$7.341$ million.

Table 7 illustrates what happens if the price of urea is adjusted upwards or downwards by 5%. These calculations show that to generate the original profit, with a 5% lower price, sales revenue has to increase by 22.8% and sales volume by 29.3% while with a 5% higher price sales revenue can fall by 14.4% and sales volume by 18.45% because of the changes in contribution for each unit sold. These calculations can be represented graphically as shown in Figure 4.

Table 7. Pricing on the Basis of Contribution Analysis

	Current Price	5% Lower	5% Higher
Price/ton, \$	273.4	259.73	287.07
Variable cost/ton, \$	213	213	213
Contribution/ton, \$	60.4	46.73	74.07
Contribution, %	22.09	17.99	25.8
Overheads, \$ million	0.6	0.6	0.6
Breakeven revenue, \$ million	2.716	3.335	2.325
Breakeven, tons	9,935	12,841	8,101
Profit, \$ million	0.608	0.608	0.608
Sales revenue to generate original profit, \$ million	5.468	6.715	4.682
(% change)	-	22.8%	-14.4%
Sales volume to generate original profit, tons	20,000	25,854	16,310
(% change)	-	29.3%	-18.4%

Contribution analysis provides the necessary background against which to evaluate the elasticity of demand around a particular price level. For any given overhead cost structure and contribution the impact of actual price changes on marketing margins (or profits) can be compared to estimated demand elasticity. For example, in the data on Table 2 a 5% increase in price requires no more than a 18%

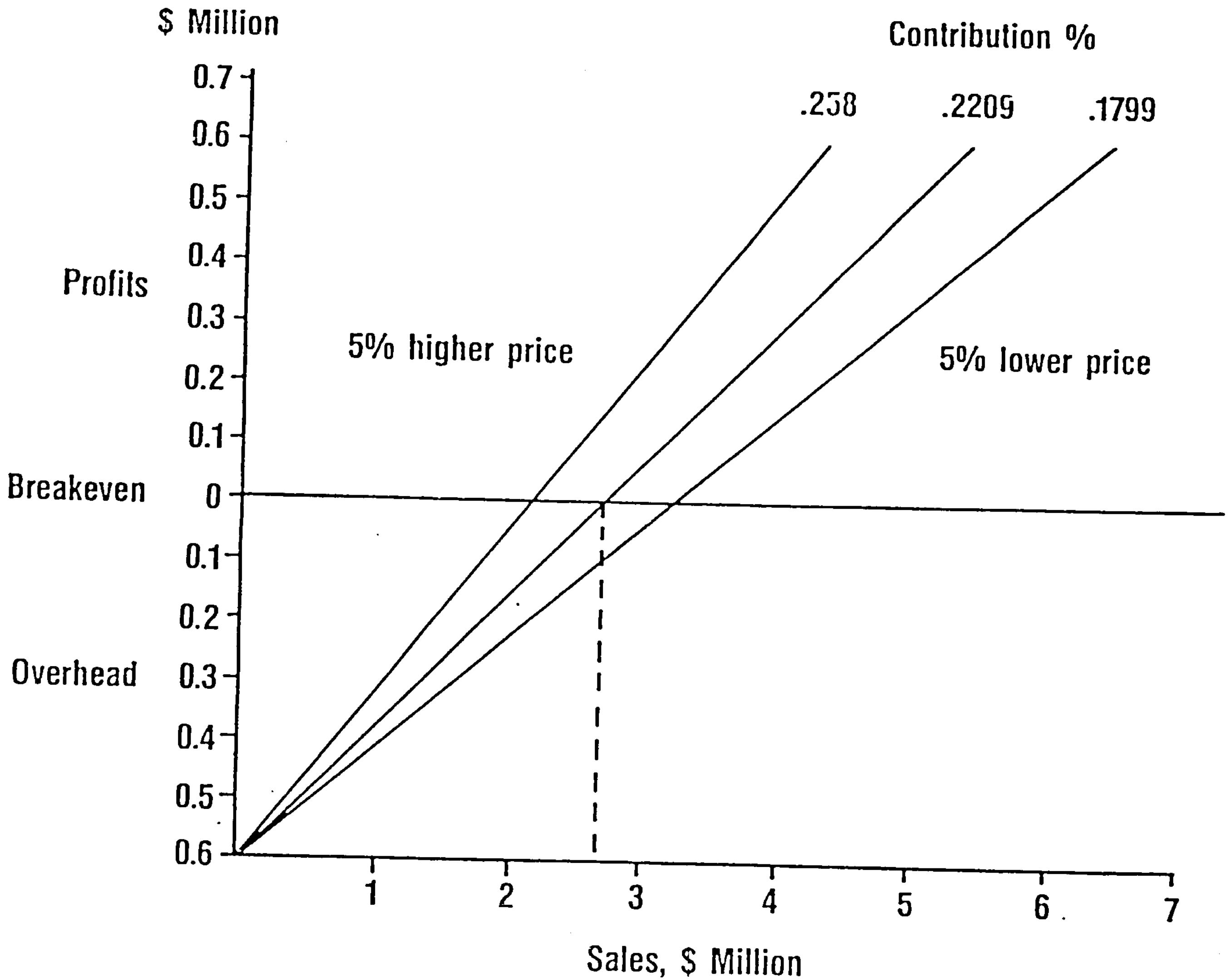

Figure 4. Contribution Analysis.

fall in sales volume to maintain the original profit level. Without a change in crop prices the actual fertilizer price increase is a real price increase and a demand elasticity of -3.6 (-0.18 ÷ .05) is required in the marketplace to achieve the marketing objective. If the demand elasticity in the marketplace is estimated at only -1.5 then it is most likely that the required sales volume will be achieved because a 5% increase in fertilizer price will only result in a 7.5% fall in sales volume.

Using the same data but changing the marketing objective to one of reducing fertilizer costs to farmers then a different scenario arises. A 5% reduction in price requires a 29% increase in volume to achieve the original profit level, implying a required market demand elasticity of -5.8 (.29 ÷ -0.05), way above the estimated elasticity of -1.5. The marketer is then faced with the task of reducing costs, both overhead and direct costs, to maintain profitability. In the example used, if overhead costs cannot be reduced then direct costs have to be reduced from \$213/ton to \$203.5/ton to achieve the dual marketing objectives of a 5% reduction in price and maintenance of profits. Again, the calculation is simple as in Table 8.

Table 8. Calculation of Direct Cost Reduction to Maintain Profit

Current sales volume	20,000 tons
Sales volume with a 5% lower price	21,500 tons (+7.5%) E = 1.5
Expected sales revenue	21,500 tons x \$259.73/ton
	= \$5.584 million
Less fixed costs	\$ .600 million
Less required profit	\$ .608 million
= Total variable costs	\$4.376 million
Variable cost/ton	\$203.54
Contribution/ton	\$56.19
Contribution as % Sales Price	21.63%

Contribution analysis plus an analysis of market demand combines the best concepts of the marketer, the accountant, and the economist. It takes account of the market as well as internal cost considerations. Unfortunately, as with many theoretical concepts, there are some difficulties in practical application.

Practical Application of Pricing Theory

In the real world of fertilizer marketing pricing policy and strategy has to be developed for markets varying from monopolistic to highly competitive. Monopolistic markets in which there is only one seller or in which government regulation determines price, both require price levels to be set in line with marketing objectives. The contribution analysis is straightforward, although many marketing organizations in developing countries fail to keep adequate costings. While this aspect is easily rectified the determination of the demand function is more difficult.

Determining the Demand Function

The problems with demand functions are that:

1. Nonprice factors alter the level of the demand function.
2. Elasticity changes with time.
3. The underlying crop response function only reflects the impact of price on application rates but not on fertilized areas.
4. In most developing countries there is inadequate data on demand by crop segment over time.
5. The theoretical precision of demand elasticity is often not realized in practice.

Nonprice factors can raise or lower the level of the demand function. Increased irrigation area, high-yielding varieties, and credit availability will increase the level of demand and mask the impact of price elasticity. As market segments mature, that is as more farmers use fertilizer at close to optimum rates, elasticity tends to fall. Farmers using fertilizer at close to optimum rates do not have to reduce application rates to maintain marginal product in response to increased fertilizer prices as much as those farmers using fertilizer at lower rates.

Faced with changed real fertilizer prices, farmers can react in three ways: change application rates, change the area fertilized, or change both. In situations where farmers have a good understanding of fertilizer use and fertilize their total crop area, their reaction to real fertilizer price increases is usually to drop the application rate. In developing market segments, where understanding of and commitment to fertilizer use is low, farmers tend to react to fertilizer price increases by reducing the area fertilized as well as reducing application rates.

Fertilizer marketers can try to establish demand functions for fertilizers by several methods:

- Direct attitudinal surveys
- Statistical analysis
- Market testing
- Subjective analysis

Whichever method or combination of methods is used the final estimate of market response to price changes is heavily reliant on the experience of the marketing manager and the understanding of the customer. A good market information system which allows the manager to consider the individual crop segments can lead to excellent subjective analysis.

Marketing Objectives

The demand function and internal cost considerations place upper and lower limits on pricing levels but the actual price is arrived at through a careful consideration of the marketing objectives and the reaction of competitors in competitive markets. A specific market goal in terms of volume, marketplace, leadership, or in terms of attracting retailers, distributors, or agents will determine an appropriate price level. Volume and marketplace are very relevant to fertilizer markets in developing countries.

Market Development Objectives–In the introduction phase of market development when farm incomes are low, fertilizer knowledge is poor, distribution systems are expensive, and crop marketing systems inadequate, relatively low fertilizer prices are necessary to make the use of fertilizers attractive. As balanced sector development occurs during the takeoff stage, raising agronomic potential, adoption and learning by farmers, efficiency in distribution and crop marketing, and farm incomes while lowering farmers' aversion to risk in using fertilizer, then fertilizer price levels can be raised. The timing and sequencing of changes in the real price levels of fertilizer are specific to each situation but a common objective should be to avoid large absolute levels of change because these create uncertainty in the minds of farmers, retailers, and wholesalers.

Channel Objectives–Pricing policies aimed at attracting retailers or wholesalers should be based on providing margins commensurate with the marketing tasks performed by the retailers or wholesalers. A retailer who only takes orders, has little or no stock or storage facilities should not get the same margin as an active retailer providing credit, storage, on-farm selling, and organization of farm demonstrations. The marketer, in setting objectives for a retailer, should provide a margin based on a combination of the cost to the retailer of performing the tasks and the value to the organization of having those tasks performed.

Distribution Objectives–Fertilizer markets are characterized by high seasonal peaks. Excessive distribution costs in terms of freight and/or stock holding costs often occur. Seasonal discounts to encourage offtake and stock piling by retailers or farmers can reduce the cost of seasonal peaks. The level of discount should be matched to the cost savings for the marketing organization and provide an incentive to the buyer.

Territorial Objectives–Often a pricing objective is to provide all farmers with fertilizer at the same price. This entails subsidizing those farmers further away from the supply point (factory or port) and penalizing the farmers near the supply point. Various arguments can be made for and against such policies but a uniform price policy tends to hide the real cost of freight subsidies and penalties and distorts resource use. The use of direct subsidies to farmers in remote areas does not penalize other farmers. Compromise approaches can be taken such as regional pricing points where prices are quoted ex-regional store. Wherever such a system is applied it is important for the marketing organization to record the actual freight costs between regional warehouses and then be able to compute the price averaging.

Volume Objectives–The use of volume discounts, a common practice in developed countries, encourages the establishment of wholesalers and leads to economies in freight by encouraging larger shipments. Volume discounts can be supplemented by minimum order quantities which provide a marketing organization with increased dispatch efficiency.

Product Mix Objectives–Product mix pricing considerations often mean modifying a product price to achieve a desired product mix. A marketing organization selling urea, ammonium nitrate, and ammonium sulfate can price these products in several ways such as: (1) equal price per unit of nitrogen on-farm; (2) equal contribution per product ton; (3) equal contribution per ton nitrogen; (4) product value basis; and each method will give rise to a different product mix and a different total contribution. The marketer should search for a mutual set of prices that maximize contribution on the total product mix. This exercise is difficult because of different demand and cost interrelationships and product substitution. Modifying nitrogen product prices on a value basis is preferable because this takes account of the perceived value in the marketplace which can be modified with product promotion strategies. In the above case the differences in agronomic efficiency and the value of sulfur should be used to modify prices to achieve the required product mix.

Commodity Objectives–When products being sold are very similar (commodities), their prices are generally very competitive, such as in the international fertilizer market and in the fertilizer markets of developed countries. Prices tend to be similar due to the effects of competition. In markets where products are alike and prices are similar, marketing organizations can adopt high volume, low price strategies or place a strong emphasis on other nonprice marketing elements such as distribution, promotion, services, credit, and incentives.

Marginal Objectives–In situations of oversupply such as those that occur periodically in the world fertilizer industry, the fully absorbed cost of production or marketing cost has little influence on price. During the mid-eighties world prices for fertilizers fell below the full cost of production due to falling demand and oversupply on the world market. Major producers sought to maintain sales volume and capacity utilization by aggressive pricing based on variable production costs. This strategy can only be short-lived because the basic cost of manufacture does not change and a contribution to overheads has to be made. The rationalization of the fertilizer industry in North America and Europe resulted from too much product being marginally priced for too long in response to intense price competition from low-cost producers in North Africa, the Middle East, and Eastern Europe.

One aspect of commodity products such as fertilizers is that over time the real price of the product falls. Calculations made for urea, ammonium nitrate, and DAP show that the real prices of these products has fallen 1%-2% per year over the past 15 years. These real price falls arise due to the impact of experience (learning) in production and the removal of barriers to production over time. This becomes an important consideration in planning new fertilizer production investments.

Fertilizer Pricing in Developing Countries

In most developing countries the value cost ratios for fertilizer use were initially too low to induce farmers to use fertilizer. In efforts to keep consumer food prices low (because of low incomes) most developing countries elected to adjust fertilizer prices by subsidizing production and/or marketing activities. These policies were reinforced by the energy and fertilizer crisis of the 1970s. As a consequence, government intervention in determining fertilizer prices is the norm in most developing countries and many governments exercise direct or indirect control of retail prices.

In a review of pricing policies in selected developing countries, Mudahar and Kapusta (1987) made the following observations and comments.

1. Both ex-factory and retail fertilizer prices are fixed by government to achieve predetermined goals of production efficiency and price parity with agricultural commodities at the farm level.
2. Actual farm prices often vary from official levels, being higher during scarcity and lower when there is a glut, reflecting deficiencies in fertilizer supply management. Deregulation of retail prices in Bangladesh in 1983 did not appear to have any adverse effect.
3. Uniform prices across a country are prevalent.
4. Some countries have the same retail prices for different fertilizers irrespective of nutrient content or cost, which has no social or economic justification.
5. Retail prices are often held constant (in nominal terms) over extended periods, causing the real price to fall.
6. Retail price rises when implemented have often been in large discrete jumps with adverse effects on consumption.
7. Where dual pricing policies have been practiced black markets and leakage occur and the system is administratively difficult.

8. High cost domestic fertilizer industries established to achieve fertilizer security can be self-defeating insofar as high retail prices cause falls in fertilizer consumption and agricultural production.
9. Farmers in most countries are not paying the economic prices for fertilizer. Subsidies lower the cost below the world market price.

These observations and comments reflect a need for developing countries to implement pricing policies and strategies that are based on the underlying principles of pricing; namely contribution analysis and demand elasticity principles combined with gradual change to price levels as sector development proceeds and the use of nonprice factors to raise demand and reduce price elasticity.

Further Reading

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Workshop on

Efficient Marketing of Fertilizers in Cameroon

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Fertilizer Packaging

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Fertilizer Packaging

1. Introduction

The package is an essential item in the fertilizer systems of the developing countries. Marketing and distribution managers may not always be aware of the importance of the package as it affects their costs and the quality of the fertilizer delivered to the farmer. Various aspects are considered in this presentation to provide food for thought and perhaps to stimulate action in reducing both packaging and fertilizer damage costs while at the same time improving package and fertilizer quality.

2. Why Bag?

In asking this question, we come up with what may appear to be some very obvious answers. We should not forget, however, that commodities in bags can be handled by all-manual methods through any system and on all forms of transport without any special equipment whatsoever. Other possible systems include (a) palletized bags, (b) sling loads of bags, (c) mini-bulk or 1-ton bags, and (d) delivery in bulk. These all require a degree of mechanization not usually available in the developing countries.

In considering movement of fertilizers, many factors are involved but it comes down to:

1. *Customer* requirement.
2. *Protection* of the product.

The farmer in the developing countries usually requires a relatively small quantity in a conveniently handled form, but he also wants a guarantee of the weight and quality of the product. He is therefore looking for a factory-finished, tamper-proof bag. The fertilizer bag usually consists of a strong outer bag of sufficient strength to contain the product and a polyethylene liner to reduce moisture pickup. The farmer is often very interested in the reuse value of the bag.

For the marketing man, a quality package can help sales and improve the company image. The printing on the bag is also necessary to define the contents and can also be used to give various messages to the consumers. In many countries this is regulated by law; for example, in India by the Packaged Commodities Rules (1977).

3. What Weight of Bag?

Loosely referred to as the "size" of the bag, this is usually 50 kg and sometimes 25 kg. A 50-kg bag is about the maximum acceptable one-man lift that can be handled through a manual system and by the farmers. A 25-kg bag is preferred by farmers for ease of handling, transport, and use. It is approximately two-thirds the cost of a 50-kg bag, but twice as many per ton are required, so that overall 25-kg bags are approximately one-third more costly to the producer (US $3-$4/ton). In addition, the 25-kg bag may almost double filling and handling costs. The 50-kg size is therefore more economical to the producer and, largely for this reason, has become the generally accepted standard "size."

Larger bags (50 kg instead of 25 kg) are more prone to damage, particularly because of increased use of the *hook* (see below). In some places 100-kg bags are still in use. These were once much more common but because of handling difficulties have been phased out. Smaller bags are mentioned later.

For a particular weight of fertilizer, the actual size of the bag is, of course, determined by the density of the particular product. For a relatively low density or "light" product, such as urea, a larger and more expensive bag will be needed than for the same weight of a high-density or "heavy" product, such as TSP. Some values are given in Table 1.

Table 1. Packaging Volume of Fertilizers

Product	Bulk Density	Volume for 50 kg
Urea prills	740 kg/m^3	68 L
TSP granular	1,120 kg/m^3	45 L
MOP granular	1,050 kg/m^3	48 L

Most fertilizers can be accommodated in two sizes of bags:

1. 60 cm x 100 cm (flat dimension) for low-density (light) fertilizers, such as urea and ammonium nitrate.
2. 55 x 90 cm, for high-density fertilizers, such as phosphate potash and NPKs.

Bag size should, in any case, be tailored to the particular product to minimize package costs. However, the exact size can only be determined by trial and error. Ullage (free space) of 10%-15% is left to give the sealed bag the right handling characteristics. A too tightly packed bag is more difficult to handle and stack and is more likely to burst open when dropped. A too loosely packed bag is like handling a bag of water.

In recent years, growing interest in 25-kg bags has been observed. There is also interest in 10-kg and 5-kg bags as starter packs for small farmers. The 10-kg and 5-kg sizes may be overpacked in a "standard" 50-kg bag and handled through the system using existing manual methods.

4. Hooking

The greatest single source of damage and loss in handling bagged fertilizers is caused by handling with hooks. This is particularly noticeable in port handling.

The problem is not simply that the holes caused in the bags may lead to leakage and loss of product. The real problem is the puncturing of the inner, waterproof liner. As noted earlier, fertilizer must be protected from moisture, so the bags have an inner waterproof liner. Once this liner is punctured, moisture can readily enter the bag, causing severe caking and physical loss of quality, in addition to the physical loss of fertilizer. This damaging effect continues after leaving the port or factory throughout the system of handling and storage, right up to the time that the fertilizer is used by the farmer. It is then very important to the receiving country that bagged fertilizer *should not be handled with hooks.*

In considering how to stop hooking, we must start by recognizing:

1. Hooking is a very efficient way of handling bags.
2. Picking up 50-kg bags manually is difficult.
3. Handling 50-kg bags is very hard physical labor.

If we had to do this job ourselves, we would find it much easier to pick up bags using hooks in the hold of a ship than without them. In order to eliminate hooking, it is therefore necessary to compensate for the increased difficulty. More men per gang will be required to handle at the same rate. Alternatively, extra payment or lower targets may be necessary. A slightly higher cost of handling will then have to be accepted, but this should be more than compensated by a reduction in fertilizer damage and losses, both in and after leaving the port.

The attached article (Appendix I) tells how a USAID logistics officer in Bangladesh in the early 1980s managed to eliminate hooking of fertilizer bags in Chittagong port. This has become Bangladesh Government policy for all products. It is important that any such action must have official and continuing support. It is very easy for hooking to creep back in if management relaxes its efforts.

5. Bag Types

5.1. Introduction

Accepting a weight of 50 kg fixes the volume of the bag, but there is still an almost unlimited range of options in terms of materials of construction, form of the materials (thread, tape, sheet, etc.), treatment of materials, strength, shape, use of liners, types of liners, surface treatment, closure of bags and liners, printing, etc. We will consider the main options.

5.2. Materials of Construction

A wide range of materials is used for construction of fertilizer bags, including jute, cotton, polypropylene, polyethylene, polyvinyl chloride (PVC), and paper. These may be used singly or in almost any combination.

The most commonly used materials for constructing fertilizer bags are jute, woven polypropylene (WP), woven polyethylene (PE), PE film, and paper. Bags produced from these materials have been developed with regard to practical requirements of strength, resistance to damage, cost, reuse value, ease of handling, and availability of raw materials. Frequently, a combination bag is used; this generally consists of an outer bag with a liner of polyethylene film. Combinations of materials may also be used. In woven bags, the warp may be jute and the weft polyethylene. "Single" film materials may be co-extruded with different materials or different types of polymer of the same material, e.g., a polyethylene two-layer co-extrusion may have a UV-treated and a low-slip layer on the outside and a high-slip material on the inside.

5.3. Methods of Construction

Bags have traditionally been produced from natural fibers and woven materials and, more recently, from plastic materials which are heat extruded to form tubular film. This tube may be used as such or cut into thin strips, which are processed into woven material.

Bags are produced as a true tube in the case of most single-film plastic bags, and also for circular woven bags. These have an advantage in not having a sewn side seam, which can be a source of weakness. Otherwise, bags are made from a flat sheet, which is folded and the seams then made in the side and bottom. The seams may be joined by sewing, gluing, or heat sealing.

The woven materials for bags use a weave of specified weight and strength. Bags made from natural fibers, such as jute or cotton, use fibers which are roughly circular in cross section. Woven synthetic materials, e.g., polypropylene or polyethylene, are usually woven from flat tape or ribbon. Woven types have the ability to close up or "self-heal" to some extent after being snagged or hooked.

Many fertilizer bags are fitted with liners and these are discussed in a later section.

The most common type of bag for fertilizer use is the open-mouthed pillow bag. Pillow bags are most commonly made from jute, woven polypropylene, woven polyethylene, or single-film polyethylene; gusseted bags are usually of polyethylene or paper. Construction varies, with the most common being sewn seam for jute; sewn seam or tubular weave for woven polypropylene or woven polyethylene. Polyethylene film bags and liners are produced as an extruded tube, heat sealed at one end. Other construction methods may be used, such as pasted square bottoms for paper bags or heat-sealed square bottoms for PE bags. This type of construction offers the advantages of a square-ended pack which stands and palletizes well.

A recent interesting development is the "form and fill" process. In this process, two reels of flat PE film are fed into a rectangular former in a filling machine. The weighed fertilizer is filled between the two films, which is then sealed around the former. This produces a pillow-type bag which is heat-sealed around all four sides.

5.4. Shape of Filled Bag

Many bags are of the "pillow" type, sealed or sewn across both ends.

Others have folds or gussets, which may be in the bottom or in the bottom and sides. Gusseted bags are generally of polyethylene or paper construction. After filling, the gusseted bag has a square-sided configuration. This gives compact and stable stacking. The bag also stands more conveniently in use. Bags with a gusseted base or manufactured with square ends (usually PE and paper) are also termed "block bottom."

The bag corners may also be mitered by being sewn or sealed across the corners before filling. This gives a more square corner and eliminates the ears, which are liable to damage during handling.

5.5. Valved Bags

A special type is the valved bag or "valve pack." This type of bag is usually constructed of paper or polyethylene film and has an opening, generally at a corner, with an internal flap or labyrinth valve which acts as a self-sealing closure after filling. The paper-valve bag may have an external flap or spout which is manually tucked in after filling. An adhesive patch may also be used to seal the valve after filling. Machines are also available for PE bags which can heat seal the valve after filling. Although valve bags are more expensive than the open-mouthed type, they are attractive for production because they eliminate the closing operation after filling. Valved bags are generally not recommended for use in developing countries for the following practical reasons:

1. Easy access for pilfering or adulteration.
2. Spillage during handling (sifting from the valve).
3. Entry of moisture.

5.6. Aspect Ratio (or Shape)

Aspect ratio is the ratio of width to length. Accepting 50 kg as the standard weight of material we wish to package, and a particular type of construction, what "shape" package do we use? Any aspect ratio might be used, implying an infinite number of choices. Our choice, however, is limited by some very practical requirements of our handling system; i.e., what shapes can be palletized, stacked, shipped, and handled efficiently and economically? Consider aspect ratios of 1:1, 1:2, and 3:2 (Figure 1).

1:1 results in a square bag which is awkward to handle and stack. Secure stacks cannot be made since interlocking of bags is difficult (Figure 1A).

2:1 results in a rather elongated bag configuration with limited stacking and palleting patterns available (Figure 1B).

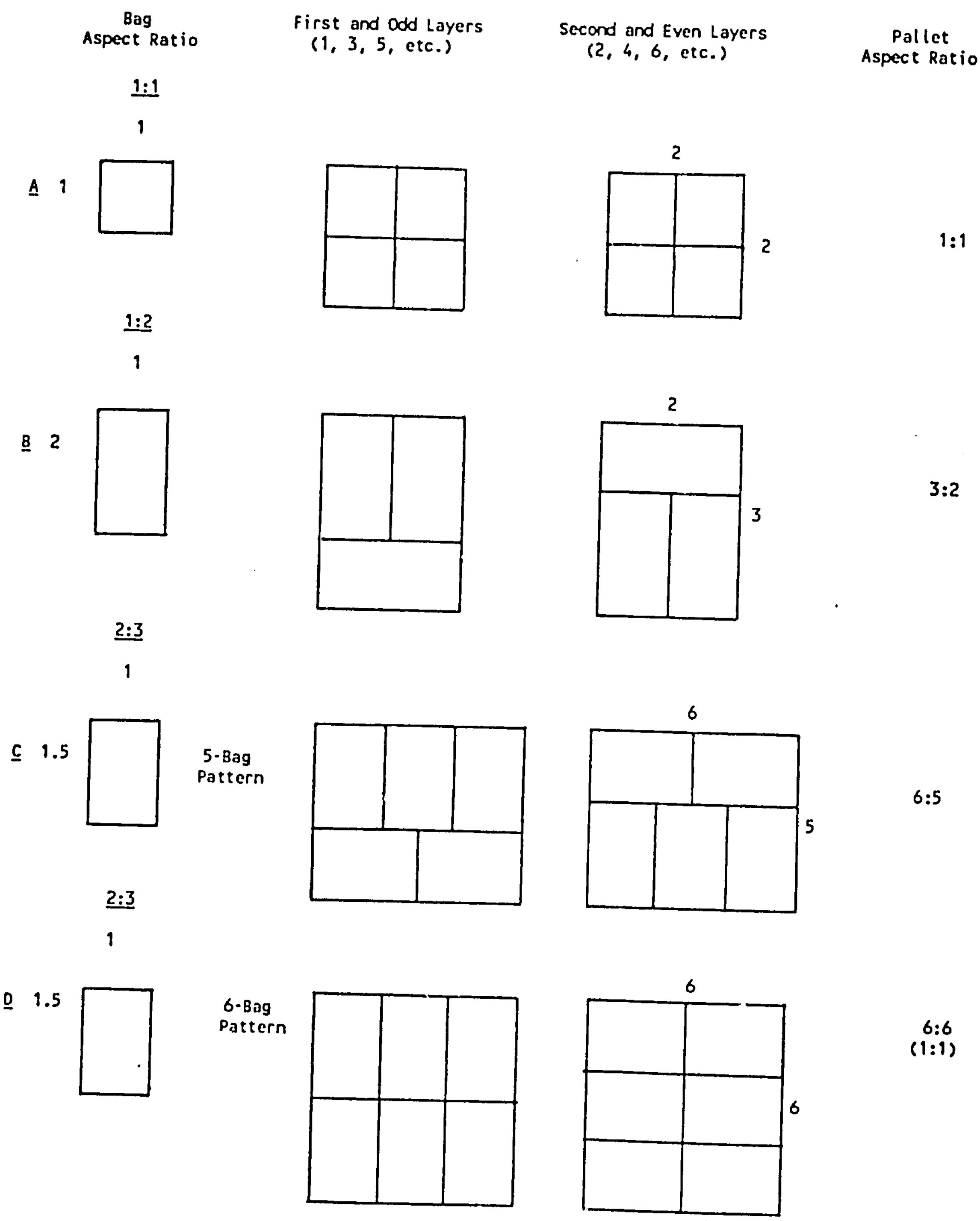
3:2 is the most commonly used ratio, yielding fairly economic use of materials and good stacking and interlocking characteristics (Figure 1C). The second layer is turned 180°, the third layer is the same as the first, and so on. A pattern of five bags to the layer and four bags high results in a unit of 1 ton or six high for 1.5 tons. When considering the *interlocking* and relative stability of block stacks using each of these patterns, the 3:2 ratio has definite advantages. A pinwheel stacking pattern is sometimes used. This is quite space efficient, as shown in Figure 2.

It should be remembered that fertilizer is very often stacked in these types of pallet patterns when in storage, even though not actually on pallets. Correct aspect ratio is then of importance to ensure a well made and stable stack.

The rectangular five-bag pattern shown in Figure 1C is standard, particularly for palletized fertilizer carried on road trucks. The square six-bag pattern shown in Figure 1D gives good interlocking and might be preferred to the "standard" five-bag pattern. Why is the six-bag pattern not used for transport? Some simple calculations may give the answer.

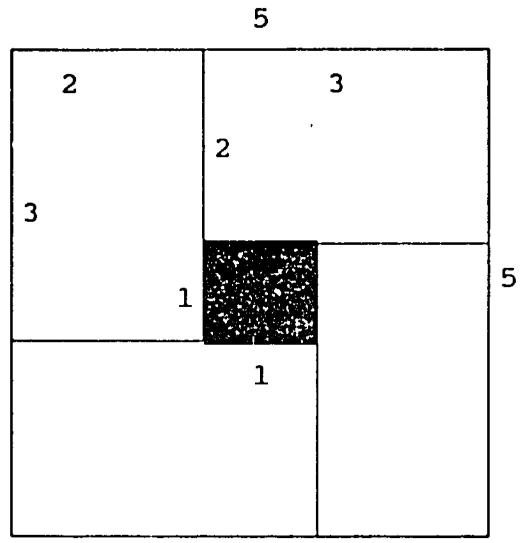
1. Assume a 50-kg packed bag size of 55 cm x 83 cm (2:3).
2. A five-bag pattern is 1.38 M x 1.65 M (5:6).
3. A six-bag pattern is 1.65 M x 1.65 M (6:6).

Figure 1. Aspect Ratios and Pallet Patterns



For B, C, and D, alternate layers are stacked in different directions to achieve interlocking.

Figure 2. Pinwheel Pallet Pattern



Unused area, 1 in 25 = 4%

Alternate layers are stacked in alternate directions to achieve interlocking.

4. Transport regulations allows a 2.5 m truck platform width, with a load overhang of approximately 0.25 m on each side, for a maximum load width of 3.0 m.

It is then clear that two six-bag pallets cannot be carried side-by-side on the truck (3.3 m) while two five-bag pallets at 2.76 m are a comfortable fit.

If it is necessary to make the best use of a defined space for palletized material, such as in filling an ISO container, firstly there are a limited number of pallet sizes which will fit into the container efficiently. Then there are a limited number of interlocking pallet patterns which can be used. It is quite possible that the standard bag size will not fit efficiently with mechanical (palletized) handling and the bag size may have to be changed.

5.7. UV Protection

Fertilizer bags will be exposed to sunlight during transportation and storage operations and require protection from the ultraviolet rays present in sunlight. Ultraviolet (UV) radiation causes *rapid* deterioration of untreated polyethylene and woven polypropylene materials, resulting in failed bags and lost fertilizer.

It is essential that UV stabilizers or additives are used to protect against UV damage. Commonly used additives are carbon black, CYASORB UV531, cadmium yellow and other pigments. Tests have shown that bags can be safely stored outdoors for over 12 months when treated with these stabilizers, although uncovered outside storage *is not recommended. It is always advisable to cover bags stored outside to protect against both UV attack and rainfall.*

The cost of full UV stabilization is only around US 1¢/bag. (See attached copy of telefax from Zakkencentrale, Appendix II.)

Full UV stabilization should be included in any specifications.

6. Bag Liners

Liners are normally made from polyethylene film and are essential for many fertilizers in order to reduce moisture pickup. They may serve three main purposes:

1. To retard pickup of moisture.
2. To prevent sifting and loss of fine particles.
3. To prevent contamination.

It is important to realize that although the liner may be considered waterproof, it is in fact a semipermeable membrane, which allows water vapor diffusion through the film. The rate of diffusion is:

1. Proportional to the difference in relative humidity outside (RH of the air) and inside the bag (CRH of the product).
2. Proportional to the area exposed.
3. Inversely proportional to the thickness of the liner.

In practice the rate of moisture pickup is very low, but it is important to realize that a sealed liner does *not* give a hermetically sealed package.

The USAID specification for WP bags with a PE liner requires a liner thickness of four mil[1] or 0.1 mm. A thickness of 2 mil is fairly common. Bags with laminated liners may go down to 1 mil or 0.025 mm. The best protection against moisture pickup is given by single-film polyethylene bags, commonly around 7 mil or 0.175 mm.

Liners are usually made from tubular extrusions of polyethylene and may be placed loose in the bag ("cuffed"), laminated to the outer bag by gluing or by heat, or may be sewn into the outer bag. Some are gusseted and almost all are heat sealed at the bottom. A

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[1] 1 mil = one thousandth of an inch.

loose liner should be longer than the outer bag to allow for heat sealing, wiring, tying, or folding of the top. It should also be wider than the outer bag in order to be a loose fit inside which will not be stretched and split when the bag is filled.

7. Bag and Liner Closure

7.1. Closing of Outer Bags

Woven types of bags and paper open-mouthed bags for fertilizer are closed by sewing. It is strongly recommended in all cases that the *top of the bag is folded over* before sewing to obtain a strong closure and good sealing.

This is particularly important with bags with laminated liners, which have a smooth inside surface. Turning over the top not only gives a much stronger closure, but more important, it minimizes entry of air and moisture (leading to caking) through the top of the bag. It also avoids loss of fertilizer. When sewn unfolded, the stitches and the gaps between the stitches are visible from the top of the bag. During manual handling, small quantities of fertilizers trickle out from these gaps, causing dirty handling conditions and damage to facilities.

Single-film polyethylene bags are closed by heat sealing. These bags have pinholes in the sides or ends which allow escape of trapped air after packing, usually assisted by bag squeezers or flatteners. The pinholes are carefully designed and located so that air can be released while preventing moisture from entering the bag. A typical arrangement might be 4 x 1 mm holes punched through the empty bag at each end, 10 cm from the end and 10 cm apart. This has been found to release air satisfactorily but to allow little entry of moisture. Holes in the contact areas of the bags may be affected by capillary action or "wicking" of water between bags.

7.2. Closing of Liners

The best closure for a polyethylene loose liner is heat sealing, but this requires additional equipment and significant additional handling and cost. Other alternatives include tying with string or wire, rubber bands, or simply folding or tucking without tying.

The tendency is to use the simplest method, which is folding or tucking, but it is very difficult to ensure that this is done properly on a regular production basis. It is also important to ensure that as much trapped air as practicable is expelled to prevent ballooning of the sealed bag, which can result in unstable stacks or burst liners.

Where the liner is laminated to the outer bag, as with the jute bag and woven polyethylene bag in India or with the "export" bag with a sewn-in loose liner from Europe, *it is important that the top of the bag is folded over* before sewing to obtain a satisfactory closure as noted above.

7.3. Importance of the Sewing Thread

The type of sewing thread to be used requires very careful consideration. Factors to be taken into account include the material of the bag, whether hand or machine sewn, type of sewing machine, type of stitching used (e.g., chain, lock, overhead, etc.), product, and handling and storage methods to be used. Clearly, the stitching must not be the weakest link in the chain, allowing the top seam sewn during filling to fail during handling, either initially or after aging in storage. Similar considerations apply to the side and bottom seams made by the bag manufacturer. The seams and sewing thread come under greatest strain when a bag is dropped or otherwise roughly handled.

Commonly used threads include natural fibers; e.g., cotton and jute, or synthetic fibers, such as viscose rayon, nylon, polyester or polypropylene, or blends of these, e.g., nylon/cotton.

The synthetic fibers are generally stronger than the natural fibers and less susceptible to natural decay or chemical attack by the fertilizers. They may, however, require different sewing techniques or special lubrication or finishes to reduce wear and ensure smooth operation of the sewing equipment.

The closure must also be able to withstand any conditions to which the bag will be exposed. It will be noted in the USAID Specification (Appendix III) that the UV stability test covers both the bag material *and* the specified polypropylene sewing thread.

On overall performance, the best sewing thread may be polyester, because of its high strength and high resistance to UV and chemical attack. Synthetic materials are generally better for the filling operation because they are less likely to break than the natural fibers.

8. Damage Levels and "Shrink"

A commonly quoted level of damage or "shrinkage," when speaking of handling systems for bagged materials, is 1% per handling operation. *This level is far too high, unrealistic, and totally unacceptable.* Damage can be reduced mainly by proper management and supervision throughout the system – from specification of packages through the packaging operation, transport, handling, and warehousing. Damage must be monitored, measured, costed, responsibility assigned, and reported to management. The goal should be to reduce loss throughout the *whole* system to a level of less than 1%.

Damage can result from many actions in the handling system. The most common damage/loss occurs through bags torn by using hooks in handling operations, causing both physical loss and deterioration in quality. The bags and, hence, the fertilizer may also be damaged by various other problems: Faulty bags – either wrong specifications or poor construction; faulty packaging – inattention to detail in closing or filling bag; cuts and tears – from dropping, handling, conveying, or use of hooks; seam failure – from poor heat seal, faulty sewing, poor quality thread, or imperfections in weave; water damage – from atmospheric moisture (humidity) or from exposure to rain or other source of water; and knocks and dirt – from storage environment.

Prevention of all these types of damage is possible through attention to each component in the handling system to ensure that the proper bags are used and that they are properly closed, handled, stored, and transported. This is an extremely important management function.

9. "Loss" and "Damage" Costs

It is very important to be clear as to what is meant by damage, and more particularly "loss." Most so-called losses are inaccuracies of measurement and, in some cases, theft. Damage is not necessarily a loss, because the contents of a damaged bag might all be recoverable. *True loss is only that quantity which is so damaged as to be unusable or irrecoverable.* If, in packing an import shipment, all bags are 1 kg overweight, a 2% shortage is assessed. This is not, however, a true loss. Even stolen material is not a true loss to the agricultural system. All such apparent and real losses should, of course, be identified and minimized. Damage of 1% may involve only 0.1% true loss or spoilage (plus costs of recovery and bags for repacking).

On a throughput of 1 million tons/year at $200/ton, the turnover is $200 million. "Loss" of 1% or 10,000 tons represents $2 million. Saving only 0.1% of throughput represents $200,000; therefore, the effort and expenditure to control and reduce damage is very well worthwhile.

10. Specifications

The importance of proper packaging specifications to both buyer and seller is self-evident. Specifications must not only be technically satisfactory but properly "managed" by the fertilizer manufacturer by strict inspection and control of packages, as supplied, and by strict control and checking of the packaging process. A sample specification provided by USAID is attached (Appendix III). A *manufacturer's specification* is also attached

(Appendix IV). A *buyer's specification* will be much more detailed and covers many specific requirements. The buying contract should also cover delivery inspection.

The basic specification should cover requirements of size, material of construction (including thickness and strength, warp and weft for woven materials), type of construction, construction of seam, type of sewing thread and stitching, liner, anti-slip treatment, UV inhibition, anti-static treatment, surface finish for printing, method of supply (number per bundle, whether on pallets, etc.), testing methods, inspection, and acceptance procedures. Altogether, expert advice is needed.

Incorrect specification, acceptance of poor quality or substandard bags, or changes in features, such as fabric strength or the kind of sewing thread used, can cause enormous problems throughout the system. For example, severe problems are sure to arise from a poor side seam or end seam. It is also important in the distribution chain that the material strength of single-film polyethylene is adequate, and that the heat seals are well made – both the bottom seam made by the bag manufacturer and the top seam made by the producer.

When purchasing fertilizer, before writing one's own package specification, it is advisable to obtain a copy of the prospective fertilizer *sellers' package specifications* for shipments to other markets. This procedure could enable development of a more realistic package specification, which the seller could much more easily meet with benefits to both parties.

11. Common Types of Fertilizer Bags

As discussed earlier, a wide range of sizes, materials, and methods of construction is possible for fertilizer bags. The most common size is 50 kg and a small number of common types have evolved. The principal characteristics of five of the most commonly used types are as follows.

11.1. Jute With Polyethylene Liner

Considerable development of jute bags has been carried out by the Indian Jute Industries Research Association (IJRA), particularly the jute sack with a bitumen laminated PE liner of around 1-mil thickness.

Jute bags in the correct weight and weave are strong, handle and stack very well, and have excellent reuse value. Jute has poor chemical resistance and is susceptible to attack by acid phosphates (SSP & TSP).

11.2. Woven Polypropylene or Woven Polyethylene With Polyethylene Liner (WP/PE)

These are the most widely used shipping or "*export*" packages. They are relatively expensive and very strong but can be slippery, resulting in unstable stacks, unless some anti-slip treatment is used. These bags have good resistance to most fertilizer chemicals; they are nonabsorbent, and shed moisture well. The relatively rough texture causes them to be abrasive to handlers' hands. Excellent reuse possibilities exist for these bags.

The polyethylene liner may be loose ("cuffed"), or sewn in. Laminated liners are not common. A fairly recent development in Europe is toward an unofficial "standard" type of bag for export fertilizer, produced in very large numbers by bag merchants, offering advantages in cost and ease of filling. This is a woven polypropylene bag with a loose polyethylene liner which is, however, sewn into both the bottom seam and the top seam around the open bag mouth. The liner is heat sealed at the bottom, just above the stitch holes of the bottom seam.

The sewn-in liner type offers benefits for production, compared to the loose liner, because it is easier to put on the filling spout and the liner cannot collapse into the bag. Some companies are now heat sealing the liner through the outer bag after filling. The seal is below the stitching and does not adhere to the outer bag. This gives what is probably the best all-round package on protection and performance.

11.3. Woven Polyethylene (PE) With Laminated PE Liner

This has developed in the past few years, particularly in India, but is used in a number of countries. The PE outer layer is not as strong as polypropylene but is still adequate and cheaper. The bag turned out to be popular with farmers for its reuse value, not so much as a bag but for making waterproof sheets.

With its smooth internal finish, it is important that the top of this bag should be turned over before sewing to minimize entry of moisture.

11.4. Single-Film Polyethylene

These bags are widely used in the United States and Europe for domestic shipments and sometimes for export. The film thickness determines the relative strength of the package. This package is most secure against pilfering or adulteration, sheds water well, and has good stacking properties. It is better, in fact, than most people assume – better than woven polypropylene, for example. It is also stronger than is generally assumed, although it is easily cut or slit by sharp objects or rough surfaces. This, in fact, turns out to be an unexpected advantage, since this very strongly discourages hooking.

These bags have been made from linear low-density polyethene (LLD) which has been noticeably improved in strength over the years. Recent developments of highly or ultra-linear polymers (ULLD) give even greater strength and resistance to tearing.

11.5. Multilayer Paper

This type of bag can be custom tailored to the required strength by varying the number of layers and the material of the various layers. It handles and stacks very well. A polyethylene film liner is usually laminated to the inner layer as added product protection. Paper bags are resistant to atmospheric moisture (humidity) but easily spoiled when wet.

12. Bag Costs

It is not possible to give more than cost indications, because of variations in costs of raw materials and differences in specification or quality.

The approximate cost of pillow-type 50-kg bags for urea is as follows:

	Approximate Cost
Jute with loose PE liner	$0.40-0.45
WP[a] with loose PE[b] liner (cuffed)	0.35-0.40
WP with laminated PE liner	0.30-0.35
WP with loose, sewn-in liner	0.35
Woven PE with laminated PE liner	0.25-0.30
Single-film polyethylene	0.20-0.30
Paper (4 ply)	0.35-0.40

a. WP = woven polypropylene.
b. PE = polyethylene.

The smaller bags required for higher density products, such as DAP, TSP, and potash, cost 3 or 4 cents less than the above prices.

Gusseted bags cost around 5% more. Valved bags cost 25%-30% more than the plain types.

Close attention must always be given to package quality and costs. Underpackaging, i.e., having an inadequate package, can lead to excessive costs for losses and damage. Overpackaging – having a package of an unnecessarily high standard – creates too high costs for the packages themselves, although this may benefit the farmer in reuse value.

Reuse value is of importance to the farmer. If reuse value is taken into account, the best overall package on cost and performance grounds is woven polypropylene with a PE liner (a resale value of 20¢/bag has been quoted). If the manufacturer does not take resale value into the equation, another type will be chosen.

The significance of package costs is sometimes overlooked. If an organization is handling 1 million tpy, at $0.40/bag, the bill for packages is $8/ton or $8 million/year. A reduction of only 1 cent (2.5%) in package cost is $200,000. Packaging costs could be reduced by reducing the size of the existing bag (is it too long?), or by reducing the thickness or strength of the material (is it too strong?), or by changing to a different bag? It would seem that a reduction in length or strength equivalent to 2.5% of package cost would be easy to achieve. Costs are, however, always a balance, as indicated in "Underpackaging." If the "saving" of 2.5% in package cost causes additional product losses and damage of only 0.1% at $200/ton, this overcomes the package saving of $200,000.

13. Selection of a Package

In selecting a package, many technical factors, costs, and marketing (customer) considerations must be taken into account. Availability of raw materials may be the deciding factor, as with jute in India and Bangladesh. Debits and credits for each package type cannot merely be summed. Different weightings and cost consequences apply in each specific situation and management judgment on the balance of factors is necessary. Where a change is made in packaging, perhaps to reduce costs, field trials should be carried out to assess performance in the specific handling system and to obtain customer reaction.

Let us all remember we do not yet have a perfect package for all conditions and should always be looking out for ways of improving packaging effectiveness, whether this means lower cost for the same performance or better performance for the same cost.

14. Management and Control of the System

It is suggested that in a larger system, a *Packages Manager* is an economic investment, as indicated by the potential for savings in the section on "Damage Costs." He is also essential for proper coordination and optimization of departmental interests throughout the system. In a company manufacturing and marketing fertilizers, package specifications and performance are of prime interest and importance to:

1. Purchasing and Supply departments.
2. Production.
3. Distribution and Warehousing.
4. Marketing.
5. Customers.

Any change that is beneficial to any one of these functions could have adverse effects in other parts of the system.

The Packages Manager should then be expert in his field, operate as a specialist, and monitor and coordinate the total system, including:

1. Package specifications and procurement.
2. Inspection and quality control of packages received.
3. Packaging methods and production performance – sewing, sealing, weights, etc.
4. Transportation, handling, and warehousing performance – handling methods and problems (particularly damage level and losses).
5. Customer claims.
6. Development – awareness of new materials and methods.
7. Monitoring of the balance of overall cost, loss and damage levels.

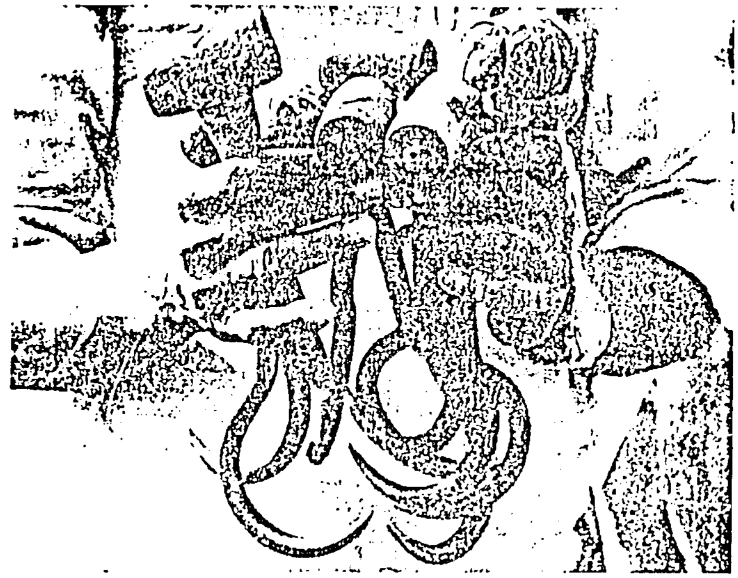
The packages expert (manager, advisor, or coordinator) may be a handling engineer or work in conjunction with a handling engineer. He should repay his costs many times over in:

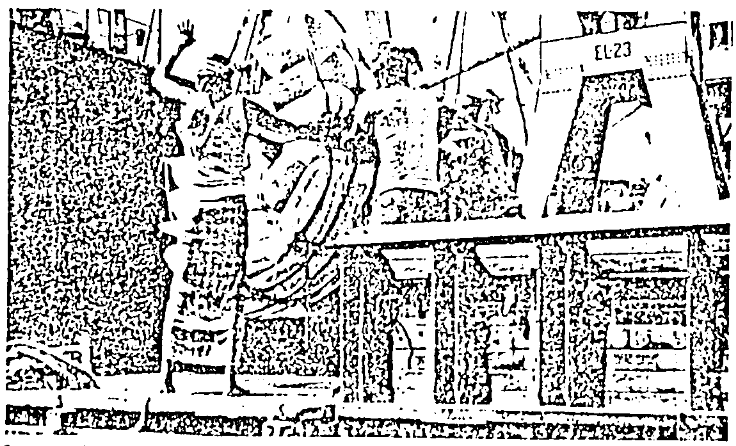
1. Reduction of package costs and damage levels.
2. Elimination of the majority of production packaging problems.
3. Improvements in quality of product delivered to customers (customer satisfaction).
4. Reduction of customer complaints and compensation claims.

Appendixes

I. USAID Article
II. Zakkencentrale Telefax on UV Stabilization
III. Manufacturers' Package Specification
IV. USAID Package Specification

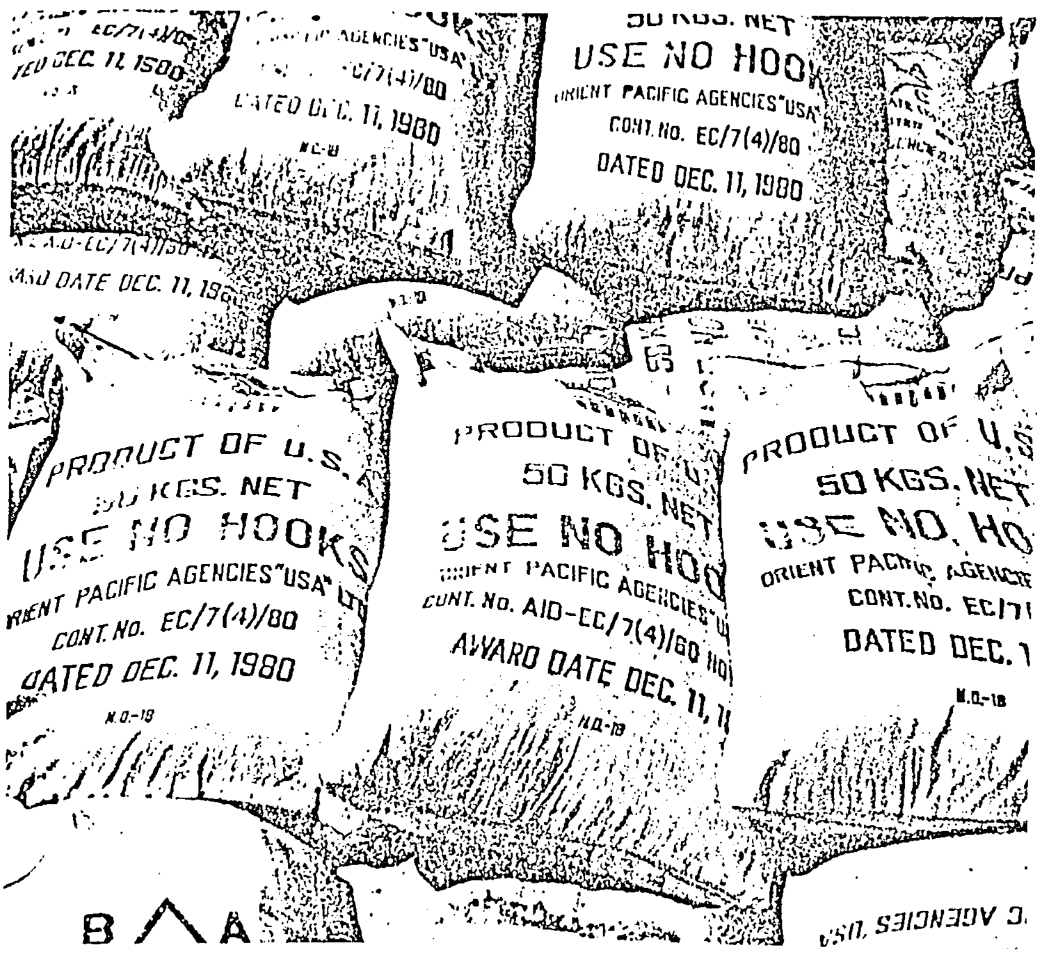
AID suggestion will help Bangladesh save millions





Stevedores' hooks were the culprits that caused extensive fertilizer loss in Bangladesh. Thanks to AID officer Paul Maddy and his staff at the mission, hooks are outlawed on the docks. Instead, workers are teaming up to load bags by hand into rope slings which swing over the ship's side and onto platforms at truck bed height—another improvement. Workers do not lift the heavy bags any higher than waist level.

'Use no hooks' policy may save millions



by Alexanderina Shuler

Who would dream that small holes in fertilizer bags could cost as much as $5 million a year and could make a difference whether a lot of people went to bed hungry or adequately fed?

It's very real, AID's Paul Maddy says emphatically. He's all too familiar with the problem having just successfully completed a two-year effort to do something about it.

Maddy, an agronomist by training, now a logistics officer in the Bangladesh mission's agriculture section, helps monitor and document the movement and receipt of AID-financed commodities. In Bangladesh, fertilizer makes up a sizeable portion of these commodities—1 million tons a year from several international donors at the going rate of $255 per ton. U.S.-financed fertilizer shipments in recent years have ranged from 60,000 to 100,000 tons.

For as long as anyone can remember, stevedores in Bangladesh—like all over the world—have used hand hooks to unload ships. The problem with using them on fertilizer bags is that they puncture the heavy-duty sacks. The hole usually closes up; undetected is the large hole in the inner plastic bag. By the time a bag leaves a ship, it is rolled, tumbled, jerked and otherwise moved innumerable times.

As it continues on its long, rough journey from dock to rice paddy or wheat field, several pounds of fertilizer pellets, which have moved into the wall between the outer and inner bags, have dozens of chances to escape as the bags suffer tears, snags and stretched seams. As Maddy puts it, "Once those pellets get in that wall, they're halfway to freedom. It's a game of who sees Bangladesh first!" He smiles at his humanization of the pellets but the point is well made.

Also, moisture is absorbed, impairing its effectiveness—the chemical properties are adversely affected and the fertilizer clumps, which means it tends to spread unevenly when the farmer puts it on his field.

Whenever possible, spilled fertilizer is swept up and rebagged. Often, the spill goes undetected; only by getting down on one's knees can sprinklings be seen.

Maddy sees the "invisible" docklin fertilizer as food that will never be gr Exactly how much is lost? Weighing bags when they arrive at port and again at final destination would prove leading. Lost fertilizer weight is repla by the weight of moisture picked up a the way. A scientific study would pro accurate figures, but why bother with expense of a study, asks Maddy, when already have enough direct and ind evidence to alert us to the problem?

Maddy figures that if the fertilizer i lost nor its effectiveness reduced—at 2% of the total used in Bangladesh year—40,000 tons or more of grain c be grown. Each year, as fertilizer shipm go up, so does the loss. Forty thou tons of grain is enough to feed 200 people for a year. It's not to say that ple are starving. But it does mean the ernment has to import that much food.

"We just couldn't ignore the situa anymore," Maddy says. The clue to sol the problem was in getting the dock w men to put aside their hooks. Maddy his staff traveled about the country an the ports, spreading an awareness of magnitude of the preventable losses. local-hire member of the staff, Robert G salves, "was especially valuable to work," Maddy notes. "Bob knows pe everywhere and is respected. That was ical to our getting our message across having people accept the changes we posed."

Full of energy and enthusiasm, Gon ves commanded the attention of labo and government officials when he proached them with, "Hooks are snatc food from the mouths of our child Hooks can't produce more rice but f lizer can."

"Workers need to understand what h pens and why, if a problem is to be rected," Maddy says, elaborating on staff's effort. "It's a matter of educat Order someone, 'don't use hooks!' and may get some results, but they'll be tem rary. As soon as the officials are ou sight the hooks will start swinging."

As they went about their work, Ma says the staff became aware of sev misconceptions people held. First, th was the idea that workers don't care would not cooperate. Get tough inste Furthermore, some people insisted ho are necessary to provide rapid unload

One suggestion Maddy frequently heard was a special bag, perhaps with handles on both ends, would help.

Maddy counters that workers do care if they are made to understand why they should care. He maintains that labor leaders told him they would have been responsive to his idea earlier if they had been properly approached.

In response to Maddy's contact with the union at Chittagong port, its chief said, "we like to express our heartfelt thanks to you and AID for your concern to the losses being sustained by the people of Bangladesh due to damage to fertilizer. We are in agreement with any proposal that will help better operations in Chittagong port as well as safeguard the interest of the dock workers." He closed by offering full cooperation.

Maddy says the idea that just because workmen use hooks does not mean they are bad workers was one they encouraged supervisors to keep in mind when they talked with the workers, whose real concern was sore hands. Once the workers were shown they could work without hooks and not get sores—by three people lifting with both hands held flat under a bag—they were cooperative. Labor agreed to rewrite contracts that would specify "no hooks" under any circumstance.

The first two misleading ideas dispelled, Maddy points out that rather than make a special bag that would cost substantially more than the ones now being used, why not use available human resources. The extra hands means a very slight additional cost in comparison to special bags. The money instead goes toward buying more fertilizer.

Finally, Maddy says the rate of unloading actually increased with more men working to load bags into larger net or platform slings. Another misconception disproved.

The idea is not a flash in the pan. Maddy says the government—aiming to meeting its goal of food self-sufficiency by 1984—is institutionalizing the changes. The fact that government, labor and contractors are discussing and negotiating the problem, not only at the docks but throughout the country as the bags of fertilizer proceed in the distribution chain, is good news. As Mary notes, the problem can be solved, as crews in Chalna and Chittagong, where vessels have discharged cargoes without using hooks, have shown.

For his part in the two-year campaign, Maddy last month received AID's Meritorious Honor Award. He's been with AID and the International Communication Agency since 1959. During his 20 years with AID, he's served in Nigeria, Sudan, Liberia, Vietnam and Panama. Prior to that he was a farmer and agriculture vocational teacher in the Iowa public school system. Maddy has bachelor's and master's degrees from Iowa State University.

ZAKKENCENTRALE B.V.
SCHIEDAM - HOLLAND

II

Vervolgblad

We herewith thank you very much for your fax regarding the UV-stabilisation.

In fact UV-stabilisation for PP woven bags can be determined by two well-known testmethods: The American Standard 5804 U.S. Federal Standard 191 and The European Standard ASTM G 5384, which is intended to be also as per CEN (European Committee for Standardization).

At the moment purchases of bags are not mentioning explicit qualifications as to the UV-stabilisation, so that bag manufacturers sometimes add a very light UV-stabilisator, or a too light UV-stabilisator and then the bags are indicated as "UV treated" (instead of UV-stabilized), or they even add nothing to the raw material, whereas also several bag manufacturers have various ways for working up the raw materials with- or without UV-stabilisators. Consequently there are no good rules, nor qualifications as to the UV-stabilisation.

The best solution would be that when buying bags the buyers arrange that an independent control company such as SGS (Société Générale de Surveillance) takes samples from a certain lot of bags and then seals the special bags as well as the lot and then have examined the UV-stabilisation, or another solution can be that the bag supplier guarantees the quality of the UV-stabilisation in the bags which are to be supplied.

As to price comparison we may say that when the woven PP bag with PE inner-liner amounts to US$0.40/bag and a perfect UV-stabilized bag amounts to US$0.41, which will say that per metric ton fertilizer the price for the bags will not amount to US$8.00, but to US$8.20 per ton. Indeed a very small difference in price for let us say a ton of DAP in bulk amounts to US$225.00, and bagging in 50kg bags amounts to USD12.00/ton and bags: 20 pieces of 50kgs UV-stabilized bags will amount to US$8.20/ton, resulting in a total amount of US$245.20. (Instead of US$245.00 for not UV-stabilized bags).

For this small price difference the fertilizer trader and the ultimate user will then receive the fertilizer in perfect condition. This is specially important for countries which are not well-equipped in the receiving ports where it also occurs that the bags are stored in the open-air during some weeks till some months, after which period then a long inland transport has to be effected.

So in general we can tell that, if bags do not comply with the qualities mentioned in the beginning of our letter: 5804 U.S. Federal Standard 191 and ASTM G 5384, the bags are not UV-stabilized.

We hope that we with the above gave you the necessary details as to UV-stabilisation and in case you like more details please do not hesitate to contact us.

Faithfully yours,

ZAKKENCENTRALE B.V.

F. Buise

Copy of telefax of June 1, 1989, from Mr. Frits Buise, Managing Director of Zakkencentrale B.V., to Dr. W. E. Clayton of IFDC.

APPENDIX III
PACKAGE MANUFACTURERS SPECIFICATION

PROPEX^R DATA SHEET

AMOCO FABRICS COMPANY
PATCHOGUE PLYMOUTH DIVISION
1-96

Suggested application - Government Spec Export Chemical and Fertilizer Bags.

Propex 1-96 is engineered to provide a high strength fabric for use in bagging fertilizer and chemicals when prolonged exposure to weather is a necessary consideration.

PROPERTIES	TEST METHOD	TYPICAL	CERTIFIED
MATERIAL		POLYPROPYLENE	POLYPROPYLENE
COLOR		BEIGE	BEIGE
WEIGHT, OZ/YD^2		2.65	2.6 MIN.
UV RESISTANCE STRENGTH RETENTION, %	AFTER 400 HOURS OF EXPOSURE, FEDERAL TEST METHOD STANDARD #191, METHOD 5804	82	>70
TENSILE STRENGTH, LBS.			
WARP		115	105 MIN.
FILL		110	105 MIN.
SLIDE ANGLE, °	TAPPI	27	25 AVERAGE
AIR PERMEABILITY Cfm/FT^2	ASTM D-737	4 - 20	<35
SELVEDGES		TUCKED	

AMOCO FABRICS COMPANY
Patchogue Plymouth Division
Suite 150, 550 Interstate North
Atlanta, GA 30339

Tel. (404) 955-0935

Issued April 21, 1977

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APPENDIX IV

II.B.5: AID-Approved Bagging Specifications - Fertilizer

a. Outer Bags:

(1) Polypropylene Bags

(a) Capacity:

50-kg net or 100-lb. net

(b) Fabric:

Bags shall be made from 100% ultraviolet-stabilized polypropylene resin with a weight of not less than 2.6 oz. per square yard and tensile strength-warp and fill, each 105 lbs. average (10 samples shall be tested in each direction with no single test below 90 lbs.). The color shall be light tan or beige. A colored identification marker (yarn) shall be inserted in the weave by the fabric manufacturer. The identification marker is to be reported to AID.

The fabric forming the top or bottom of the furnished bags shall be a tucked selvedge or a natural selvedge containing not less than the number of ends prevalent in the body of the fabric. Alternatively, the selvedge may be heat cut and formed a minimum of 1-inch wide with a minimum of 20 warp threads per inch.

The fabric must be woven to a construction tight enough to prevent excessive product sifting in the event bag liner failure occurs. All permeability of the fabric in an unstressed state should not exceed 100 cubic feet per minute per square foot.

The bottom seam is to be flat sewn in accordance with Federal Standard 751a, SSa-1, regardless of heat cut or tucked selvedge fabric. The side seam "export" type shall be in accordance with Federal Standard 751a, SSd-1. Bags shall be turned so seams are inside. The sewing thread shall be U.V. stabilized, polypropylene nominal 1000 denier with test strength of 5 grams/denier. There is no thread color requirement.

(c) Test Methods:

Ultraviolet Stability Test--Material and thread must have not less than 70% strength retention after 400 hours exposure in weatherometer. The U.V. testing-weatherometer exposure method is 5804 Federal Standard 191. Tensile strength--ASTM Method D-1682 (Grab Method). Permeability--ASTM Method D737-67.

(2) Jute Bags

(a) Capacity:

50-kg net or 100-lb net.

(b) Fabric:

New fabric shall weigh 9 ounces per square yard (305 grams per square meter) 11 porter into 12 shot Hessian, or heavier.

b. Liner (Inner Bag)

Inner loose tubular liner shall be of 4-mil polyethylene film having an impact resistance of 165 g cm. The film shall be of low-slip plastic (Kinetic coefficient of friction 0.8 m/s maximum). The liner shall be heat sealed at the bottom.

(1) Test Methods

(a) Thickness--ASTM, D374

(b) Impact Resistance--ASTM, D1709

(c) Kinetic Coefficients of Friction--ASTM, 3028

c. Methods of Closure

(1) Outer bag: Top seam stitching shall be a minimum of one inch from the selvedge. The outer bag shall be sewn above--not to the liner.

(2) Liner: The polyethylene liner shall be closed at the top by one of the following methods after exhausting the excess air:

(a) Heat sealing.

(b) Mechanically applied acid-resistant clip of 0.150 inch minimum diameter (9 gauge) completely circling the polyethylene liner to hermetically seal it.

(c) Mechanically applied bag tie 4-1/2 inches long, plastic-covered wire with a 3/8-inch inside loop on each end. The wire shall be a minimum of 17 gauge before being covered with plastic to a minimum of 16 gauge.

WORKSHOP ON
EFFICIENT MARKETING OF FERTILIZERS IN CAMEROON

MARCH 28 - APRIL 8, 1994
BAMENDA, CAMEROON

FERTILIZER STORAGE

BY

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SPONSORED BY
THE FERTILIZER SUB-SECTOR REFORM PROGRAM
(TECHNICAL SUPERVISORY COMMITTEE AND USAID/CAMEROON)

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WAREHOUSING: LOCATION, SIZING, TECHNICAL ASPECTS[1]

Why Warehouse?

Ideally, fertilizer should move from the point of production or import directly to the retailer or consumer on a regular basis, without any intermediate handling or storage, and preferably as a full load in the transport vehicle. The consumer or retailer would then store the product, with offtake seasonality determining the rise and fall in stock levels.

In practice, this ideal is not attainable but should still be retained as a target and a key objective. We should still plan to move fertilizer through the system on a regular basis throughout the year, as far as possible towards the point of final use for storage. The key level for storage and redistribution for marketing purposes is then likely to be at the district level. The district warehouses may then serve as transit certers from where material is transshipped, preferably directly to the retail level (retailer or co-op).

Because of predictable variations in consumption patterns and uncertainties in the supply system, it is therefore necessary to maintain a network of such warehouses serving as intermediate storage.

2. Location

A variety of factors may be quoted as criteria in selecting locations for warehouses. One such group is as follows:

Theoretical Approach to Selecting Warehouse Locations

2.1. Proximity to market area.

2.2. Locate in areas allowing the least freight expense.

2.3. Ready availability of onward transportation, utilities and labor.

2.4. Areas affording the lowest tax and insurance rates.

2.5. Locate in the proximity of the least expensive mode of transportation and supply route.

----

1. Prepared by W. E. Clayton, Transportation/Distribution Specialist, IFDC, Muscle Shoals, Alabama.

2.6. Avoid areas susceptible to natural disasters.
2.7. Locate in areas affording the best security and law enforcement protection.

Most of these, however, are unrealistic or of only academic interest in the real-life situation in a developing country. The principal determining factor is obviously the need to be located centrally in a major offtake area. The next is to be located on a major supply route. In almost all cases, this location is the only major town in the entire area. It is the communication center, the center of administration, and the focus of agricultural activities. The major locations thus effectively select themselves. The exact siting at the selected location is much more difficult and requires further detailed onsite study. As far as possible, the warehouse should be served directly by the primary transportation mode, usually rail or barge, but availability of land at such favorable locations is likely to be very limited, and transshipment may be necessary.

Practical location factors may then be outlined as follows:

Practical Approach to Selecting Warehouse Locations

1. Locate in a principal demand area.
2. Locate on a major supply route.
3. Serve directly by primary transport (i.e., make road, rail, and/or water connected).
4. Consult local experts.

3. Sizing

Many factors are involved in determining the required capacity. They may, however, be broken down to three principal items:
3.1. Offtake Pattern.
3.2. Supply Pattern.
3.3. Safety Stock.

We have previously stressed the importance of an accurate and reliable demand forecast. Definition of the offtake pattern on a monthly basis, with projection for the required number of years ahead, takes into account factors such as seasonality, types of product, availability of transport and the marketing situation, present and future.

Supply is hopefully on a fairly regular basis, but must be defined as well as possible, taking into account all production, import and transportation variables and probabilities.

Safety stock is decided as a consequence of the first two factors and is laid down largely as a policy matter, but based on experience, judgment and calculation of supply and offtake probabilities on as simple or sophisticated a level as required. Account must of course be taken of factors such as availability of alternative hired accommodation to cover peak requirements, or use of temporary outdoor storage. In Bangladesh this has been up to five months for some locations but this level is now being reduced.

It will then be appreciated that sizing of a warehouse requires consideration of the overall supply, distribution, and marketing system, as well as local features. Calculation of storage capacity is considered later.

4. Types and Construction Costs

We will not go into great detail, but will recognize principal types of structure, divided very generally as follows:

4.1. Permanent Structures--Reinforced concrete (RC) foundations and flooring with built-in waterproof layer. RC beam or steel frame structure, with brick walls, asbestos or corrugated iron cladding. Roof of concrete slabs or steel frame and corrugated sheeting. High capital but good long term investment. As provided under USAID programs in Bangladesh.

4.2. Local--May be concrete or brick flooring, brick or corrugated sheet sides and corrugated sheet roofing with steel or wooden frames. A good investment in the intermediate and smaller size ranges.

4.3. Village--Great variety. Concrete, brick, or mud flooring, walls of local brick, corrugated sheeting or wood. Roof of corrugated sheet or tile, usually on wood frame.

4.4. Outdoor Storage--Requires sound, well drained base and dunnage platforms (such as pallets). Cover with double waterproof sheets, tarpaulins or plastic. Secure with net, ropes or weights.

This option should not be overlooked for storage to cover peak demands or for emergency. With proper management, there is no significantly greater loss or damage. Minimal costs.

Construction costs are both type- and country-specific. A reinforced concrete, permanent-type structure in the United States currently costs around \$250/m^2 or \$23/sq. ft. The USAID warehouses in Bangladesh are around the same level. A locally designed and constructed warehouse seen recently in India, with concrete floor, brick walls and corrugated sheet roofing, cost \$87/m^2 or around \$8/ft^2.

5. Corrosion

Almost all fertilizer materials are corrosive to some degree. Water is the most important factor in enhancing corrosion effects and it is therefore of the greatest importance to minimize this effect by keeping fertilizer and water (as liquid or as vapor in humid air) as far apart as practicable by:

5.1. Correct design.

5.2. Use of correct materials.

5.3. Proper operation.

We generally have little control over the first two, but should be able to do something about the last. Roofs and drainage must be kept in good condition. Any water or spillage should be cleaned up immediately. Control of humidity is of critical importance and is discussed in the following section.

It should be appreciated that we are concerned with protection of both the warehouse and the fertilizer.

Using care and common sense in the selection of materials of construction avoids many problems. For example, concrete floors should be resistant to fertilizer materials, particularly ammonium nitrate, and should have a dampproof course to protect against rising ground water. Steel should be well protected with suitable paint. Fittings for corrugated roofs should preferably be of stainless steel, although ordinary steel roof trusses have given long and satisfactory service in fertilizer warehouses in port locations. Steel frame structures with corrugated sheet cladding can give satisfactory service, although the bottom of the walls tends to corrode. This can be overcome by making the lower sections of brick or concrete.

6. <u>Ventilation</u>

This is a critical factor in storage under tropical conditions because of the potential for pick-up of moisture by the fertilizer, with subsequent deterioration of physical quality. The significance of ventilation is often not appreciated in both design and operation of warehouses.

The controlling factor is the <u>Critical Relative Humidity</u>, or CRH of the fertilizer. This may be broadly defined as the value of the relative humidity (RH) of the atmosphere, above which the fertilizer will pick up moisture and below which it will not (and if wet, may lose moisture). Some CRH values for commercial fertilizers and their mixtures are shown in Figure 1.

In addition to the value of CRH as an indicator of moisture pickup, factors such as solubility and tendency to caking also play an important part. As we know, urea is more susceptible than DAP or MOP to the effects of moisture because of these factors. It is also the material handled in the greatest quantities.

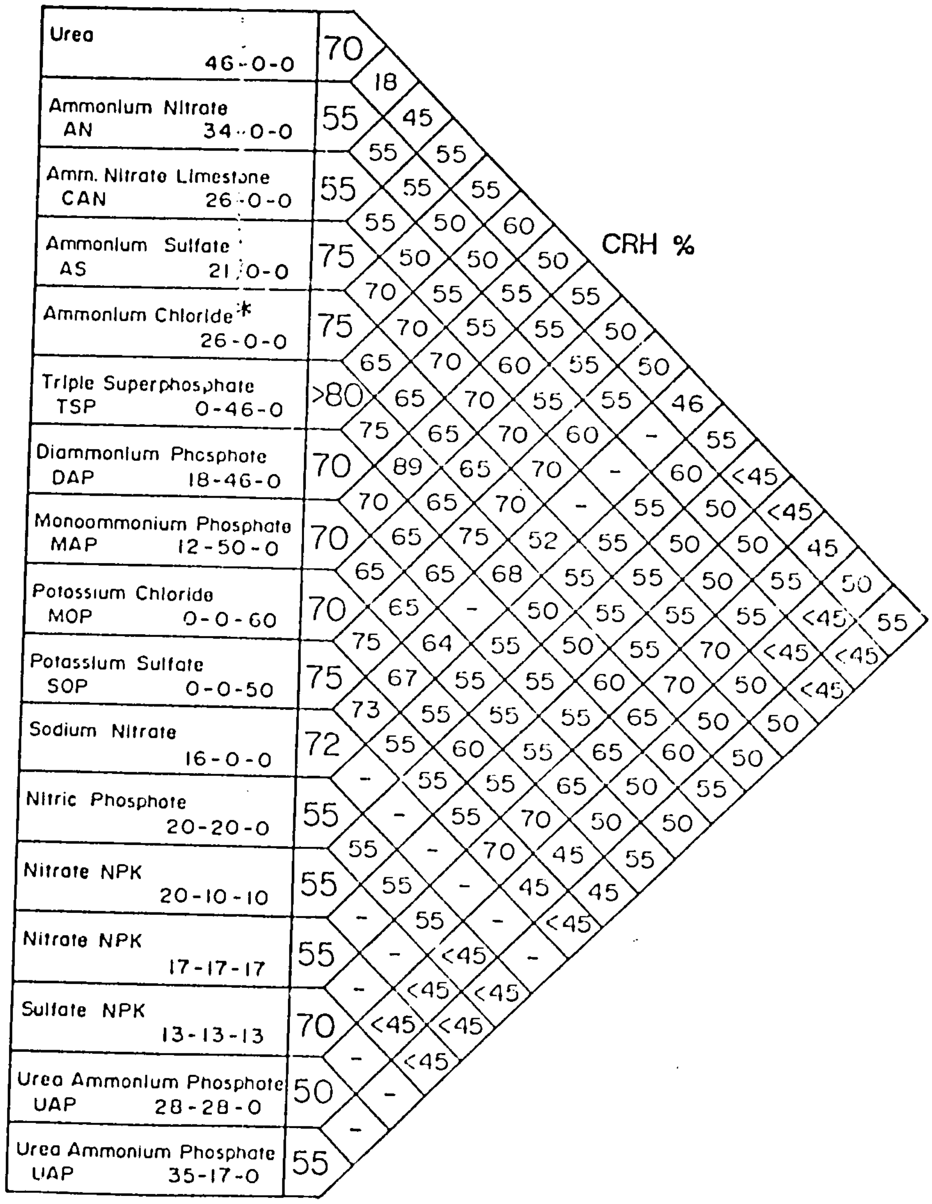
The CRH value of urea decreases with increasing temperature, although not very rapidly, e.g. CRH of pure urea at 70°F = 78%, and at 100°F = 70%. At relative humidities above the 70% range, urea will therefore pick up moisture. Unfortunately, such high relative humidities are very frequently encountered in the tropics.

Atmospheric relative humidity changes fairly rapidly with change of temperature, increasing as temperature decreases. As temperatures drop in the evening, relative humidities increase to very high levels overnight. Data for Bangladesh are given in Figure 2. It will be seen that overnight levels in or above the 70% range are experienced throughout the whole year, together with high daytime levels over a good part of the year.

In order to protect fertilizer in storage from the effects of moisture, the first line of defense is obviously the package, which must be of water resistant construction, securely closed and undamaged. The next protective measure is to avoid unnecessary introduction of "wet" air into the warehouse (i.e., any air with a relative humidity above the CRH of the fertilizer). We may then have to consider measures to control moisture levels

Figure 1

Critical Relative Humidities of Commercial Fertilizer and of Mixtures at 30°C



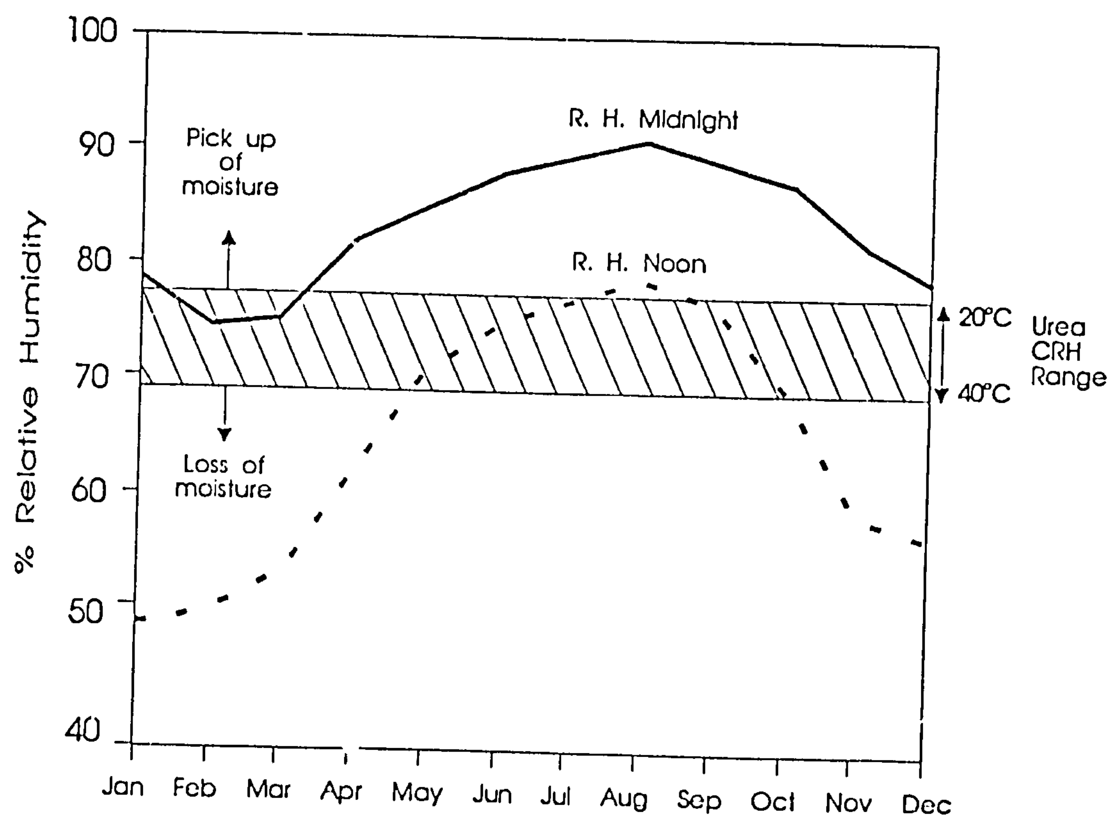
*Reagent Grade Salt.

Note: Determinations were made on commercial materials by TVA. CRH Values are approximate and may vary several points depending on production method and source of material.

Source: IFDC. 1984. *Humidity Factors Affecting Storage and Handling of Fertilizers*, Paper Series P-5, International Fertilizer Development Center, Muscle Shoals, AL, U.S.A.

Figure 2

Chittagong: Average Relative Humidity
3-Year Monthly Averages



in the warehouse, since it is impractical to seal off the warehouse completely. Conventional methods for control of moisture levels include: (1) air conditioning, (2) dehumidifying, (3) heating of the air (to lower its RH), together with (4) limiting the entry of moist air. In most cases, the first three are uneconomical or impractical and only the fourth is a practical option.

In a humid climate, it is therefore recommended that entry of humid air to the warehouse must be avoided to the maximum extent possible. It is recommended that warehouses should not have permanent ventilation. They should, however, be capable of being ventilated. In principle, a warehouse should be ventilated only when the humidity is low--60% RH or less. In practice, this is likely to be when the sun is shining and conditions are dry. At all other times, the warehouse should be kept closed, except for working access or when working conditions are unacceptable.

When a product which may be affected by moisture is in storage for an appreciable time, it could be beneficial to encase the stock in plastic or other waterproof sheeting. In fact, a well-protected stack of bags in outdoor storage may store at least as well as an unprotected stack in a warehouse which is open daily.

Statements have been noted to the effect that high temperatures contribute to caking of fertilizers in storage. At the temperatures encountered even in closed warehouses in the tropics, this effect is not considered significant for the most commonly used fertilizers. It is not, therefore, necessary to ventilate warehouses on temperature control grounds for the benefit of the product, but may be necessary to allow reasonable working conditions.

7. Calculation of Capacity

A knowledge of storage capabilities is necessary for preparation of storage plans, when negotiating hire of warehouse accommodation or when calculating costs of providing storage by alternative methods.

It is possible to calculate approximate storage factors from first principles, knowing only the bulk density of the particular products. The storage density of the bagged product is assumed about 5% less than the density of the loose product in bulk because of the spaces between the bags. Factors for three common products are as follows:

Product	A Bulk Density (ton/m³)	B Storage Factor for Bagged Product (5% Less Than A) (ton/m³)
Urea prills	0.74	0.70
Granulated TSP	1.12	1.06
Granulated MOP	1.04	0.99

Assuming bagged fertilizer, block stacked without pallets, some calculations using these factors are shown in Table 1. These relate fairly well to actual experience. In establishing storage standards, measurements for your particular products and particular methods and height of stacking must be made. Bulk density in storage is a useful tool and simpler than attempting to define numbers and dimensions of bags, which can vary considerably, e.g., a 50-kg bag of a particular product may pack tightly, whereas a slightly wider bag will pack loosely and be thinner in the stack, but spread over a greater area. However, once you have established a storage factor for a particular product, it is a simple matter to measure a stack, calculate the volume, and then the approximate weight in the stack.

Table 1. Warehousing Storage Capabilities

Product	Density	Height	Capacity
Urea, prills	0.70	3.5 m	2.45 tons/m² of stacked area
TSP, granular	1.06	3.5 m	3.71 tons/m² of stacked area
MOP, granular	0.99	3.5 m (11-12 ft)	3.46 tons/m² of stacked area
Weighted average for 60/30/10 mix =			2.93 tons/m²
		say	3 tons/m² of stacked area
Allowing 1/3 access space =			2 tons/m² of warehouse area

Remember this calculation is only an indicator and is for the stack height specified. Higher or lower stacks give correspondingly higher or lower capacities.

An allowance of one-third for access space may appear generous, but is fairly realistic in practice. It is a figure that is frequently underestimated. Consider Figure 3 for a 40 x 100 m warehouse. Allowing 1 m between wall and stacks and 1 m between stacks, with 5 m for main access corridors and a 100 m^2 working area for re-bagging damaged material, the area available for stacking is only 70.5%. This is a maximum, since if material is being moved in and out, working space in the stacks is needed. If this is as little as 10%, then a maximum of 60% of the total area is usable for stacking fertilizer, with 40% access space. In general, it can be assumed that at least 1/3 of warehouse space is required for access purposes. The figure can be much higher. For example, a design for a 20-ton village storage unit is shown in Figure 4. The space occupied by stacked fertilizer when completely full is only 54% of the storage section.

On the previously calculated basis of around 3 ton/m^2 of stacked area, the 4,000 m^2 warehouse used as an example can accommodate 8,000 tons maximum at 67% available area.

It should not be forgotten that we are paying for space in a warehouse, i.e., volume, not area. If we can stack twice as high, we can halve the cost of the storage space. (Against this, where plenty of storage area is available, there is no point in stacking high; this only adds to handling costs.)

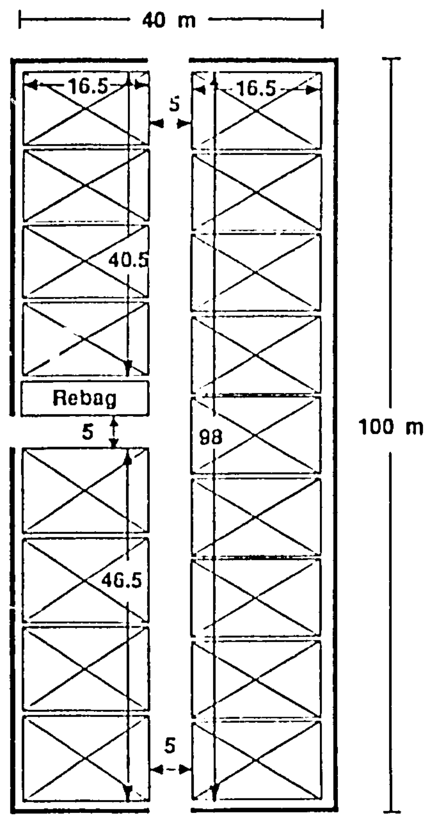
This is illustrated in Table 2.

Table 2. Warehouse Capacities and Capital Costs

	Permanent Structure	Local Construction	Village Warehouse
Construction cost, \$/m^2	250	94	62.5
Stacking height, m	5	4	2.5
Capacity of stacked area	4.2 ton/m^2	3.4 ton/m^2	2.1 ton/m^2
Capacity allowing access areas	2.9 ton/m^2	2.4 ton/m^2	1.5 ton/m^2
Capital cost per ton of warehouse capacity, \$/ton	86	39	42

Figure 3

Warehouse Area Utilization



Separation between stacks 1 m

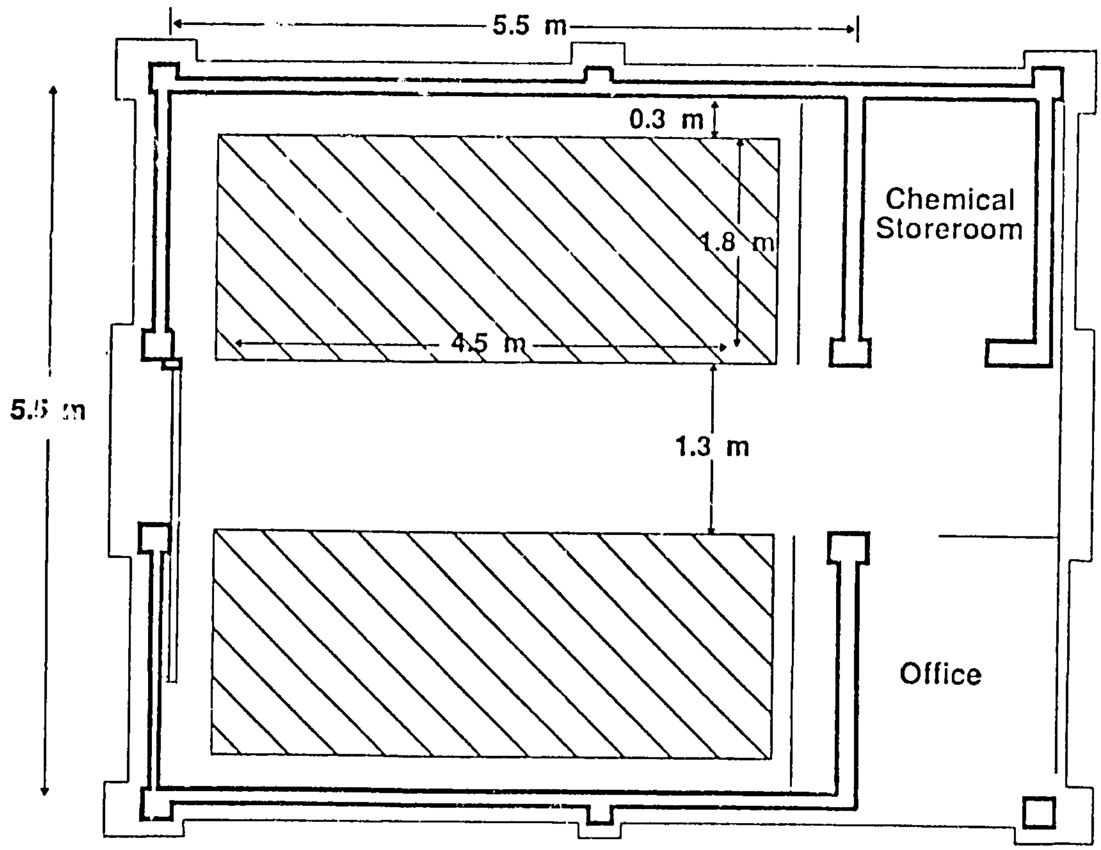
Distance of stacks from wall 1 m

Main access corridors 5 m

Total area	4,000 m^2
Rebagging area	100 m^2
Stacking area	2,820 m^2
Access area	1,180 m^2 = 29.5%

Figure 4

Fertilizer Storage (20 ton)



Total area*	30.25 m^2
Stacked area	16.20 m^2
Access area	14.05 m^2 = 46%

*Excluding office and chemical storeroom.

8. Stacking Height

Considerable misunderstanding exists regarding the height to which bagged fertilizer can be stacked, manually or in palletized form. Positive statements are sometimes made, such as "you cannot stack more than 20 bags high." It is assumed that above this number, bags may split, granules may be crushed, or the product will cake. These effects are not generally experienced in practice, except for caking of the lower layers. This is only a problem in longer term storage, say 6 months or more. With good quality fertilizers, the caking in the bottom layers in short-term storage is usually easily broken up on handling.

A stack of 20 bags of urea is around 3 m high. Stacks of 35 bags are not uncommon and CCM in Malaysia reported a few years back that on stability grounds, stacks were limited to 35 bags for woven polypropylene rather than 45 for single-film polyethylene.

At these heights, properly constructed bags and reasonable-quality granules should not suffer any damage. Fertilizers stacked in bulk piles may be up to 15 m, or more than twice as high as a 45-bag stack.

In practice, for any particular type of bag, stacking height is determined mainly by the safety and stability of the stack, as determined by the skill and experience of the workers and judgment of the supervisor or manager, assuming no limitation due to the height of the building.

In short, we should not accept arbitrary limits on stacking height. This should be determined for a specific location on the grounds of safety and stability and the quality and caking characteristics of the product.

For palletized material, manually formed pallets are less stable than autopalletized materials. For 6 layers x 5 bags (1-1/2 ton), manually formed pallets may be stacked 3 or 4 high, autopalletized units 4 or 5 high.

9. Protection of Stacks

Consideration should always be given to placing a plastic sheet (or sheets) over the top of a stack to protect it from (a) leaking roofs, condensation, etc., (b) bird droppings, dust, and dirt. This is especially important in long-term storage.

Additionally, for long-term storage, consideration should be given to wrapping the entire stack in a plastic sheet. This may be of light gauge

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since its purpose is to stop the flow of air, specifically moist air, through the stack.

10. Warehousing Costs

Rather than attempt to detail costs in a particular country let us consider the relative contribution of the main cost components. These are:

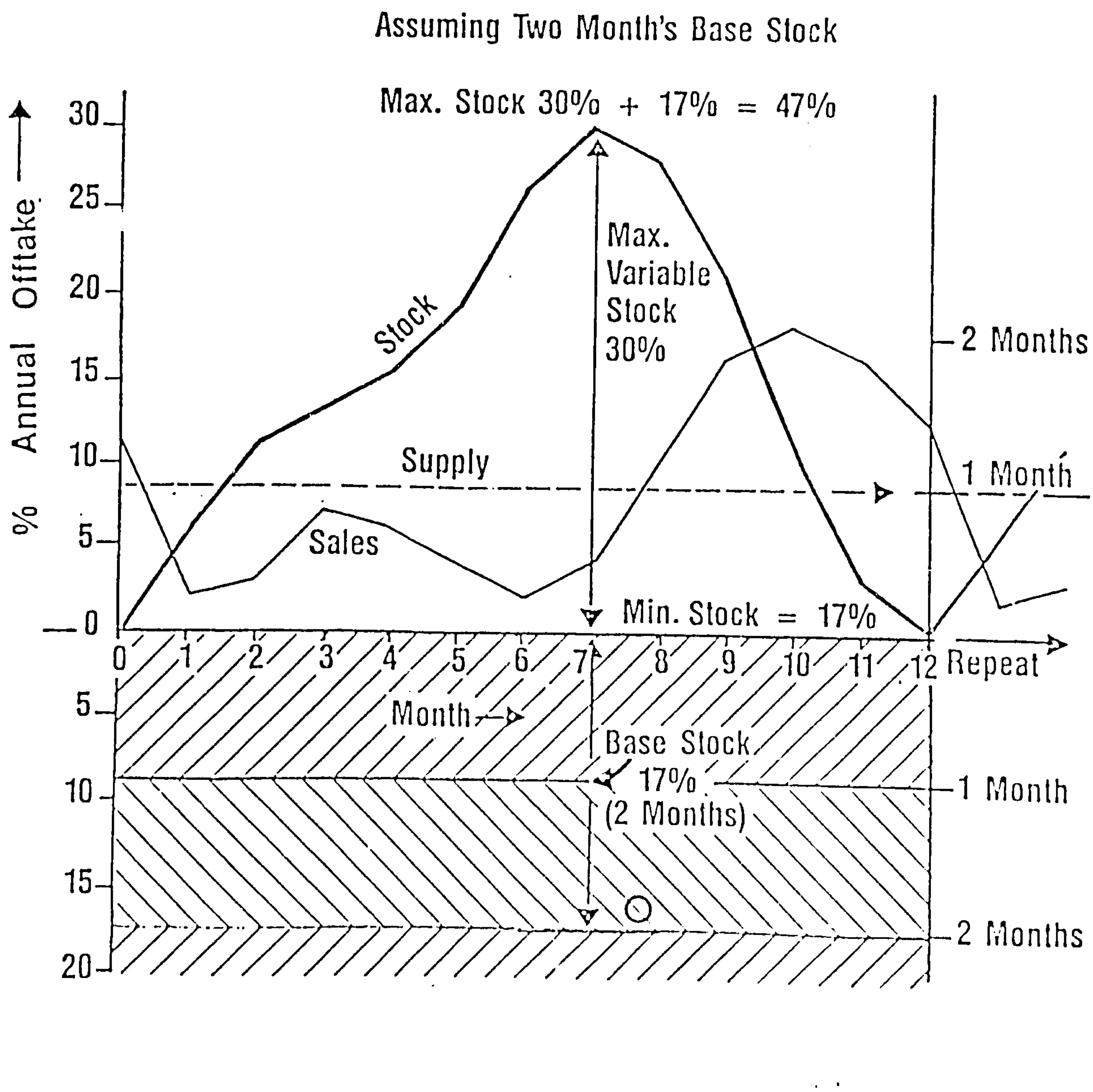
10.1. Inventory Costs
10.2. Costs of Rental or Ownership
10.3. Operating Costs
10.4. Handling Costs
10.5. Product Loss and Damage Costs

Using the two-season offtake pattern (Figure 5) we will consider a regional warehouse with a throughput of 25,000 tpy. Inventory levels and costs are then as shown in Table 3.

Table 3. Inventory Levels and Costs

	For 25,000 tpy Throughput Two-Season Offtake Pattern		
Maximum Stock Levels			
Peak of variable stock above base level	30%		7,500
Base stock level (2 months)	17%		4,250
Maximum Inventory	47%	=	11,750
Warehouse Size Allow	Approximately 6,000 m^2		
Average Stock Levels			
Average stock above base level	15.3%		3,850
Average base stock (2 months)	17.0%		4,250
Average Inventory	32.3%	=	8,100
Value of average inventory at $250/ton	$2,025,000		
Annual interest at 15%	304,000		
Cost of inventory for 25,000 tpy throughput	$12.2/t		

Figure 5. Variation of Total Stock Levels.



If the warehouse was constructed at a cost of around $250/m^2, then a 12,000-ton or 6,000-m^2 building has a capital value of $1.5 million. Assuming a 20-year life and return on capital of 10%, the capital recovery factor is 11.7%. Allowing 2.5%/annum maintenance, the owner must therefore recover 14.2% or $213,000/annum without profit. In our case, this is $3/m^2/month or $8.6/ton throughput at 25,000 tpy to cover capital charges and building maintenance costs only. These costs would of course be proportionately less for lower capital cost structures, also for existing older buildings which may already be substantially or fully depreciated.

On these bases, approximate warehousing costs are shown in Table 4. Points to be noted are:

10.1. The overriding importance of inventory cost.

10.2. Part of the inventory cost, the base or safety stock level, is controllable, the other part is not.

10.3. If not strictly controlled, loss and damage costs [5] could easily exceed total operating costs ([3] plus [4] in Table 4).

Costs may be spread by using as a multiproduct location, e.g., for storage of crops, pesticides, seeds, or equipment.

As discussed separately, consideration should also be given to pricing incentives or early delivery rebates to reduce peak stock requirements and inventory levels, as well as options for short-term storage or outside storage to cover peak periods.

Table 4. Principal Warehousing Cost Components, 25,000 tpy Throughput
(Assumptions as in text.)

		Two-Season Offtake Pattern ($/t)
1. Cost of Inventory		
i. To cover offtake variations	3,850 t	$5.8
ii. Base stock (2 months)	4,250 t	6.4
TOTAL	8,100 t	$12.2
2. Warehouse Rental at $3/m^2/month 6,000 m^2		8.6
3. Operating Management, supervision, secretarial, labor $35,000/year		1.5
4. Handling In and Out $1/ton each		2
5. Loss and Damage		
Loss 1%		2.5
Damage 1% (half recovered)		1.2
		$28.0

11. Inventory Turnover

The rate of turnover is essentially the number of times the inventory is sold in a given period of time, usually 1 year. It is calculated by dividing the annual sales by the average inventory over the year. A figure used more frequently, perhaps because it is easier to calculate, is the warehouse turnover or the annual sales divided by the warehouse capacity.

Inventory turnover is often quoted as a measurement of warehousing efficiency. It must, however, be used with great caution. It may be a useful measure in a developed economy where the warehouse manager is able to vary his ordering pattern, use different suppliers, or hire storage accommodation at short notice to cover peaks. In considering movement and storage of fertilizers in developing countries we are, however, often talking of centrally controlled systems with regular movement through the system, and storage at receiving locations. There is an inevitable stock buildup within the system dictated by the offtake pattern. This inevitable amount of fertilizer must be stored somewhere, preferably at receiving locations in the market areas. Overall inventory costs are virtually fixed and warehousing costs must be paid for somewhere in the system. Inventory turnover is then not necessarily a measure of efficiency at the district warehouse level, more a reflection of location of stocks. It is dictated very largely by the offtake pattern, over which we have very little control. Comparing the two-season pattern with a sharply peaking one-season pattern, we may find the following on sales of 25,000 tons.

In the examples used previously we had:

	Two-Season Offtake Pattern	One-Season Offtake Pattern
Av. Inventory	8,100 t	11,000 t
Inventory turnover	3.1	2.3

For equivalent operations, the difference in inventory turnover is no indication at all of relative efficiency. Higher throughput at the same location will give lower cost/ton on paper. In the present case, additional storage (a larger warehouse) is needed in the one-season pattern so the differential is even greater than indicated by a "turnover ratio."

12. Operating Features

Detailed operating procedures need to be worked out for each specific location. There are, however, a number of fairly obvious basic features for efficient operation which should be implemented by any efficient warehouse manager as follows:

12.1. Preparation of a layout plan.

12.2. Correct stacking, including use of a dunnage base, close control of handling methods, uniform stacking methods, one product per stack, separation between stacks and walls, separation between stacks, adequate gangways which are kept clear.

12.3. Keeping a stock card for each stack as well as a stock record in the office.

12.4. Good housekeeping, i.e., removal and rebagging of all damaged bags; immediate cleanup of all spillage; a clean and tidy warehouse at all times.

12.5. Maintaining the building in good condition.

12.6. Close supervision of labor, safety, and security arrangements.

12.7. Limiting access only to those with business in the warehouse.

12.8. Recording all movements.

13. FIFO: First In-First Out

Storage operations should generally be on a first-in first-out basis. This must not, however, be applied as a fixed principle. Each situation should be studied on an overall cost basis.

For example, consider an intermediate warehouse of 1,000-ton capacity serving a district with an offtake of 12,000 tons/year, i.e., an average of 1,000 tons/month. If offtake is fairly regular, or at least two seasonal, and if all fertilizer is passed through the warehouse (perhaps for administrative reasons), the turnover ratio is 12, which would be viewed by some as highly efficient. However, two points to note are:

1. Handling 1,000 tons/month into a warehouse while loading out 1,000 tons/month appears highly inefficient. Direct delivery, bypassing the warehouse, should be possible, with major savings in transport cost and some savings in handling in and out.
2. FIFO is not important because residence time is short.

However, in all cases where extended storage is involved, FIFO should be applied. Older stocks should always be moved out first, and old or damaged stocks should always be moved out as soon as possible.

14. Inventory Control

We cannot cover detailed procedures in this short presentation. Good record keeping is, however, essential.

The Manager should know on a daily basis for all products:

14.1. Opening stock

14.2. Quantities received

14.3. Quantities dispatched

14.4. Closing stock
14.5. Any losses or damage
14.6. Quantities in transit
14.7. Orders outstanding

These figures should be maintained on a daily basis and normally transmitted daily to central management, with summaries, weekly, monthly, quarterly and annually as may be agreed.

Stock checking should be undertaken at least on a monthly basis with a more detailed stocktaking quarterly. A formal annual stocktaking should be undertaken for audit purposes.

Independent unannounced spot checks on stocks and operations should also be made by central management.

15. Management

Good warehousing management is vital, yet its importance is often not appreciated.

The warehouse is the last point to handle the goods before they are accepted by the customer and the documents initiated here are critical to all company financial activities.

In the examples discussed previously, for the one-season offtake pattern, the average inventory is over $3 million, with another $1 million for the structure!

A good manager will ensure firm control over all activities associated with care of the warehouse and stock under his control. While he must accept responsibilities in these areas, he must also be given sufficient freedom of control and authority to operate efficiently within established company limits.

Central management must lay down company warehousing policies and procedures and ensure that they are complied with. At the same time, they must maintain close contacts with managers at District level and be responsive to problems which develop and be prepared to assist with information, services and training as necessary.

Workshop on

Efficient Marketing of Fertilizers in Cameroon

March 28 - April 8, 1994
Bamenda, Cameroon

Fertilizer Bulk Blending and Bagging

by

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THE GROWTH OF BULK BLENDING IN THE INTERNATIONAL MARKET[1]

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[1]For Presentation at AFTMIN 6 Seminar on Bulk Blending in Sub-Saharan Africa, Accra, November 2-4, 1993.

[2]President, A. J. Sackett & Sons Company.

THE GROWTH OF BULK BLENDING IN THE INTERNATIONAL MARKET

Assuming that the goal of any fertilization program is basically "to produce the best crop yield consistent with long term agronomic planning at the most economical cost." Bulk Blending offers a very practical and cost effective supply alternative.

Production alternatives for the preparation of granular compound fertilizer containing two or more the primary nutrients can be divided into two major categories :

A. Physically mixing various proportion of granular materials to obtain a desired nutrient ration concentration. Such processes do not alter the physical and chemical characteristics of the granular materials.

B. Processes that require chemical reaction, liquid addition, or melting of some or all of the indredients to form a granular product.

Actually, the physical blending of fertilizers was the predecessor to chemical granulation. In early bulk blending operations, only powdered or finely divided nitrogen, phosphorus, and potassium materials were available. With the development and use of semi-granulation process during the period between 1950 and 1960, many of the problems associated with the use of powdered material were significantly decreased. Semi-granulation technology was later advanced to the continuous process used to produce most granular fertilizer today. Compound fertilizer preparation rapidly evolved into a highly complex engineering operation. As such, its economics depended on large scale operations.

The large growth and availability of granular products set the stage for the emergence of bulk blending as the major production alternative for supplying granular compound fertilizers to the United States farmers. Today, there are approximately 8,000 bulk blending plants in the United States. Bulk blends account for approximately 70% of the solid compound fertilizers sold in the United States today.

Although the transition to bulk blending has not been so pronounced in other parts of the world as in the United States, the trend toward bulk blending has been steadily increasing. Furthermore, bulk blending is expected to be the first production alternative selected in many developing nations. The primary reasons for the growth of bulk blending may be summarized as follows :

COST -- If a significant production cost advantage for either process can be obtained, it should be due to the cost of raw materials since they represent about 60% to 70% of the total production cost. In many cases, all raw materials must be imported and the cost of granular material for bulk blending may be equal to or less than those for chemical granulation. Obviously, this depends on many variables and is not predictable from year to year. However, bulk blending has a marked advantage over chemical granulation in terms of the required capital investment. The capital cost of a 100,000 metric tons per year chemical granulation complex designed to produce compound N.P.K. fertilizers from imported ammonia, phosphoric acid, sulfuric acid, ammonium sulfate and potash would be 3 to 4 times more than the cost of a bulk blend plant designed for the same capacity. A study by International Fertilizer Development Center (IFDC) in 1981 indicated that considering material cost at that time and all plant operating costs that a saving of about $1.00 per unit of nutrient could be realized through bulk blending versus chemical granulation. There is also a significant energy savings in a bulk blend plant versus a chemical granulation plant. Studies done by IFDC indicate a saving of about $3.00 per metric ton of product produced for electricity and fuel in a bulk blend plant versus a chemical granulation plant. We are all well aware that material prices fluctuate quite drastically. However, prices of raw materials have often resulted in a lower finished product price for materials alone in bulk blending versus N.P.K. granulation.

SIMPLICITY -- From a process and operating viewpoint, bulk blending is much simpler than a chemical granulation plant. There is considerably less equipment in a bulk blend plant and it requires less expertise to operate and less maintenance to keep running. Whereas, a chemical granulation plant requires equipment designed to deal with chemical reactions and precise metering; a bulk blend plant only requires a precise scale system and efficient mixer to ensure the production of a good product.

LOCATION -- Because bulk blending units are relatively inexpensive to install and simple to operate, several small units can be located at strategic locations near consumption areas, thus offering a more reliable supply of fertilizer to regions that may be distant from a large granulation complex. The higher cost and the more complex mechanical and technical nature of the chemical granulation units do not make the installation of several small granulation units practical.

QUALITY -- The widespread acceptance of bulk blending has been largely due to the production of good quality products that rival the best chemically granulated products. For many years the quality of bulk blends was debatable, primarily due to the availability of granular materials of compatible size. In order to produce bulk blends of a good quality, certain steps must be followed :

A. Raw materials must be closely matched in particle size. This is probably the most critical factor in the production of good bulk blends. Most commercially available granular fertilizer materials used today for bulk blending are in the size range of minus 6 plus 16 mesh (Tyler).

B. Materials should be chemically compatible to prevent them from reacting with each other.

C. Weighing and mixing systems are extremely important and should be designed properly

D. Transportation and storage systems should be designed to minimize segregation.

Bulk blends are made from high quality granular materials such as, D.A.P., urea, and potash, and if additional elements are required, it is simply physical mixing, not a chemical reaction required. Therefore, none of the agronomic effectiveness is lost in a bulk blend. On the other hand, compounds are sometime over ammoniated (losing water-solubility), and when secondary or micronutrients are added, the resulting chemical reactions may reduce the agronomic value of the fertilizer.

PRODUCT FLEXIBILITY -- Since bulk blends are not subject to the process restrictions associated with chemical granulation, a large number of nutrient ratios can be made from a few granular raw materials, such as urea, diammonium phosphate, and potassium chloride. Examples of some of the nutrient ratios and grades that can be made by using these three raw materials are :

Examples of Grades of Bulk Blended Material

Nominal	Maximum Grade, wt %			Quantity of Material Required Per Metric Ton of Product kg[a]		
Nutrient Ratio	N	P_2O_5	K_2O	Urea	DAP	KCl
1:1:1	19	19	19	261	418	321
1:1:3	11	11	35	159	255	586
1:2:1	15	30	15	75	669	256
2:1:1	26	13	13	482	293	225
2:2:1	22	22	11	310	499	191
3:1:1	31	10	10	601	226	173
4:1:1	33	8	8	676	184	140

a. Material analysis urea 45% N. DAP 18% N and 46% P_2O_5, and KCl 60 K_2O.

In addition to providing the traditional N.P.K. nutrient requirements, bulk blends are well suited for incorporating micronutrients. Bulk blending provides the means by which a local plant can provide varying fertilizer grades to satisfy the specific needs of the local farmers. As agronomic techniques become more sophisticated and more widespread, the need to respond to specific crop requirements has become increasingly important. Where chemical granulation can typically provide from four to ten grades from one installation economically, the number of grades that can be offered from a bulk blend plant are almost limitless.

Product flexibility is especially important in developing regions because sufficient crop response data are unusually not available to make a reliable prediction of the long-term nutrient requirements necessary to justify the installation of a relatively inflexible chemical granulation plant.

Bulk blending has become popular as a method by which a local plant can provide varying fertilizer grades to satisfy the specific plant needs of the individual farmers with relatively simple and inexpensive equipment. The granular materials produced by the large manufacturer are shipped in bulk to the plants who generally provide the finished N.P.K. product to their customers in bags. Bulk blending appears to have much in its favor with lower capital investment and virtually no process restrictions allowing the production or more ratios which are economical to produce in almost any quantity. There factors make bulk blending the most feasible production alternative for compound fertilizers in many countries.

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CASE STUDY

Experiences with Bulk Blending in Nigeria

Fertilizer in Nigeria

Before 1988, Nigeria depended largely on imports to meet the bulk of the national fertilizer requirements. The supply-demand gap created by an upsurge in demand in recent years had to be filled through imports, but the scarcity of foreign exchange and untimely release of funds led to erratic and sometimes inadequate fertilizer supply during this period. The objective of Government policy was to develop domestic production capacity to meet the bulk of national fertilizer requirements.

Nigerian Government policy to develop domestic fertilizer production

Nigeria has vast reserves of natural gas, most of which is wastfully flared. A joint venture between the Federal Government of Nigeria and M.W. Kellogg of America led to the commissioning in 1987 of the National Fertilizer Company of Nigeria (NAFCON).

This company produces 1,000,000 tonnes per annum of Ammonia, Urea, DAP and Compound Fertilizers, making use of the abundant natural gas as a source of energy and hydrogen.

The company works consistently above design capacity. NAFCON has been so successful for Nigeria that the NAFCON II project is already well under way. NAFCON II will effectively double the company's output of NH_3 and Urea.

NAFCON has therefore significantly increased Nigerian domestic fertilizer production capacity, and has made possible the establishment in Nigeria of NPK Bulk Blending PLants.

Raw materials for Bulk blending

One fundamental prerequisite for a successful Bulk Blending operation is the availability as raw materials of good quality granular intermediates. The availability of a high proportion of locally available granular raw materials can significantly improve the viability of a Bulk Blending Plant. In a situation where foreign exchange is scarce, the purchase of materials with local currency is much easier.

Granular Urea

It is important to emphasize the suitability for Bulk Blending of NAFCON Granular Urea. Most Urea available on the world market is produced by the prilling process. Prilled Urea often has a median size rather smaller than that of DAP.

Granular Urea from NAFCON has a granulometry which is close to that of DAP, MOP, and other blending intermediates. Closely size matched raw materials give a Bulk Blend which is less likely to segregate during handling.

NAFCON Urea granules have a low specific surface area, and are coated with Urea-formaldehyde to resist degradation by humidity - an important factor in the humid coastal areas.

Bulk Blending Plants in Nigeria

In January 1989 Fertilizers and Chemicals Ltd. (F+C) opened Nigeria's first Bulk Blending Plant in Kaduna, Nigeria. F+C turned out 100,000 tonnes NPK in the first year, and 164,000 tonnes in 1990. The average production is 100,000 tonnes per annum during the first four years of operation.

In June 1990, a similar Plant was commissioned in Minna, Nigeria under the name of Morris Nigeria Limited (MNL).

These plants each have installed capacity of fifty tonnes per hour . This rate of production may be exceeded during times of peak demand, while lower production may be expected at other times, due to a number of factors to be studied in this paper.

Development of local raw materials

Wherever possible, the Bulk blending company should encourage the development of local raw material sources. In Nigeria, the program for expansion of NAFCON is receiving priority attention from Government This will satisfy both local and export requirements for Nitrogen products.

Meanwhile, Nigeria's reserve of Phosphate rock is under investigation. In a country with proven reserves of Phosphate Rock, a Bulk blending company might be encouraged to invest in mining, benification and granulation of the rock - such projects are under consideration at present. This type of investment has high start up costs. Great care must be taken in the location of proven reserves of economically recoverable minerals. In cases where the costs are prohibitive to private sector, Government investment might be necessary.

Limestone Granulation

F+C Ltd. has invested in the mining and granulation of Calcitic and Dolomitic limestones at Okpella, Nigeria. This plant, West African Fertilizers Limited (WAFERT) was commissioned in February, 1993, and produces 60,000 tonnes per annum of Dolomitic limestone Granules. These granules are used exclusively by F+C and MNL as a component of bulk blended NPK products.

Planned expansion of this plant will increase Nigeria's domestic fertilizer production capacity.

Raw Material Imports

To operate a Blending Plant in Nigeria, it is normally necessary to import two or more of the raw materials. Importation of bulk granular fertilizers requires the following:

- Finance: access to foreign exchange
- Bulk handling facilities
- Storage
- Transportation

Finance

A typical shipment of 7,500 tonnes DAP represents US $ 1,500,000. Before such an amount of foreign exchange can be secured, a company must bid in the highly competitive financial market. The administration of such transactions is a costly and time consuming burden for management. The inherent simplicity and economy of operating a Blending Plant can become overshadowed by the administrative burdens of import management.

Bulk Handling facilities

Handling bulk fertilizer requires grabs, hoppers, conveyors, elevators, payloaders and dump trucks. All these facilities must be provided by the importer.

In Port Harcourt, Nigeria, F+C has established a Bulk Handling terminal for offloading bulk fertilizer at 3,000 tonnes per day.

Fertilizer is recovered from the vessel with 4 tonne hydraulic grabs, and deposited onto a conveyor system which stockpiles the material inside the storage building.

Storage

An importer is unlikely to find a purpose built Bulk fertilizer store lying empty at the Port. Normally it will be necessary to convert and modernise existing vacant structures.

F+C has 15,000 tonnes bulk storage in Port Harcourt, situated in two warehouses. The buildings were renovated and converted for fertilizer, with the installation of overhead belt conveyors.

Humidity

One of the major risks of handling bulk fertilizer in the tropics is the likelihood of deterioration due to humidity. These risks are accentuated in the West African ports where the rainy season extends through most of the year, with high humidity throughout.

Whilst fertilizer in sealed bags is less vulnerable to degradation, bulk fertilizer will rapidly deteriorate following exposure to high humidity or rainfall. Bulk fertilizer should be stored indoors in large piles and covered with tarpaulins to minimise the effect of surface exposure.

Transportation

Transportation of bulk fertilizer must be in sealed, weatherproof containers, with discharge capacity to accommodate the provisions for offloading at the Blending Plant.

F+C makes considerable use of Rail transport, using covered hopper wagons formerly designed for coal. Since road transport plays a major role, F+C has invested in a fleet of trucks with specially designed bottom discharge trailers. These offer security from the weather, and minimal labour requirement at the offloading point.

Operation of the Blending Plants

F+C has two Bulk Blending Plants each having 50.t.p.h. installed capacity. The plants are situated in areas where much of Nigeria's fertilizer is used.

During the period of peak demand, the plants may be expected to package 800 tonnes per day, week after week. There are also periods during the year when production will be lower due to a number of factors.

Demand seasonality

The main season for fertilizer use in Nigeria begins in June with the establishment of regular rainfall. Demand is high during this period. Demand for fertilizer products during December, January, February and March is virtually nil.

Producers could take this opportunity to build up stocks in preparation for the planting season. This however requires substantial investment in raw materials and storage facilities. Interest incurred on the value of products in stock will erode the Blender's profit margin.

F+C Ltd has normally found it necessary to continue production off season in order not to lose allocation of Urea from NAFCON which is normally available on a monthly quota and for which NAFCON has limited storage capacity.

In the extreme case, a Blender could continue production during the first quarter of the year and not sell any product. This occured to F+C in the first quarter of 1993 during which time a stockpile of 11,810 tonnes accumulated. Obviously, this is an extreme situation which must be avoided by planning and scheduling off season sales, with discounts or incentive schemes for early collection and payment.

Product type and formulation

Products and prices thereof are agreed annually by contract between the Blenders and the Ministry of Agriculture. Product types are authorized by the National Fertilizer Technical Committee, an advisory body of Soil Scientists and Agronomists.

Accent is on the higher Nitrogen content products, since these have higher local content and can therefore be more easily supplied by the blenders.

Micronutrients and Secondary Elements

Long term research has shown that soils in some areas of Nigeria are deficient in micronutrients and secondary elements. Recommendations have been published by Government for the inclusion of Zinc, Sulphur, Magnesium and Boron in blended fertilizers.

F+C Ltd bulk blending plants have the facility to produce complex blends containing seven or more nutrients. During the last four years, blends have been produced containing Zinc, Sulphur, Calcium and Magnesium formulated in a close approximation of the Government recommendations. These products have been under observation in field trials for 4 years and limited quantities have been marketed.

Micronutrients

With micronutrients such as Zinc and Boron, attention must be given to the high cost of bulk blended compounds containing these elements. Zinc and Boron will be likely to give economic yield response only when applied as a component of fertilizers formulated for specific crops and soil types, following soil analysis.

The recommendation of products containing Micronutrients for blanket application over large regions or zones of the country might be wasteful of these nutrients and should be considered with caution.

Distribution of special formulations

Central control of distribution in Nigeria by NAFCON has resulted in some degree of rationalization whereby certain region-specific fertilizer products are directed to their target zones.

Soil acidification

To achieve a profitable yield, farmers in Nigeria are likely to apply Nitrogen at a rate of 120 Kg N/Ha. In order to prevent soil acidification and subsequent yield reduction, F+C advocates the use of blended NPK products containing Magnesium and Calcium granules. These balance the effect of the fertilizer and serve as a useful source of secondary elements.

Bulk Blending in Nigeria - the outlook for the 90's

Nigeria will soon have three major Bulk BLending Plants in production, and two more plants planned for construction. Until NAFCON expands the Urea production facility, these Blending Plants will not be able to work at design capacity. When NAFCON II is on stream, then these five plants will have adequate capacity to produce Nigeria's realistic NPK requirement.

Food production in Nigeria could be substantially increased if serious attention was given to the following three areas:

i) Delivery of Products direct to Nigerian farmers
ii) Delivery in time for the planting season
iii) Improved fertilizer use efficiency

Points (iii) above is an important factor. The farmer himself can significantly improve his output and profits if he places his fertilizer in the right place at the right time during development of the crop.

Correct and timely placement of the fertilizer will of course vary according to:

Crop
Soil type
Cultivation System
Climate

It is the responsibility of the Bulk Blenders to become familiar with these factors and to advise farmers accordingly.

Workshop on

Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994

Bamenda, Cameroon

Fundamentals of Bulk Blending

by

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Training Module

Fertilizer Blending

Foreword

This module on *Fertilizer Blending* presents an overview of the technical concepts involved in blending and places fertilizer blending into perspective with other fertilizer supply and production alternatives. The advantages and disadvantages of blending are described. Other modules are available which describe in greater detail the design and operation of blending plants, product quality control, and the marketing of blended fertilizers.

Slide 1. FERTILIZER BLENDING

Slide 2. **Introduction** – Traditionally, multinutrient fertilizers or compounds were produced by chemical granulation processes. We are going to discuss blending.

Slide 3. What is meant by *fertilizer blending*?

Fertilizer blending is the deliberate and careful mixing together of two or more dry fertilizer materials to obtain a mixture (blend) of the desired nutrients in a predetermined ratio and concentration. The process of blending does not involve chemical reactions between the materials; each material retains its identity.

Slide 4. The term blending connotates *controlled* mixing of the different components. It implies attention to quality and therefore is preferred to the term *mixing* which may be understood by some to be a less precise procedure.

Slide 5. Dry blends are commonly prepared using *granular materials* of well matched particle size, although the size of the materials may often fall outside the generally accepted granular range of 1-5 mm. As a result, the quality of blends can be quite variable. Factors affecting blend quality are discussed later. A more closely matched range than 1-5 mm is preferable. Liquid mixtures, e.g., solutions and suspensions, might also be considered as blends, but liquid mixtures are beyond the scope of this module.

Slide 6. What is *bulk blending*?

Bulk blending or *bulk blends* are other names for *fertilizer blends*. The term *bulk blending* originated in the United States presumably because most fertilizer blends were sold in bulk and applied directly to the field without an intermediate bagging step.

Slide 7. Why are some fertilizers blended?

Blending provides a convenient way to apply more than one nutrient at the same time. This convenience is usually cost effective if the crop requires the application of more than one nutrient at the same time.

Slide 8. What is the difference between blends and compounds?

Slide 9. *Blends* are dry mixtures of different particles, in which the individual ingredients retain their own identity. The particles do not agglomerate, react, or combine to form a different particle or granule.

Slide 10. *Compound* or *complex fertilizers* are manufactured by combining and/or chemically reacting a number of solid and liquid materials to form granules that are more-or-less homogeneous in composition. Granular compound fertilizers are sometimes used as blend ingredients.

Slide 11. How much of the world's fertilizer is blended?

Not much. Of the approximate 375 million tonnes of fertilizer products consumed annually worldwide, only about 26 million tonnes (about 7%) are in the form of blends; of this, the United States and Canada account for about 12 million tonnes. Another 60 million tonnes (16%) are in the form of compounds, while about 30 million tonnes (8%) are in fluid form (mostly nitrogen solutions and anhydrous ammonia). The remainder (nearly 260 million tonnes or about 70%) is used as straight (as-manufactured) materials such as urea, ammonium nitrate, ammonium sulfate, ammonium phosphate, superphosphate, and potash.

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Slide 12. **Estimated World Production of Blended Fertilizers**

Country	Estimated Annual Production	
	Million Tonnes	% of Total
United States	10.0	38
Canada	2.0	8
Brazil	6.0	23
Western Europe	4.2	16
Central America/Caribbean (Total)	1.0	4
Japan	0.8	3
Others	2.0	8
TOTAL (1992)	26.0	

Slide 13. Why is blending not more widely practiced?

The answer to this question may be better understood by looking at the reasons why the concept of blending developed so rapidly in the United States and why its development was slower in Europe and elsewhere.

Slide 14. The major sources of N, P, and K were and still remain on the periphery of the United States while the major market for fertilizer in the Corn Belt is in the center of the country. Therefore, the cheapest way of supplying the farmers was to bring N, P, and K products together in the use area and to mix them for economic application. Since farm size is large enough to justify bulk supply and application, transportation of the primary raw materials is also cheapest in bulk. In the United States, fertilizer blending developed most rapidly in the "Corn Belt" where the use of nitrogen is high. By the late-1960s, anhydrous ammonia and nitrogen solutions had gradually replaced a major portion of the growth in solid nitrogen fertilizer use. Today the major nitrogen source of the U.S. farmer remains anhydrous ammonia and nitrogen solutions. Because these liquid nitrogen fertilizers are applied separately from the dry fertilizers, most bulk blends in the United States are low in nitrogen. Blending of nongranular and semigranular fertilizers began in the "Corn Belt" in the 1940s. By 1947, at least four blenders were reported to be operating in the state of Illinois. These rather crude blends were generally made from such materials as ground phosphate rock and nongranular superphosphate, ammonium sulfate, and potash; they tended to cake and were difficult to apply uniformly. The development of modern granulation technology in the 1950s lead to the widespread availability of granular nitrogen, phosphate, and potash materials by the mid-1960s. These materials were well suited for the manufacture of homogeneous free-flowing blended fertilizers.

About this time, because of the increased use of directly applied anhydrous ammonia and nitrogen solutions, a strong demand developed for phosphorus (P) and potassium (K) fertilizers containing little or no nitrogen. With this fertilization practice, and because fields are large (typically 50-100 ha), farmers used tailor-made bulk blends for each field based on soil tests for P and K. This gave the American farmer the flexibility to fertilize each field differently. This flexibility also nicely served the concept of applying the required P and K fertilizer before planting followed by multiple applications of nitrogen at the times and rates defined by the climate, soil, and crop. Fertilizer blenders developed this "prescription-type" fertilization practice (including custom application) as a marketing tool which fitted well with the farmers' needs.

However, it should be noted that such an approach is not always the most cost-effective way when fields are small and when fertilizer is sold in bags. In the U.S. market, blends are usually mixed and spread within a few hours. Bagged blends need special precautions in production and storage.

Slide 15. As fertilizer production developed in Europe during the early to mid-1900s, granulation plants produced relatively high-analysis NPKs. Tailor-made blends were generally not available because materials suitable for blending were not available. Most straights were powdered, low-analysis products. The availability of suitable analysis compound fertilizers such as 26-13-0, 20-20-0, and 15-15-15 slowed the development of blends. Ammonium nitrate was, and continues to be, the preferred straight nitrogen fertilizer. Recently, however, the use of blends is beginning to increase as many of the older compound fertilizer plants are being closed for economic reasons.

Slide 16. In developing countries, the quantitative need for fertilizers containing all three primary nutrients (N, P, and K) for use at planting time is not, even at this date, clearly defined. For the small farmer with an average of 4 ha of land and an average field size of less than 0.5 ha, the convenience and value of using multinutrient fertilizer treatments is questionable. Adequate supplies of concentrated sources of straight N, P, and K fertilizers at the village level together with farm-level education on their correct use could lead to cost effective use of fertilizer at the farm level. This is particularly the case with those farmers growing modern rice and wheat varieties which use relatively high levels of nitrogen fertilizers which are applied at intervals after planting the crop. It should also be noted that these small farmers in the developing countries account for about 40% of the world's total fertilizer consumption.

The potential of adulteration of blended fertilizers along with difficulties in consistently obtaining physically and chemically compatible raw materials has also hindered the development of bulk blending in developing countries.

Slide 17. Other reasons most often cited for the slow development of blending worldwide are:

1. When using a multinutrient fertilizer, farmers are accustomed to compounds which look more homogeneous; they perceive blends to be inferior.

2. The promotion of blends requires a stronger marketing effort which is often weak or lacking, especially in the developing countries.

3. The production of good-quality blends requires ingredients that are granular and closely matched with regard to particle size. Such materials are not always readily and economically available – especially in many of the developing countries.

4. It is more difficult to uniformly incorporate small quantities of secondary and micronutrients in blends than it is to incorporate them in compounds.

5. Producers of compounds have little incentive to promote the widespread production and use of blends since, in most markets, such blends would be a replacement for compounds.

Slide 18. How much do blending plants cost?

Slide 19. The cost of a blending plant can vary quite widely. A typical plant in a developing country location may cost in the range of $1.5 to $3.5 million. Blending plants in the United States seldom cost more than $0.5 million because large storage facilities are not needed.

In the United States raw materials are readily available and transport facilities are good. Thus, the U.S. blender does not have to maintain large on-site inventories of raw materials.

Slide 20.

Blending Plant in a Developing Country	Approximate Range in Cost, Million US $		
Machinery and other mechanical equipment	0.3	-	0.5
Bulk raw material and bagged product storage	1.0	-	2.5
Administration and maintenance facilities	0.2	-	0.5
TOTAL	1.5	-	3.5

Storage for ship-load quantities of raw materials is usually the largest cost item.

Slide 21.

Slide 22.

Slide 23. This slide shows the approximate fixed capital investment required for alternative NPK production processes. Refer to Table 1 for a breakdown of estimated fixed capital investment.

Slide 24. The resulting production cost for a 15-15-15 fertilizer is shown. Refer to Table 2 for a breakdown of estimated production cost.

These cost data are for illustration only and could vary significantly depending upon a number of site-specific factors.

Slide 25. How much fertilizer can a typical blending plant produce?

A granulation plant runs continuously and its output is in tonnes per year. A blending plant with much lower capital generally operates on an "as-required" seasonal basis. A blend plant output is quoted in tonnes per hour. Even the simplest blending plant can produce 15 to 20 tonnes per hour. The annual capacity depends almost entirely upon the length of the consumption (production) season. If a 15-tonne-per-hour plant operates for an average of 6 months per year, it could produce about 50,000 tonnes per year. An average blending plant in the United States produces only about 5,000 tonnes per year because of the very short spring planting season. However, the operating rate of many of these U.S. plants is quite high – about 50-100 tonnes per hour – because they must meet a very high seasonal demand often over a period of less than 8 weeks.

The annual capacity of a blending plant depends almost entirely upon the length of the fertilizer consumption season and the amount of product storage (inventory) that is economically feasible to maintain.

Table 1. Estimated Fixed Capital Investment for Various NPK Production Processes – 120,000 Tonnes Per Year at 75% Capacity Utilization Developing Country Location

	NPK Production Process			
	Bulk Blending	Compaction Granulation	Steam Granulation	Chemical Granulation
	(US $ x 1 million)			
Battery-limits process unit	0.4	4.6	5.9	9.4
Bulk storage (dry raw materials and products)[a]	1.6	1.6	1.6	1.1
Bagged product storage[b]	0.5	0.5	0.5	0.5
Liquid storage (ammonia, phosphoric acid, and sulfuric acid)[c]	-	-	-	1.6
Auxiliary and support facilities[d]	0.4	1.0	1.2	1.9
Total Installed Cost	2.9	7.7	9.2	14.5
Project management and startup[e]	0.1	0.4	0.5	0.7
Interest during construction[f]	0.2	0.6	0.7	1.2
Total Fixed Capital Investment	3.2	8.7	10.4	16.4

a. 22,000 tonnes total, except 15,000 tonnes for chemical granulation.
b. 5,000 tonnes total.
c. 3,000 tonnes each for ammonia, phosphoric acid, and sulfuric acid.
d. 15% of cost of process unit and total storage facilities.
e. 5% of total installed cost.
f. 8% of total installed cost.

Table 2. Estimated Production Cost for Various NPK Production Processes – 15-15-15 Product
120,000 Tonnes Per Year at 75% Capacity Utilization
Developing Country Location

	NPK Production Process			
	Bulk Blending	Compaction Granulation	Steam Granulation	Chemical Granulation
	(US $/tonne product)			
Fixed Cost[a]				
Operating labor	1.4	2.9	2.9	3.5
Overhead and general expenses[b]	1.4	2.9	2.9	3.5
Maintenance (labor and materials)	0.5	2.6	3.1	4.8
Insurance and taxes[c]	0.2	0.6	0.8	1.2
Fixed capital recovery[d]	4.6	12.4	14.8	23.3
Subtotal	8.1	21.4	24.5	36.3
Variable Cost				
Electricity (US $0.04/kWh)	0.2	2.0	1.2	2.0
Steam (US $10.0/tonne)	0.0	0.0	0.6	0.3
Water (US $0.5/tonne)	0.0	0.0	0.5	1.0
Fuel (US $8.0/million kcal)	0.0	0.0	1.4	0.8
Bags	10.0	10.0	10.0	10.0
Contract labor (bagging)	1.0	1.0	1.0	1.0
Miscellaneous chemicals and supplies	0.3	0.5	0.7	1.0
Raw Materials	138.9	126.8	126.8	128.9
Subtotal	150.4	140.3	142.2	145.0
Total Production Cost	158.5	161.7	166.7	181.3

a. Refer to Table 1 for total fixed capital investment estimates.
b. 100% of operating labor.
c. 1.0% of total installed cost.
d. 17.1% of total fixed capital investment (15 years at 15% annual interest rate).

Slide 26. What are the major advantages of blending compared with other methods for producing mixed (multinutrient) fertilizers?

1. Blending plants are relatively inexpensive to build and operate. A blending plant in a developing country with a capacity of 100,000 tonnes per year may cost less than US $3.0 million; whereas, a chemical-type granulation plant with the same capacity may cost US $10-$15 million.

2. Blending plants can be operated on an intermittent basis without adversely effecting product quality.

3. Blending plants can make small batches of product – for example, 1-5 tonnes and the grade can be changed for every batch. One highly automated plant in Thailand produces 50-kg (single bag) batches. A chemical granulation plant usually needs to produce at least 200 tonnes per grade for economic and quality purposes.

4. Blending plants can use a large variety of raw materials because they are not as tightly restricted by chemical reaction criteria as are the chemical-type granulation plants. Precautions about raw material compatibility in blending plants are discussed next.

Slide 27. How does one make good-quality blends?

The four essential elements needed to make good-quality blends are:

1. Use raw materials that are *compatible* with respect to particle size and chemical reactivity.

2. The individual ingredients must be *carefully weighed.*

3. The ingredients must be *thoroughly mixed.*

4. After mixing, the blended product must be *carefully handled* to avoid separation (segregation) of the individual ingredients.

A more detailed discussion of these four essential elements follows.

Slide 28. This sample illustrates the result of a uniform particle-size distribution of two different materials contained in the blend. The individual materials in such a mixture do not tend to separate (segregate) when the blend is handled or transferred.

Slide 29. This sample illustrates severe segregation. The larger particles tend to accumulate on the outside of a pile while the smaller particles accumulate near the middle or core of the pile. In the case of a bag of fertilizer, the smaller particles move toward the bottom.

Slide 30. The degree of particle-size compatibility is determined by analyzing the particle-size distribution of each material used in the blend.

Slide 31. Test sieves are used for this purpose.

Slide 32. The particle-size distribution (particle size compatibility) of the materials can be compared in a number of ways. Plotting the test sieve results on a simple graph gives a good visual impression.

Slide 33. Chemical compatibility

Slide 34. Some fertilizer materials *naturally tend to react* with each other, especially during *long-term storage* in bags. Table 3 shows the chemical compatibility of some commonly used blend materials. Others not shown are compatible.

Slide 35. These *mixtures should be avoided* because they are not chemically compatible.

Slide 36. 1. Urea plus ammonium nitrate or ammonium nitrate-containing materials. These urea mixtures are the most reactive of all common fertilizers and therefore should be completely avoided.

	INCOMPATIBLE
L	LIMITED COMPATIBLITY
OK	USABLE (RANGES FROM DRY TO SLIGHTLY MOIST & STICKY IN SPOTS BUT ACCEPTABLE)

	TRIPLE SUPERPHOSPHATE	20-20-0 NITRIC PHOSPHATE	UREA	AMMONIUM NITRATE	AMMONIUM SULFATE	DIAMMONIUM PHOSPHATE	POTASSIUM CHLORIDE	POTASSIUM NITRATE	17-17-17 NITRATE BASED	13-13-13 SULFATE BASED	11-55-0 AMMONIUM PHOSPHATE
20-20-0 NITRIC PHOSPHATE	OK										
UREA	L										
AMMONIUM NITRATE	OK	OK									
AMMONIUM SULFATE	OK	OK	OK	OK							
DIAMMONIUM PHOSPHATE	L	OK	OK	OK	OK						
POTASSIUM CHLORIDE	OK	OK	OK	OK	OK	OK					
POTASSIUM NITRATE	OK	OK	OK	OK	OK	OK	OK				
17-17-17 NITRATE BASED	OK	OK	OK	OK	OK	OK	OK	OK			
13-13-13 SULFATE BASED	OK	OK	OK	OK	OK	OK	OK	OK	OK		
11-55-0 AMMONIUM PHOSPHATE	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	
AMMONIUM NITRATE-LIMESTONE 26-0-0	OK	OK		OK	OK	OK	OK	OK	OK	OK	OK

Table 3. Chemical Compatibility of Various Fertilizer Salts After 7 Days in Closed Bottle at 30°C.

Slide 37. 2. Urea plus single or triple superphosphate.

Slide 38. 3. Diammonium phosphate plus single or triple superphosphate.

Avoidance of these mixtures is especially important if the blend is going to be bagged and stored for any appreciable length of time.

Slide 39.
Slide 40. Before making a large quantity of a blend containing any new or unfamiliar material, always *make a small test batch* to determine if the material is chemically compatible with the other ingredients of the blend, either by visual examination or using the small bag caking test.

Slide 41.
Slide 42.
Slide 43. After selecting materials that are physically and chemically compatible, the next step is to *accurately weigh* each ingredient of the blend.

Slide 44. Although some blending plants measure the materials by volume, this should be avoided because the volume-to-weight relationship of most materials varies widely.

Slide 45. After careful weighing, the ingredients of the blend must be thoroughly mixed.

Slide 46. Many types of mixers are used –

Slide 47. 1. Concrete-type.

Slide 48. 2. Rotary drum-type.

Slide 49. 3. Paddle-type.

Slide 50. 4. Screw-type.

Slide 51. 5. Layering-type.

Slide 52. 6. Tower-type.

Slide 53. Rotary mixers are most common in the United States and give good results.

Slide 54. In the United States, most mixers are operated on a batch basis.

Slide 55. Internationally, there are some high-capacity plants that use a system based on continuous weighing and mixing.

Slide 56. After mixing, special care in handling is needed to avoid the risk of unwanted segregation (separation) of the individual materials in the blend. Especially in blends where the materials are not completely matched.

Slide 57. Special handling precautions for blends handled in bulk –
Slide 58. 1. Baffles in storage hoppers, trucks, or rail
Slide 59. wagons.
Slide 60.

Slide 61. 2. Multiple piles in storage bins, trucks, or rail wagons.

Slide 62. Immediate bagging of blends is recommended to minimize risk of *segregation* and adverse climatic effects; for example, the *absorption of moisture* in humid locations.

Slide 63. Are there any other precautions that should be taken to ensure that the farmer receives a high-quality blended fertilizer?

Yes, the list of precautions is quite variable depending upon the location and particular farming practice. Some of the most important factors besides (1) particle size and chemical compatibility, (2) accurate weighing, (3) careful mixing, and (4) appropriate handling follow.

Slide 64. *Minimize* the use of *urea* in the blend if long-term (in excess of about 3 months) storage is anticipated. The storage properties of urea-based mixtures are quite variable and uncertain.

Slide 65. Do not mix hydrated copper sulfate (micronutrient source) with blends containing urea. Very small quantities of certain hydrated
Slide 66. metallic salts react with urea to form a wet, sticky mass; hydrated copper sulfate is the most notable example.

Slide 67. To minimize the risk of hard caking during storage, a small quantity (about 1%-2%) of *conditioning powder* (clay) should be added to the blend.

Slide 68.
Slide 69.
Slide 70. *Moisture-resistant packaging is essential* for urea-based blends. Bags should be lined with plastic and tightly sealed since most fertilizers naturally tend to pick up moisture from the air. Such packaging is generally advised for all products, especially in humid areas.

Slide 71. **Summary**

1. About 7% of the world's fertilizer is blended (about 26 million tonnes annually).

2. The promotion of blends requires a stronger marketing effort than that required for straight materials or homogeneous compounds.

3. The quality of a blended fertilizer is determined almost entirely by the close matching of the particle-size ranges of the ingredients.

4. The presence of urea adversely affects the physical quality of most blends.

Slide 72.

5. Blending plants are relatively inexpensive to build and operate. Storage for raw materials and products is usually the most costly component in a blending plant.

6. Blending plants are very flexible with respect to capacity and grades that can be produced.

7. It is difficult to uniformly mix small quantities of micronutrients into blends.

Slide 73. 8. Blends that are bagged require special care in preparation to ensure that each bag of product meets the stated guarantee. If bags of blended fertilizer are handled many times they may tend to segregate if particle-size ranges are not closely matched. This problem could become serious if the farmer purchases his fertilizer loose from the retailer.

Slide 74. Fertilizer blending can, in many instances, provide a practical method for supplying multinutrient fertilizers. However, the criteria for producing high-quality blended fertilizers are quite rigid. Thus, the widespread application of blending will depend heavily upon meeting the criteria for production and use as described in this module–particularly well-matched particle-size ranges.

Workshop on

Efficient Marketing of Fertilizers in Cameroon

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Demand Forecasting Techniques

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Demand Forecasting Techniques

The objective of this paper is to introduce and discuss briefly several different forecasting methods available for making fertilizer demand projections. No knowledge of econometrics or advanced forecasting methods is assumed.

Many types of forecasts are needed to support a successful marketing program. Business decisions would be much easier to make if the future pattern of sales were perfectly known. Forecasts are needed to determine the product and geographic markets that will earn the highest returns. Even in markets where profit is not the objective, the government must forecast where the business can make the largest contribution to society.

Forecasts are needed to estimate the level of fertilizer demand or market share with alternative prices, promotional activities, and economic situations. Projections are needed to assess the need for additional production facilities and to evaluate whether present mixing, bagging, handling, warehousing, and transportation facilities are adequate. Forecasts are needed to determine how much fertilizer the company should produce or import and the number of trucks needed to transport the fertilizer and when. Forecasts are needed to estimate the cost of producing fertilizer assuming different levels of technology, wage rates, raw material prices, etc. Forecasts of conditions likely to exist 5 years ahead are needed to guide the planning process.

It is a common practice to differentiate between short- and long-term projections. The decision to be made determines which time period is more appropriate. For example, the general manager deciding whether to build a new urea plant will need annual projections on fertilizer consumption of 10 years or more from now. On the other hand, the retailer considering how many bags of urea to order may only need forecasts on sales in his district for the next 3 months.

Many techniques are available to assist in making these forecasts. These techniques range from simple and inexpensive procedures to methods that are very sophisticated, complex and expensive and require extensive training in econometrics. Some forecasting techniques are basically quantitative; others are qualitative. It is always a good idea to graph your data as a first step to help in selecting the techniques. Regardless of the technique used good forecasts must be based on accurate historical data. Most forecasting techniques used in the fertilizer industry can be divided into the following 12 broad categories:

1. Agronomic requirements
2. Food requirements
3. Leading indicators
4. Survey techniques
5. Graphical extensions of trends
6. Percentage growth rates
7. Absolute changes
8. Expert estimates
9. Delphi method
10. Trend fitting with statistical procedures (regression)
11. Cause and effect regression
12. Other econometric models

There is no best forecasting method. One of the limitations of any forecasting method is that government policies, such as the removal of a fertilizer subsidy or the creation of a major irrigation development, can have a tremendous impact on fertilizer use. Politics and the resulting policies can be very difficult to predict, particularly in the distant future. It is impossible to say that one method is always better than another. For a certain type of forecast, one method may be superior. For another forecast a simpler method may be more practical. It is not worth spending $1,000 on a forecast to make a $100 decision. The method you decide to use should be based on the following factors.

1. <u>The degree of accuracy required</u> – How important is the decision for which this forecast will be used?
2. <u>The amount of time needed to prepare a forecast</u> – If the forecast deadline is in the next few minutes, you do not have time to develop a model.
3. <u>Data available to use in developing your forecast</u> – If historical price data are not available, you cannot develop a model using prices to make the forecast.
4. <u>Accuracy of available data</u> – If you have price data that are not for the same item for all years or are not correct, they may not be useful.

5. Length of forecast – A survey might be used to determine which crops a farmer will grow next year, but might be useless in projecting crop acreage 15 years from now.
6. Availability of computers and computer programs – Regression models can be difficult to use without a computer.
7. Availability of funds and other resources – If you have no money to buy computer time or to hire help for doing a survey, you may be forced to use other methods to make your forecast.
8. Your assumptions about the future – Will events unfold as they have in the past or will there be a substantial change?

Agronomic Requirements

A method sometimes used in projecting fertilizer consumption is based on cropped area and recommended levels of fertilization for each crop. Fertilizer trials under farm conditions determine a fertilizer response curve (production function). Supported by soil or plant analyses and current price relationships of fertilizer and crops, a fertilizer response curve can be used as the basis for the formulation of fertilizer recommendations.

Assumptions about the area to be planted to each crop will enable the forecaster to project fertilizer consumption by multiplying recommended application rates by the expected acreage of each crop. Ideally, this method should be the most accurate of the forecasting techniques; however, past performance has shown that farmers rarely use fertilizer at the recommended rate. Thus, either some percentage of the recommendation must be assumed in order to arrive at the forecast, or actual usage levels per hectare of each crop must be known. Since these detailed data are not available for most countries, this projection method is usually not practical. This procedure can be used to represent the maximum projection level by assuming that farmers fertilize at the recommended rate. This approach is sometimes eferred to as the "agronomic potential."

Food Requirements

Projected fertilizer consumption with this method is derived from projected requirements of food or from nutritional targets to feed the increasing population. Food requirements can be derived from a regression equation (to be explained later in this paper) relating the change in the demand for food to factors, such as projected population growth and the projected change in real disposable income. The per capita consumption of food can also be projected. Introducing a governmental objective of attaining self-sufficiency in food or meeting a specified nutritional level will then determine production targets. The future areas of each crop must then be projected. The required increases in yields to meet the production requirements can then be estimated. These projected yield increases then determine the projected change in fertilizer consumption, either by subtracting the projected values of the various other yield-increasing factors, by making use of a fertilizer response curve, or by postulating a fixed ratio between yield and fertilizer consumption. Key variables in this type of forecast are food consumption per capita, population growth rates, shifts in diets to more meat as income levels increase, fertilizer use per hectare of each crop, and changes in area of each crop. This is a more theoretical way to make fertilizer consumption projections. Because much of the data needed must also be projected, this method may not be practical. However, it may be used as a check with other projection methods.

Leading Indicators

One method for making short-term forecasts is with the use of leading indicators. If a forecaster has the good fortune to discover an economic series that leads (precedes) the one he is trying to forecast, he can use the leading series to forecast short-term changes just as a meteorologist uses changes in a mercury barometer to forecast changes in the weather.

This approach to forecasting has been used for centuries. Merchants, thousands of years ago, used the arrival of trading ships as leading indicators of business activity. Andrew Carnegie, a U.S. industrialist, is reported to have used the number of smoking industrial chimneys to forecast business and the demand for steel. Today, many economists measure the health of the U.S. economy by the amount of newspaper space used for "help-wanted" advertisements. If the economy is good, companies will be hiring; hence, more advertisements will be placed. Therefore, help-wanted space is a leading indicator. In most cities a building permit must be issued before a house is built. Thus, building permits become a leading indicator of the demand for construction materials.

The possible leading indicators for fertilizer market demand in a country, for example, might be the average farm income of the previous year, the amount of credit used by farmers by a certain date, or the amount of high-yielding seeds sold by a certain date prior to planting time. Higher crop prices may increase the demand for fertilizer for the following crop and thereby increase price. Thus, crop prices may be a leading indicator for fertilizer prices.

In practice, the use of leading indicators is not as simple as it might seem. There are very few series that always correctly indicate changes in another economic variable. The indicators that have good records of forecasting directional changes fail to lead by a consistent period. Even those that lead by a predictable period may not provide accurate information about the magnitude of change that can be expected.

If there are several leading indicators for a variable you want to predict, it is possible to combine these into an index that is "smoother" and has less random fluctuation. It is even possible to weight these indicators by their importance. Such a series may have less tendency to produce false signals of change for the predicted variable.

Another way to use more than one leading indicator is to determine the number of "leading" indicators that are rising or falling at a given point in time and express this as a percentage. For example, if you have 10 leading indicators that are relatively reliable in predicting fertilizer demand and 8 are rising, the index would be 80%.

However, even with these two indices for leading indicators, it is still difficult to estimate the change in an economic variable. Leading indicators are still very helpful in short-run forecasting, especially in calling the turning point. This procedure is obviously not suitable for long-range forecasting.

Surveys

Short-term forecasting is often based on surveys. Each month in the United States, from July through November, the U.S. Department of Agriculture (USDA) surveys a sample of farmers asking each one how many bushels per acre of corn or other crops they feel they will produce based on current conditions. This survey helps USDA forecast each month how large this year's production is likely to be. Each month a new survey is taken that reflects changes in crop conditions during the past month. USDA also makes a similar survey to find out how much fertilizer is applied to each crop.

Many privately owned companies also make farmer surveys. They might ask farmers what fertilizers, pesticides, and herbicides they plan to use during the next cropping season. Using the results of these surveys, companies then plan their manufacture of these products and inventory levels at their retail outlets.

In taking a survey it is important that the selected sample represents the "population" in which you are interested. The most simple strategy is to list all farmers and then *randomly* select a small number from the entire list to survey. Each farmer should have an equal chance of being included in the survey. Depending upon the variation within the population and the degree of precision needed, a small sample can generally be used to predict the same statistic for the entire population. Formulas are available to compute the actual sample size needed.

If we were trying to forecast fertilizer usage for the country, we might find out we needed to sample only 500 farmers. The smaller the sample error we want and the more variability we have in usage the more farmers we have to survey. We would sample these farmers at *random* and then apply these results to all farmers in the country.

A *stratified random sample* could be used to measure anticipated fertilizer usage by maize farmers and rice farmers. We could stratify these farmers into two groups and draw a random sample from the rice farmers and a random sample from the maize farmers. We would then analyze how each type of farmer plans to change usage this year compared with last year. By knowing how much fertilizer was used by rice farmers and maize farmers last year, we could estimate how fertilizer usage this year would change.

Cluster sampling is where, instead of trying to randomly select farmers to interview from a list of all farmers in the country (such a list may not be available), we divide the country into many small geographic areas or "clusters" and sample all farmers within randomly selected clusters.

It is very important that the questionaire is designed so that the questions are clear and not asked in such a way as to bias the answer. Interviewers have to be properly trained. Personal interviews are likely to be expensive and time consuming. However, surveys can be very helpful in making short-term forecasts.

Surveys are helpful in short-range forecasting but are obviously not suited for long-range forecasting because respondents generally have not made plans for 5-10 years ahead.

Graphical Extensions of Trends

Regardless of the forecasting method to be used, historical data should first be plotted to recognize trends that are occurring. One of the most simple and probably most common method of forecasting is extending these trends to future years with the use of a ruler or a straightedge.

In extending trends graphically you project the future by freehand if cycles or seasonalities are present. If the data do not contain seasonals or cycles, you can "eyeball" a trend line by extending the path of the historical data. This is known as trend extrapolation. No mathematical formulas are involved.

There are three major advantages of graphical analysis compared to statistical models.

1. It saves time. For this reason they are widely used in business where approximate results must be obtained in the minimum time.
2. Graphic curves are more flexible than rigid mathematical functions and, hence, may fit the data more closely. If the data contain obvious highs and lows that were caused by unusual circumstances, these can be easily ignored.
3. Graphical projections are very easy to explain to others.

There are just as many major disadvantages. This procedure reflects the subjective errors of the analyst. His personal bias, mistakes in judgment, and optical errors all affect the results. Mathematical curves can be expressed by formulas that provide the best fit according to some stated criterion. Such results have at least the appearance of greater exactness than do hand-drawn curves and, hence, may carry more conviction with the reader.

In extending trends it is important to recognize cycles and seasonalities. Sometimes these cycles are predictable. The fertilizer industry is also characterized by cycles. Firms tend to overexpand when profits are large and fail to expand fast enough to meet future demand when prices are low. These tendencies cause fertilizer prices to also be very cyclical. In doing any type of short-term forecasting, it is important to recognize which stage of the cycle you are in.

In addition to cycles, it is also important to recognize seasonalities. An analysis of seasonalities can vastly improve short-term forecasting results. For example, maximum fertilizer usage normally occurs at the major planting time while the lowest consumption is in the winter months. In projecting monthly consumption, this must be taken into consideration.

If monthly sales data for a particular product indicate that, on the average, March sales are 20% above the average for the year, this must be reflected in your projections. Likewise, if December is 20% below the average, this should also be considered.

Annual sales might be estimated at $120,000 or $10,000/month. However, the March sales projection would be adjusted to $12,000 (1.20 x $10,000), and December sales would be adjusted to $8,000 (.80 x $10,000). Graphing historical data first helps us recognize both seasonals and cycles that are in the data.

Graphs utilizing 12-month moving averages are sometimes used to remove seasonalities. In doing this the point graphed for each month is the average value for the preceding 12 months. This makes a smoother graph, but it takes considerably more time to construct the graph if monthly data for several years are used.

Percentage Growth Rates (Historical Growth Rates)

A common method that is used in making projections is to look at what growth rates have been in recent years and to assume that each year in the future consumption will increase at this rate.

This procedure is very often used, but it is generally a very poor method. If we are projecting fertilizer consumption, we might calculate the percentage increase and note that increases during the past 5 years have ranged between 9% and 11% (Table 1). Unless we have a valid reason not to, we probably will project that this kind of growth will continue. We might estimate that the average annual growth during the next 5 years will be 10%.

Table 1. **Percentage Change in Fertilizer Consumption From Previous Year**

1983	9.3
1984	8.5
1985	11.0
1986	10.8
1987	8.0
1988	9.2
1989	10.3
1990	9.5
1991	9.8
1992	9.9
1993	10.1
1994	Assume 10.0% annual increase
1995	
1996	
1997	
1998	

Most countries with substantial consumption are increasing consumption at a slightly slower growth rate each year because the base becomes larger and the percentage increase is harder to maintain as the market becomes mature. The curve representing a country's consumption increasing at a constant percentage bends upward (Figure 1). A related approach is to project a future year at a compound growth rate and then connect the beginning and ending points.

Table 2 shows what the consumption of each nutrient would be, assuming various growth rates and 100 mt consumption in Year 0. The curve in Figure 1 was derived using a 10% annual compound growth rate. Table 3 uses the same Year 10 consumption for each rate, but has the same annual absolute increase each year. The plot of these figures is a straight line. The straight line in Figure 1 was plotted from the 10% growth rate shown in Table 3. Note in Table 3 how the growth rate from year to year varies using this procedure. Again, using a 10% compounded rate until Year 10 and then assuming the same absolute increase each year (straight line), the rate of growth varies from 15.9% in Year 1 to only 6.5% in Year 10.

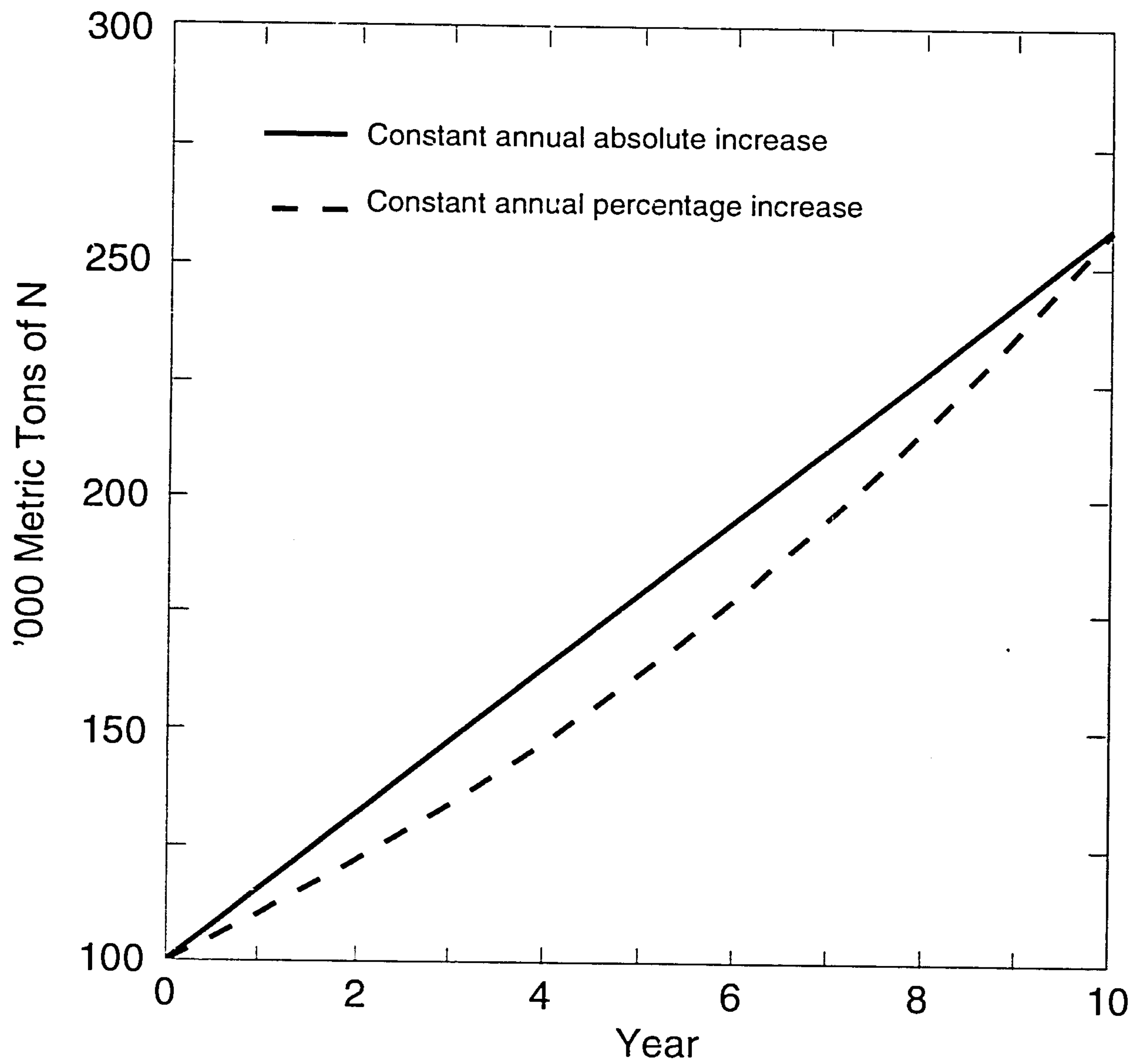

Figure 1. Two Ways to Reach 10% Compounded Annual Growth at the End of 10 Years.

Table 2. **Fertilizer Consumption Based on Various Growth Rates Each Year**

Rate	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
5.00	100.0	105	110	116	122	128	134	141	148	155	163
6.00	100.0	106	112	119	126	134	142	150	159	169	179
7.00	100.0	107	114	123	131	140	150	161	172	184	197
8.00	100.0	108	117	126	136	147	159	171	185	200	216
9.00	100.0	109	119	130	141	154	168	183	199	217	237
10.00	100.0	110	121	133	146	161	177	195	214	236	259
11.00	100.0	111	123	137	152	169	187	208	230	256	284
12.00	100.0	112	125	140	157	176	197	221	248	277	311
13.00	100.0	113	128	144	163	184	208	235	266	300	339
14.00	100.0	114	130	148	169	193	219	250	285	325	371
15.00	100.0	115	132	152	175	201	231	266	306	352	405

Table 3. **Fertilizer Consumption Based on Various Compound Growth Rates for 10 Years With Straight Line Connection This Year and Value 10 Years From Now** (Number underneath in parentheses is annual growth rate)

Percentage Rate	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
5.00	100.0	106	113	119	125	131	138	144	150	157	163
		(6.3)	(5.9)	(5.6)	(5.3)	(5.0)	(4.8)	(4.6)	(4.4)	(4.2)	(4.0)
6.00	100.0	108	116	124	132	140	147	155	163	171	179
		(7.9)	(7.3)	(6.8)	(6.4)	(6.0)	(5.7)	(5.4)	(5.1)	(4.8)	(4.6)
7.00	100.0	110	119	129	139	148	158	168	177	187	197
		(9.7)	(8.8)	(8.1)	(7.5)	(7.0)	(6.5)	(6.1)	(5.8)	(5.5)	(5.2)
8.00	100.0	112	123	135	146	158	170	181	193	204	216
		(11.6)	(10.4)	(9.4)	(8.6)	(7.9)	(7.3)	(6.8)	(6.4)	(6.0)	(5.7)
9.00	100.0	114	127	141	155	168	182	196	209	223	237
		(13.7)	(12.0)	(10.7)	(9.7)	(8.8)	(8.1)	(7.5)	(7.0)	(6.5)	(6.1)
10.00	100.0	116	132	148	164	180	196	212	228	243	259
		(15.9)	(13.7)	(12.1)	(10.8)	(9.7)	(8.9)	(8.1)	(7.5)	(7.0)	(6.5)
11.00	100.0	118	137	155	174	192	210	229	247	266	284
		(18.4)	(15.5)	(13.4)	(11.9)	(10.6)	(9.6)	(8.7)	(8.0)	(7.4)	(6.9)
12.00	100.0	121	142	163	184	205	226	247	268	290	311
		(21.1)	(17.4)	(14.8)	(12.9)	(11.4)	(10.3)	(9.3)	(8.5)	(7.8)	(7.3)
13.00	100.0	124	148	172	196	220	244	268	292	316	339
		(23.9)	(19.3)	(16.2)	(13.9)	(12.2)	(10.9)	(9.8)	(8.9)	(8.2)	(7.6)
14.00	100.0	127	154	181	208	235	262	290	317	344	371
		(27.1)	(21.3)	(17.6)	(14.9)	(13.0)	(11.5)	(10.3)	(9.4)	(8.6)	(7.9)
15.00	100.0	130	161	191	222	252	283	313	344	374	405
		(30.5)	(23.3)	(18.9)	(15.9)	(13.7)	(12.1)	(10.8)	(9.7)	(8.9)	(8.1)

We should note here that a small change in the slope of your line or in the annual rate of change does not make much difference in your projections the first year, but it has a big impact on projections several years in the future. The longer the projection period used, the larger the difference becomes. If consumption in 1993 is 250 tons there is not much difference in a 5% and a 6% forecast for 1994. However, look at the difference a 5% versus 6% annual growth makes by the year 2010 (Table 4).

Table 4. **Table Illustrating Difference a 1% Change in Growth Rate Makes**

Year	Growth Rate 5%	Growth Rate 6%	Difference
1993	250	250	0
1994	262	265	3
2000	352	376	24
2010	573	673	100

Absolute Changes

A similar procedure is to project a constant absolute change each year, if past changes have been relatively constant (Table 5). Note that a constant increase implies a smaller percentage change each year. For example, an increase of 50 from 1,000 to 1,050 is a 5.0% growth, but an increase of 50 from 1,800 to 1,850 is only a 2.8% growth. A projection that is a straight line represents a constant absolute change each year.

Markets may vary in maturity. For example, increases in fertilizer consumption generally occur in three phases. Phase one represents the rapid growth during early stages of development. Phase two is the transition period between rapid development and a mature market and is characterized as a rising straight line. Phase three is the older mature market in which decreasing rates of increase are observed. In making projections it is important to recognize which phase you are in. This is a major limitation of assuming that today's and yesterday's rates of increase (either on a percentage or absolute basis) will be those experienced in 5 or 10 years.

Table 5. **Absolute Change in Consumption From Previous Year**

Consumption		Percent Increase From Previous Year
1982	1,000	-
1983	1,050	5.00
1984	1,100	4.76
1985	1,150	4.55
1986	1,200	4.35
1987	1,250	4.17
1988	1,300	4.00
1989	1,350	3.85
1990	1,400	3.70
1991	1,450	3.57
1992	1,500	3.45
1993	1,550	3.33
		Projections
1994	1,600	3.23
1995	1,650	3.12
1996	1,700	3.03
1997	1,750	2.94
1998	1,800	2.86
1999	1,850	2.78

Expert Estimates

Another way to forecast consumption is to let "experts" who are familiar with farmers and the farming conditions estimate fertilizer usage. The estimate is based on the experts' "opinion" rather than a formalized procedure. These experts can estimate nationally or several experts can be used, allowing each to estimate fo he region with which he is most familiar and then combining these regional estimates to obtain a national estimate. This method is usually limited to short-term projections. The validity is only as good as the experts selected.

Delphi Method

A related method is the "Delphi Method" which takes individual estimates of several "experts" and returns them to each "expert" to be revised after the group's projections are reviewed. This starts a second round of individual estimates. The degree of consensus should improve with each round.

Trend Fitting With Statistical Models (Regression)

The most frequently used method of making projections is by extrapolation of historical trends. Projections based on past trends assume that the events in the future will unfold as they have in the past. It assumes that there will be no unpredictable shocks to the system, such as wars, strikes, flood, recession, or drought.

Trend extrapolation can be done graphically, or a simple mathematical equation can be used to describe the historical data (called a "time series" in statistics). An equation provides an objective and concise expression, but the form of the equation places certain limitations on the possible shapes of the fitted curve.

The most widely used procedure to determine the "best" equation to fit the historical data is that of "least squares." This criterion states that the best fitting curve is the one in which the sum of the squared deviations of the data from the trend line is the smallest. This criterion requires that the sum of the deviations of the data above the trend line must equal the sum of the minus deviations below the line so that the grand total of the deviations is zero.

The general equation of the straight trend line is

$$Y = a + bX$$

where

$Y =$ the value of the time series or the dependent variable. Y might be fertilizer consumption in Year X.

a = a constant that represents the value of Y (fertilizer consumption) when X is zero.

b = the slope of the trend line (or the change in fertilizer consumption each year in our case).

X = the independent variable or the value that is known. In our case we let X be the year, i.e., 1990.

By taking a very simple example, we can derive the equation for the line. This is done only to show how the regression line can be fitted to the data.

Table 6. **A Hypothetical Example of Fertilizer Consumption**

Year	Fertilizer Consumption ('000 tons)
X	Y
1987	1
1988	2
1989	3
1990	4
1991	5
1992	6
1993	7

These values are plotted in Figure 2. Thus we see that Y would be zero when X = 1986 and the line increases 1 unit per year (or 1,000 tons). Thus our equation should be Y = -1986 + 1.0X. We can prove this is so by solving equations for the constant term and the regression coefficient (slope).

To mathematically find a (constant term) and b (slope) in our equation, we solve the following equations:

Equation (1) $\Sigma Y = Na + b\Sigma X$

Equation (2) $\Sigma XY = a\Sigma X + b\Sigma X^2$

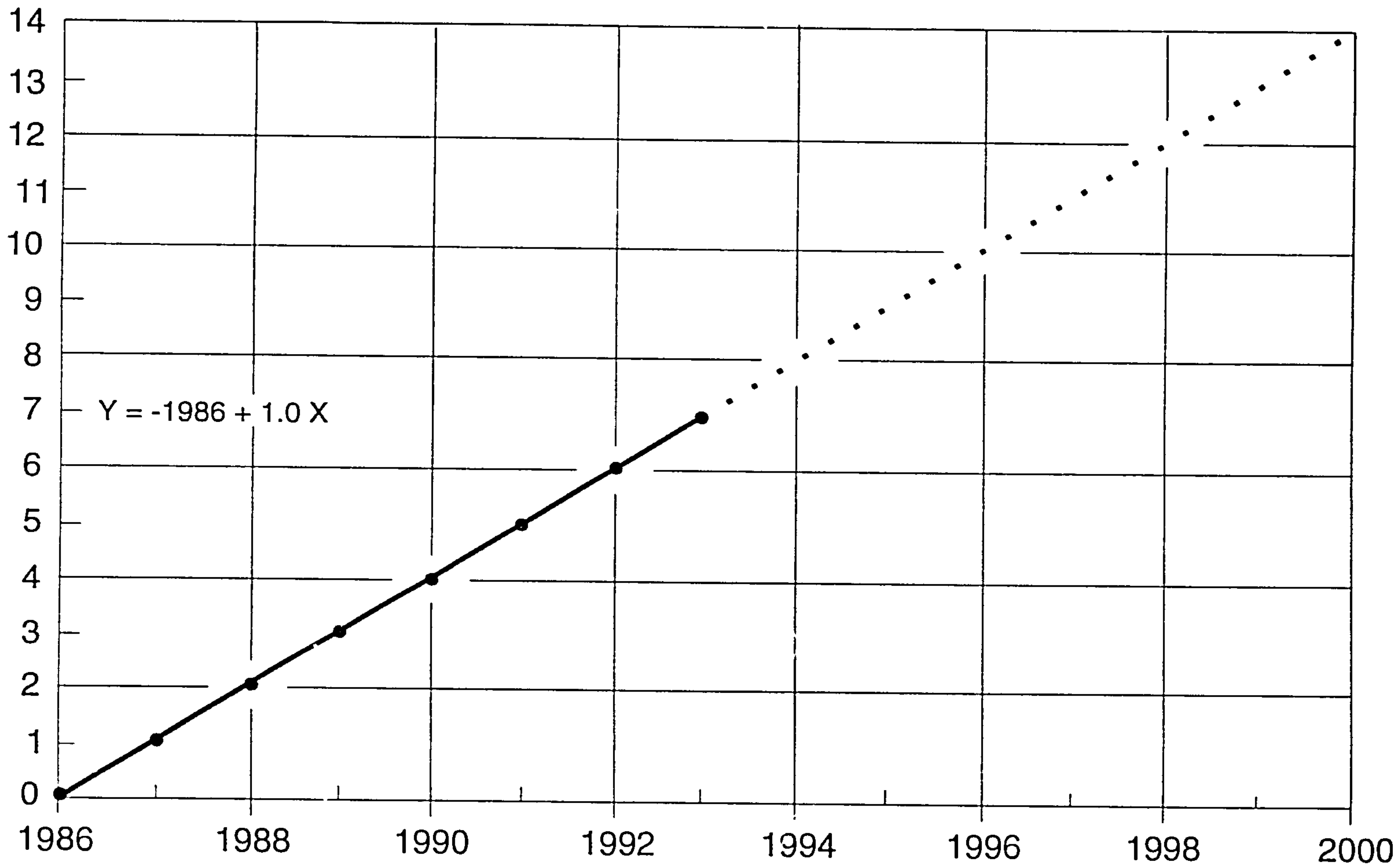

Figure 2. Fertilizer Consumption by Year.

Substituting the values from Table 7 and using Equations 1 and 2 the equations now can be simplified.

Table 7. **Computation for the Simple Example**

Year X	Consumption Y	XY	X^2
1987	1	1,987	3,948,169
1988	2	3,976	3,952,144
1989	3	5,967	3,956,121
1990	4	7,960	3,960,100
1991	5	9,955	3,964,081
1992	6	11,951	3,968,064
1993	7	13,951	3,972,049
13,930	28	55,748	27,720,728
ΣX	ΣY	ΣXY	ΣX^2

Equation (1) $28 = 7a + 13{,}930b$
Equation (2) $55{,}748 = 13{,}930a + 27{,}720{,}728b$

Multiplying Equation (1) by -1990 to get rid of the "a" term we get
Equation (1) $-55{,}720 = -13{,}930a - 27{,}720{,}700$
Equation (2) $55{,}748 = 13{,}930a + 27{,}720{,}728b$

Adding the two equations we obtain
$28 = 28b$ or $b = 1$ (slope) and substituting for b in equation 1
means $a = -1986$ = (constant) or $Y = -1986 + 1.0X$

which, as we could see earlier in this very simple example, is our equation. Generally, the data do not all lie on a straight line and, thus, we cannot determine its equation without doing the calculation.

You can see from these simple calculations how difficult it is to calculate regressions manually, particularly if there are several variables and many observations.

There are calculators that allow you to compute the coefficients fairly easily. However, these generally can handle only one dependent variable (Y) and one independent variable (X). There are many computer programs that have been developed to calculate regressions and the associated correlations. At IFDC the program that is generally used is the Statistical Analysis System (SAS). There are a number of regression programs that are available for microcomputers. These programs are probably available in your country. The LOTUS 1-2-3 spreadsheet also has the capability to calculate regressions.

Cause and Effect Regression Techniques

These techniques seek to establish a causal relationship between fertilizer use and one or more factors influencing demand. These factors might include crop prices received by farmers, fertilizer prices paid by farmers, credit availability, interest rates, farm income, irrigated area, area seeded with high-yielding varieties, the availability of crop markets, fertilizer availability, rainfall, crop mix, government's fertilizer price subsidies, crop support prices, and number of retailers. For policy analysis and planning, cause and effect models are more meaningful than other methods including trend extrapolation. An example of this type of model might be

$$Y = a + b_1X_1 + b_2X_2$$

Fertilizer use = 10.0 + 1.5 x rice price + 3.2 x urea price.

Selecting the variables to include in the equation is an important part of this technique; usually, it is worth running correlations with variables. The variables selected must make economic sense.

Use of causal models requires a considerable amount of accurate data to determine exact relationships. A major limitation is that the values of the demand-influencing factors (independent variables) must also be projected in order to project fertilizer market demand. Indeed, it may be harder than projecting fertilizer consumption because (1) there may be more year-to-year fluctuation in these variables and (2) there are several more variables to estimate. Another problem in the use of regression models, when more than one independent variable is used, is intercorrelations between the variables. Factors, such as irrigated crop area and use of high-yielding varieties (HYVs), are intercorrelated because HYVs tend to be used in irrigated areas; the two factors are not independent but rather highly related factors in explaining variations in fertilizer use. Inaccurate historical data and inappropriate handling of intercorrelations between market forces and other statistical problems can prevent a forecaster from establishing a meaningful causal relationship between fertilizer demand and each demand-influencing factor. There is a big difference between models that "fit" historical data and models that will accurately "predict" future conditions.

Other Econometric Models

We have used a straight line of the formula $Y = a + bX$. With the use of some imagination, we can use the same principles to fit data that are not linear. Other equations used by Harris and Harre (1979) in fertilizer demand projections in various countries included the following:

$$Y = a + b_1X + b_2X^2$$
$$Y = a + b_1 (1/X) + b_2 (\text{Log } X)$$
$$Y = a + b_1X + b_2 (1/X)$$
$$Y = a + b_1X + b_2 (\text{Log } X)$$
$$\text{Log } Y = a + b_1X + b_2 (\text{Log } X)$$

There are also many other types of econometric models that have been used in forecasting. These include various forms of exponential or logarithmic curves including the Gompertz curve, two- and three-stage least squares, simultaneous equations, distributed lag models, instrumental variables, etc. However, the purpose of this paper has been to provide very simple examples of forecasting rather than to cover more advanced topics.

Presentation of Your Forecast

Presentation of forecasting results is very important. Before your manager or the decisionmaker in your company will use your results, he has to understand what you have done and what the limitations are of the forecasting procedure you have used.

Generally, you will be asked to write a report summarizing your results. Do not try to overwhelm your readers with numbers. A short report that is well-written has a much better chance of being read and understood than does a long report full of numbers. Graphs and charts are a good way to present your results. If your forecast is based on certain assumptions, you may want to indicate what effect a change in these assumptions would have on your forecast. In your report, clearly state the methodology and assumptions you have used in making your forecast.

If you can make an oral presentation of your report, it will give you the opportunity to explain much better what you have done and why and to answer questions anyone might have. Again, your presentation should be concise and well organized.

Summary

In this paper, we have briefly discussed several forecasting procedures. Leading indicators and survey techniques are best used for short-term forecasting. Graphical extension of trends, percentage or absolute changes, and trend fitting with statistical procedures are more suited for longer term forecasting. The technique chosen also depends on accuracy required, time available, and data and other resources available. Even after the method used to make our prediction is selected and the forecast is made, the job is not complete until a presentation has been made to management. The presentation can be oral, written, or both. Either way it should be short and concise, but briefly explaining the methodology used, the result, and the implications of the results.

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Workshop on

Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994

Bamenda, Cameroon

Dealer Selection and Development

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Dealer Selection and Development

Introduction

In the agricultural sector, the main recommendations of the on-going structural adjustment program include reduction, even the elimination of subsidies of agricultural inputs (fertilizers, pesticides, agriculture materials, etc.) and the withdrawal of government from activities such as fertilizer procurement.
Practically, the evolution of government's role in many countries was due to the abandon of the direct subsidy.
For fertilizer procurement, there are two categories of countries:
- Countries with heavy public sector involvement
- Countries in which the private sector plays a key role (Senegal and Niger in francophone west Africa).

In the first category, there are countries in transition where the private sector has started to intervene (e.g. Mali in non-cotton zone, Benin with the gradual withdrawal of the state from the importation and distribution of agricultural inputs in cotton production, Cameroon in non-cotton zone).

In the scope of privatization, it is important to have a suitable selection of fertilizer dealers who will be able to play a role in the development of fertilizer use

It is necessary to make policy reforms in view of having favorable conditions for an open and competitive fertilizer markets; but it is also required to focus on the "skills of private sector and cooperative dealers performing the distribution, wholesale, and retail functions that must be broadened in the context of their practical application in a fully market-oriented privatized competitive market"(1).

Distributing a product means to make it available to the consumer.

What is the profile of a good fertilizer dealer? Or in other words how to make a dealer selection? I will introduce this issue in the first part. In the second part I will talk about the essential conditions that dealers will need for their development and the development of the fertilizer market.

I. The profile of a good fertilizer dealer

My analysis will be based on the Senegalese experience concerning the settlement of a private fertilizer distribution network. In Senegal, the government is, over ten years ago now, no more involved in fertilizer distribution, apart from a few crops including cotton, which are still controlled by the public enterprise, the Société pour le Développement du Textile (SODEFITEX). Privatization is effective for cereal fertilizer. The place left by public firms has been filled by SENCHIM, the sales subsidiary of Industries Chimiques du Senegal (I.C.S.). SENCHIM has created a distribution network, composed of private dealers, which covers the regions where great amounts of fertilizer are used.
The private fertilizer procurement network, which exists in Senegal, is particularly due to the fact that a local industry, contrary to the Nigerian case, does not have the State as its major client and has no subsidy on local sales.

A) At the beginning: the sale of fertilizer can be a second activity, the main activity is related to another sector (e.g. food products like sugar, rice, oil, etc.).

- The dealer has to be well established in rural zone, in other words he has to know the agricultural sector.
- He must have suitable warehouses for a good fertilizer storage.
- If the dealer is in a city, he has to be in a position to deliver fertilizer to the consumption areas.
- He has to have his own sales network or the capability to establish it. In Philippines and Senegal, the experience showed that the dealers' (retailers') network is in a better position when dealers are in direct contact with farmers. So, they have the possibility to integrate the farm input business with farmers' credit and farm output marketing.
- He must be aware of farmers' needs (for example to sell small bags of one kilo of fertilizer instead of the usual bag of 50 kilo).

B) In the medium term the successful dealers must be involved in all agricultural input business. They also have to be capable to offer a great choice of inputs to farmers (seeds, fertilizer, pesticides, agricultural equipment). In order to strengthen the distribution network, the dealers have to be supported by big fertilizer suppliers (exporters, importers).

These latter have to give technical support (training in fertilizers, demonstration on farm level, and help in the construction of warehouses, etc.), and commercial support (credit facilities, advertising and promotion, etc.).

With the support of big fertilizer suppliers, the dealers will be the development partners of the farmers, this means they will not only sell but will also give technical advice to farmers.

II. Dealer Development

For this purpose, two keys elements are identified for discussions:

- The price structure
- The need of favorable environment

The price structure

Channel network development can only be sustained if an adequate margin is available in the price structure to govern all real costs (transport, storage, overhead costs, etc.).

In Senegal, fertilizer wholesalers take a minimum net margin of CFA 5000 per ton, the retailer takes CFA 1000 per ton.

Schematically, the price structure of a Senegalese dealer consists of the following elements:

1. purchase price (tax on fertilizer excluded by the government, contrary to Mali, where a tax of 6% of the value price is charged)
2. transport and handling costs
3. financial costs
4. overhead costs (storage, equipment etc.)
5. profit margin
6. losses (0.5% for fertilizer in bags, and 1% for bulk fertilizer)

It is necessary for dealers to have a reasonable profit which will allow them to compensate the risk that the business faces.

The need of favorable environment

In the agricultural sector, privatization has become a key issue according to African policymarkers. It is crucial that Governments continue to play some role in the agricultural sector. The role which should contribute to dealer development may include the following:

- As indicated by Mr. Catalino (1), in Philippines , according to the very low profitability in the fertilizer trade, "some fertilizer traders resort to product alteration and underweight fertilizer bags to survive in the business". Even if the profitability is good, there is a need of effective control of fertilizer (quality and quantity) by the government. Government intervention has to clean the fertilizer market from traders who are not serious.
- In a free market system, the private sector would be allowed to fix its prices. In this case, the State would be eventually discuss margin with the private sector (i.e. rice and cement in some countries).
- The government has to organize the marketing of farm output. Farmers' profitability is immensely affected by factors other than the cost of the input such as their output price. If farmers' profitability is correct, they will use more fertilizer and then dealers will sell more.
- The Government has to allow greater participation of the private sector in view of avoiding the replacement of a state monopoly by a private one.
- The Government has to monitor the market in order to make a reasonable procurement and distribution policy
- The Government has to monitor recommended formulas and support research to improve new formulas applied to crops.
- The Government must facilitate the funding of fertilizer purchase. This funding may be [illegible] because of the [illegible] of the FCFA

With privatization policy , government should fill the gap (legal aspects and financial problems) which exists as far as private sector involvement in the agricultural input distribution is concerned.

Given the need for the State to play a role in the agricultural sector, IFDC-Africa will support the West African countries to create national input development units. The main tasks of these units will be to develop market input and to advice governments in agricultural policy. This idea is appreciated by some donors and governments.

III. Final remarks :

Reforms should be gradual (point of consumption) and move upward toward the national level (point of supply or production).
We will say with Mr. Catalino that (1) IFDC's experience in Bangladesh has demonstrated that the reform process is most successful if this is implemented in the following sequence:

1. Privatization of retail distribution and marketing.
2. Privatization of wholesale trading.
3. Privatization of import and export activities.
4. Privatization of production units.

The design of the training development programs should be appropriate and satisfy the training needs of the particular group for which the program is intended.
As it is done in Egypt, it is useful to make a "translation of training materials into the local language to facilitate the teaching and learning process" (1)

Reference :

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How to Reach the Small Farmer

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How to Reach the Small Farmer

Reaching the small farmers with fertilizers and technology is a common problem in many developing countries. This is a case study involving the small farmers in the country of Utopia.

Utopia is located in the central section of Africa. Approximately one-half of Utopia lies within the rain forest and the other half within the savannah zone. There is a tremendous agricultural potential in Utopia. The soils are fertile, there is plenty of sunshine even during the rainy season, and there is plenty of water for crop production except during the short dry season of November-March.

Utopia has a large navigable river that transverses the country. The name of the river is Madila. It forms in the mountains in the north and empties into the Atlantic Ocean near the southern seaport city of Serendip. Serendip is the only seaport city in Utopia. Imported items including fertilizers arrive in Serendip and are transshipped upcountry by railroad or trucks. Railroads serve the major cities. Rail service has been slow and has forced the use of trucks for delivery. Truck delivery of fertilizers has been handicapped since there are only two major highways running north and south and only three highways running east to west.

Up country approximately 200 km from Serendip and along the Madila River there is a large parcel of land with slightly more than 50,000 ha. The area is known as Dunnieville. A soil survey and study revealed that this land is more suited to rice cultivation than any other area in Utopia. The farmers in this area prefer to grow cassava, sorghum, and millet. Rice has been grown in very small plots and only for home consumption. The farmers in the Dunnieville area are smaller than the national average and on the average own 6 ha each.

The Government of Utopia has been importing between 200,000 and 250,000 tons of rice annually. Government planners have given consideration to the idea that Utopia could become self-sufficient in rice production if the potential rice area around Dunnieville could be developed. There are several things that must be worked out if rice is to be produced on a large scale in this area. Among the chief problems are:

a. There are no secondary roads leading into the Dunnieville area. The government has plans to build some secondary roads in Utopia in the next development plan. Connecting roads to Dunnieville could take as much as 5 years to complete.

b. Farmers in the Dunnieville area prefer to produce cassava, sorghum, and millet. The study showed farmers would resist growing rice. The primary reasons for the resistance seemed to be that farmers thought they would make more money on cassava, sorghum, and millet, and these are also a preferred food.

c. The price of fertilizer in Utopia has been subsidized at approximately 45% of the total cost. The Government wants to eliminate the subsidy on fertilizers. At present farmers are paying the following prices.

Urea	- ₦ 98/ton
AS	- ₦ 63/ton
NPK	- ₦ 68/ton
20% P_2O_5	- ₦ 62/ton

d. It has been reported that on rice AS and 20% phosphate will produce yields comparable to those produced by urea and NPK fertilizers. It may be possible that NPK would also produce good yields. If so, only one fertilizer product would have to be shipped into Dunnieville. Research at the station near Serendip has shown that approximately 90-40-60 kg/ha is needed to produce rice.

e. Farmers in some sections of Utopia have been receiving ₦ 650/ton for their rice this year. The cost of producing rice at the research station is approximately ₦ 450/ton. The Government of Utopia has been paying ₦ 850/ton for imported rice so far this year.

f. There are no fertilizer dealers in the Dunnieville area. There is one agricultural officer (AO) that lives and works in the area. The AO has averaged selling 20.8 tons of fertilizer per year in the area during the past 3 years. The AO has not made much effort to sell or promote fertilizer use since he has other work. Ammonium sulfate has accounted for 50% of the fertilizer sales. Fertilizer has moved into Dunnieville by farm tractor and trailer during the dry season. The AO thinks a strong case can be made for a warehouse to store fertilizers and other essential inputs.

g. The Government of Utopia has taken an official position to start moving toward privatization in agriculture businesses. The Government recently announced a decision to build a new fertilizer complex within the private sector. The

Government has formed a partnership with a private firm to build the fertilizer plants and build a marketing system in Utopia.

h. There are approximately 7,500 farm families living in the Dunnieville area. There are eight different family groups (tribes) in the area. They are hard workers and get along well on community projects. The groups do not mix on marriage and family matters. Men do the heavy work in crop production whereas the women do the weeding, fertilization, harvesting, and marketing of surplus crop produce.

i. Credit has been a problem for the purchase of essential inputs. A credit scheme will be needed for the area.

Procedure

The class will be divided into groups. Each group will elect a spokesman to present the group's solution to the questions. Each group will have up to 10 minutes to present their recommendations. Following each presentation the remaining three groups will question or challenge the remarks of the group giving the presentation. Each group will be expected to defend their recommendations. Five minutes will be allowed for the rebuttal and defense. During the presentations the three groups listening should prepare questions for the presenting group to defend.

Problems

1. Based on the above facts, the President of Utopia has requested your group to prepare a position paper on making the country self-sufficient in rice production. The President wants your paper to include a reply to the following:
   a. Prepare an outline of a 3-year fertilizer marketing plan for the Dunnieville area.
   b. Prepare a budget to support the marketing plan utilizing up to ₦ 8.00/ton of fertilizer consumed.
   c. Who should own and manage the recommended marketing system?
   d. Should the area be developed on a large-scale farming plan or continue with the small farmer?
   e. Recommend a pricing policy for rice.
   f. What type credit scheme is recommended, if any, to support the recommended marketing system?

How to Reach the Small Farmer

(Case Study Analysis and Resolution)

Determine the Facts and List in Order of Importance

1. Government planners are considering to make Utopia self-sufficient in rice production.
2. The Government of Utopia is importing 200,000-250,000 mt of rice annually.
3. Dunnieville – an area well-suited for growing rice – is approximately 200 km up the Madila River from Serendip.
4. Seventy-five thousand hectares are available in Dunnieville for rice culture.
5. Farmers in Dunnieville have little interest in growing rice because they do not know how to grow rice or how to market it.
6. There are no roads leading into the Dunnieville area. The area is reached only during the dry season.
7. The only research station is near Serendip where there is experience in growing rice and amount of fertilizer needed.
8. Rice is grown on a few 1- to 1½-acre plots for local consumption in Dunnieville.
9. The agricultural officer in Dunnieville is currently selling fertilizer. He makes little effort to sell fertilizer as he has other work to do.
10. Fertilizer sales in the Dunnieville area are only 20.8 tpy. Ammonium sulfate accounts for half of the fertilizer sales.
11. Farmers in Utopia have been receiving ₦650/ton for their rice. Production cost at the research station at Serendip reported at ₦450/ton and the government has been importing rice at ₦850/ton.
12. The Madila River transverses the country and it is navigable. Two major highways run north and south. Only three highways run east and west. There is rail service to major cities but it is poor. Most transportation is done by trucks. Serendip is the major seaport in Utopia. All imported goods pass through Serendip.
13. The government has joined with a private company to build a fertilizer plant in Utopia and to set up a partnership with the company for marketing fertilizer in Utopia.
14. There were no fertilizer dealers in the Dunnieville area.
15. There is a credit problem for purchasing essential inputs in Utopia.

16. The farmers in Dunnieville are small averaging 4 ha each.
17. Building roads into the Dunnieville area will take about 2 years from the start of construction and the government has plans to build secondary roads in Utopia.
18. There are around 10,000 farm families in the Dunnieville area. They represent about eight tribes. They work well together but do not mix socially.
19. Fertilizers are subsidized at 45% of total cost in Utopia.
20. Soils are fertile, plenty of sunshine, plenty of rain except in the dry season – November-March.
21. The country of Utopia is located in the central section of Africa – half lies in the rain forest and half in the savannah zone.

Identify the Problems

1. There are no roads leading into the Dunnieville area.
2. Farmers in the Dunnieville area know little about growing rice and there is no one to teach him. The farmer does not know what the real incentive is for growing rice under improved practices.
3. Farmers in the Dunnieville area do not know how to market rice and cannot get crops to market.
4. The only research in the country on growing rice has been located in Serendip. No research has been done in the Dunnieville area.
5. Lack of credit to purchase essential inputs affects all farmers in Utopia.
6. There are no fertilizer dealers in the Dunnieville area and apparently no warehouses to store fertilizer or other essential inputs.

Suggested Courses of Action

1. Crash program to build roads and establish a port on the Madila River to serve the Dunnieville area.
2. Start rice research trials in the Dunnieville area. Determine best varieties, planting dates, fertilizer recommendations, and cost of production.
3. Get the private industry and/or government to build rice mills in the Dunnieville area to process the farmers rice, thus creating a market for rice in the Dunnieville area. Extend government credit through the rice millers to the farmers.

4. Increase the price of rice and reduce imports of rice in relationship with the rice production in the Dunnieville area. This is essential to create a demand for rice produced in the Dunnieville area and to give the farmers a good incentive.
5. Get the government/private sector fertilizer company to set up dealers in the Dunnieville area, build warehouses, put on rice fertilizer demonstrations, hold farmer meetings with the extension officer on the techniques for growing rice, varieties, weed control, etc.
6. Have the extension service strengthened in the Dunnieville area. Have them launch a promotional program on growing rice with the private/government marketing company.

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Methodology for Analyzing Cases

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Methodology for Analyzing Cases

As many of you know, the case study method is extremely popular in the United States. Its popularity has been particularly enhanced by its use at the world renowned Harvard University School of Business. The case method does serve as an excellent teaching device aimed at bridging the gap between classroom type teaching and business (work) organizations. IFDC has found the use of cases particularly valuable in terms of strengthening analytical activities and improving speaker effectiveness in presentations to management. In performing a case study, the participant must sort out relevant information from the case, organize the facts into a clear statement of the problem, identify possible solutions, recommend the most appropriate course of action, and develop an implementation plan for the solution. A well-organized lecture on a marketing topic may be very thorough and the participant may visualize application of the concepts to his own situation. However, by putting the participant in the position of manager and presenting him with various problems and/or business opportunities, he tends to focus more seriously on the problem and quickly recognize that any decision is interrelated with other factors; most importantly he learns about the decision making process, the essence of the manager's work.

No single methodology for dealing with case analysis is ideal for all situations. However, one approach that has proved successful in most instances involves six steps as indicated below.

Step 1

Read the case carefully and make notes of the firm's strengths and weaknesses and key market characteristics (i.e., competition, market size, growth trend, etc.).

Step 2

State the important facts about the case. A restatement of the facts helps to fully understand the situation being studied. This may involve preparing a diagram of certain relationships, e.g., the channel members in the marketing system or the physical flow of fertilizer through the distribution system for a particular market segment.

When listing the facts about the case, the most important facts should be listed first and the least important last. The facts should also be categorized to (1) separate objective facts from opinions and assumptions and (2) group facts pertaining to certain characteristics (i.e., market size, competition, pricing and marketing cost, financial condition of the firm, etc.).

Step 3

Identify the firm's problems and/or profit opportunities. It is critical to separate the problems from the symptoms and secondary issues. For example, it is not meaningful to identify the problem as low market share, since low market share is only symptomatic of the underlying problem—possible poor product quality, late fertilizer arrival at the retail point of sale, etc. The **real** problem should be identified and agreed to by the case study team. The problems should be listed in order of priority.

Step 4

Identify and evaluate the alternative courses of action. All reasonable courses of action (technically and economically feasible) should be identified. Each alternative should be fully evaluated, identifying the advantages and disadvantages of each.

Step 5

Recommend the preferred course of action. Based upon the above evaluation, select the course of action that provides the best approach to dealing with the problems or opportunities. The reasons for selection of the preferred alternative should be stated.

Note: The participant will be expected to defend his recommended course of action upon presentation of the case study.

Step 6

Implementation plan. A strategic plan for implementation of the recommendation should be outlined including (a) the activities that are to be carried out, (b) the personnel requirements, (c) the timing and sequence of required events, and (d) a budget for the plan.

The case study approach is an invaluable tool. It helps to develop the analyst's analytical abilities and helps to sharpen management presentation effectiveness.

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Fertilizer Marketing in Goodland

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Fertilizer Marketing in Goodland

Goodland is a medium-sized country located in the tropics. Yields and agricultural production have been declining in recent years. Vegetables, rice, corn, cassava, tea, and rubber are the major crops. Cassava, rice, and corn are major export crops purchased by the Government at domestic prices and sold internationally at higher prices. Agricultural exports are an important source of foreign exchange and have been decreasing the last 2 years. The country is self-sufficient in food production and uses about 700,000 mt of fertilizer per year. Land is of moderate fertility and fertilizer usage per hectare is (28 kg of nutrient per cultivated hectare) the lowest of any neighboring country. Farmers who have moved away from the farm say that there are only a few places to sell their excess production and at low prices. Farmers are leaving the farms for a better life in the city. The remaining farmers produce enough food for themselves and enough for the city needs. They ask "why should they use fertilizer?" They say "there is no incentive to produce surpluses."

For several years the Government has been trying to encourage fertilizer use and offers fertilizers at a subsidized price equal to 50% of the Government's imported cost plus, "marketing costs" (currently running at 35% of import costs). Because fertilizer costs are going up, the fertilizer subsidy has become a drain on the economy. All fertilizer prices are set by the President of Goodland at the same price "anywhere" in the country. The Universal Bank has requested Goodland to eliminate the subsidy in 5 years if Goodland wants their continued assistance.

There is only one small fertilizer plant in the country which is a privately owned urea plant and which is running at full capacity and producing 150,000 mtpy. Total urea consumption in the country is 350,000 mtpy but total fertilizer usage has been increasing at the rate of only 1%-2% annually for the last 4 years. The Government does not allow the urea company to market fertilizer in Goodland or to export fertilizer. The Government through the Ministry of Agriculture imports all needed fertilizer by use of negotiated purchases and buys urea at the plant's gate at production cost plus 7%.

Urea is imported in bags while DAP and potash are imported in bulk and bagged at the port. There have been problems with the bagging machines at the port and, due to large unemployment problems, the Minister of Agriculture has decided that all bagging will be done by hand.

All fertilizer is marketed (distributed, promoted, and warehoused) by the Federal Extension Service. Extension offices are located in each province and district. There are around 15,000 farmers per extension agent. All provincial offices have phones but less than 25% of the district extension offices have phones. District extension offices cover their districts on foot and/or on bicycles. It takes 2 weeks to get a letter from most district offices to the capital. Extension agents spend very little time teaching farmers new production methods due to their administration and fertilizer related duties.

There are no brand names for fertilizer sold by the Federal Extension Service. The extension agents receive no commission for selling fertilizer and, in fact, managing fertilizer warehouses, selling the fertilizer and keeping up with funds collected takes time away from other important jobs the agents are supposed to carry out. Only about 90% of the funds from fertilizer sales can be accounted for. This further contributes to the Government's losses.

An interview with a local farmer gives a clue to many farmer's frustration. The farmer said, "He picked up his order form to buy three bags of DAP last week, but by the time he waited in line to get it stamped, the extension office, where the fertilizer is warehoused and that sells the fertilizer, was closed. He returned the next day, but the office was closed because the extension agent was participating in a meeting at the university. He returned this week and obtained his fertilizer – the bags were hand sewn and looked underweight."

For the last 3 years farmers have had trouble getting fertilizer, because of poor and late forecasting of demand by the Federal Extension Service. The General Assembly was late in receiving the import requirements and passing the agricultural appropriations bill and foreign exchange was not available to import all the needed fertilizer. Many extension agents sold (out the back door) what they had at double the official price because of the shortage. Farmers bought about half of their normal requirements at this price.

The district extension agents are frustrated also. They get blamed when fertilizer doesn't arrive on time, they get accused of short bag weights, of not being open 24 hours a day, and they are often accused of black marketing. Agents, however, privately say "they need the extra income selling fertilizer provides because their pay is very low."

The Government although "socially oriented" has a stated policy to encourage the development of the private sector and private industry. The private urea company has approached the Government about importing and marketing fertilizer. The company argues that this would free the extension agent to concentrate their efforts on other assignments helping farmers adopt modern production practices.

The private urea company is a subsidiary of an international company with its own shipping fleet. The company feels that they could reduce the Goodland Government's fertilizer losses (subsidy) by at least 30% if they were allowed to import all fertilizer needed, had freedom to set retail prices at 30% over import costs or plant gate costs, and had freedom to sell to private retailers anywhere in the country. If the company were allowed to import and market fertilizer as stated above, management officials are also interested in discussing with the Government the possibility of building a new plant to meet most of the fertilizer needs of the country.

Procedure

The class will be divided into five teams. Using the "Case Study Method" each team will prepare a one-page summary of their recommendations. Each team will elect a spokesperson to give a 7-minute presentation of their recommendations. Each team will be allowed 3 minutes to defend their recommendations against questions from the other teams. Each team will turn in a one-page outline on their recommendation **before presentations are given.** Team 1 will go first, followed by teams 2, 3, 4 and team 5 last.

Assignment

Ministry of Agriculture

You are the Minister of Agriculture. The President of Goodland is complaining about the frustrations farmers are having with the fertilizer program, declining agricultural exports, poor farmer incentives, and the increasing financial burden on the government of maintaining the fertilizer program. The President needs the farmers' votes in the next election but needs the Universal Bank's continued support. The President has given you 7 minutes to present a one-page summary of your recommendations. Your job depends on what you recommend.

Fertilizer Marketing in Goodland

(Case Study Analysis and Resolution)

Determine the Facts and List in Order of Importance

1. Fertilizers are subsidized at 50% of the total cost. Fertilizer subsidy is a drain on the economy and the Universal Bank wants Goodland to eliminate subsidy in the next 5 years if Goodland wants the bank's continued assistance.
2. Farmers are unhappy with the current "extension service" fertilizer distribution system due to difficulty in getting supplies, delays, and shortage. Bags are underweight and hand-sewn.
3. Yields and agricultural production have been declining in recent years.
4. Farmers are leaving the farms and going to the cities because of low incentives to produce surpluses and lack of markets for surplus.
5. Agricultural exports are important sources of foreign exchange and have been decreasing the last 2 years.
6. The country is self-sufficient in food production and uses about 700,000 tons of fertilizer per year.
7. Vegetables, rice, corn, cassava, tea, and rubber are major crops; cassava, rice, and corn are major export crops purchased by the Government at domestic prices and sold internationally at higher prices.
8. A private urea company claims it could reduce costs of the government by 30% if it were allowed to import all fertilizer needs and had freedom to market fertilizer anywhere in the country and freedom to set prices at 30% over imported cost or plant-gate cost.
9. All fertilizer is marketed through the federal extension service; there is one extension officer for 15,000 farmers.
10. Forecast of demand by the extension service is poor and late, resulting in shortages and fertilizers being sold at black market prices.
11. The Government, through the Ministry of Agriculture, imports all fertilizer materials using negotiated purchases and buys urea (150,000 tons) from the private fertilizer urea plant at cost plus 7%. Urea, DAP, and potash are imported in bulk and bagged at the port of import. Fertilizers are being bagged by hand at the port.
12. Extension agents receive no commissions for selling fertilizer. Selling fertilizer takes time away from other important extension agent functions. Only about 90% of the fertilizer revenue is accounted for.

13. Communication to the provinces is poor, and extension officers cover their districts on foot and/or bicycle. Extension agents spend little time teaching farmers new production methods.
14. Extension agents are poorly paid. Selling fertilizers above the gazetted prices is one way extension agents generate additional income.
15. The Government has a policy to encourage the private sector.
16. There is one small urea plant in the country producing 150,000 mtpy. Urea consumption totals 350,000 mtpy in the country. Sales have been increasing at the rate of only 1%-2%/year.
17. Fertilizer use is low, only 28 kg/cultivated hectare.
18. The private urea company wants to build a fertilizer plant in Goodland to meet most of the fertilizer needs of the country.

Identify the Problems

1. Fertilizer subsidy has become a drain on the economy.
2. The Universal Bank requested Goodland to eliminate subsidy in 5 years if Goodland wants the bank's continued assistance.
3. Current "extension fertilizer marketing system" is not serving the farmers well.
4. The Government's pricing policy has resulted in a lack of incentive for farmers to increase production.
5. Yields and productions have been declining in recent years.
6. Extension service marketing of fertilizer results in 10% of the fertilizer sales being unaccounted for.
7. Poor and late forecasting of demand results in shortages.
8. Extension agents' involvement in fertilizer marketing leaves little time to teach farmers new production methods.
9. Imports of fertilizers are not adequate to meet demand, which results in fertilizer being sold at black market prices.
10. Communication is poor to district locations and there are too few "extension agents." Extension agents must cover their districts on foot or bicycles.
11. Extension agents receive low pay.

Suggested Courses of Action

1. Allow several private companies and farmer associations to import fertilizers and market it in Goodland and set official maximum retail prices at an average c.i.f. import cost plus 30%. Take the extension service out of fertilizer marketing.

2. Eliminate fertilizer subsidies within 5 years.
3. With the savings resulting from elimination of fertilizer subsidy, increase the number of extension offices and agents, increase pay levels, and provide each extension worker with a bicycle and/or motorbike to cover his territory. Launch an extension/dealer program to increase crop production using modern practices and field demonstrations.
4. Increase the Government's purchase price for export crops to levels reflecting international prices and assist export associations in exporting crops.
5. Fund agricultural research with the goal of supporting export crop production, reducing production costs, increasing quality, and providing technical support to extension agents.
6. Negotiate a contract with the private fertilizer company to build a fertilizer plant in Goodland if this program can reduce fertilizer costs.

Workshop on

Efficient Marketing of Fertilizers in Cameroon

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Bamenda, Cameroon

Fertilizer Transportation

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Fertilizer Transport Modes

1. Introduction

This presentation is intended to cover the characteristics of the various modes of transport and transport vehicles used by the fertilizer industry.

2. Choice of Transport Mode

Methods of selection of transport mode or "optimal routing" may be discussed theoretically, but in practice there is often little choice when planning fertilizer or other movement. Where there is a choice, selection is usually straightforward.

Transport choice is determined by (1) availability, (2) cost, (3) flexibility and service factors. If a port or factory is not rail connected, the fertilizer will be moved by road or water. If both are available the choice is made on cost grounds, and water is likely to be cheaper. It is also necessary that sufficient capacity to the required destination is available. This is usually not the case for movement of an entire cargo by water, so that road is more often the preferred choice.

Whatever the choice, the most important factor is the efficient management of the system. This means defining the most effective routing and mode of transport in advance, then controlling the operation to ensure best use of limited resources.

3. Characteristics of Transport Modes

3.1. Relative Costs

Road is usually the cheapest mode for distances up to 150-250 km. This break-even range assumes realistic cost levels, and may be quite different if artificial cost levels are mandated by government, e.g., by means of subsidies or controlled freight rates for rail. At greater distances, rail is cheaper than road. Barge is usually cheaper than rail. The relative costs are illustrated in Figure 1.

3.2. Flexibility

As is well known, road is the most flexible and convenient mode. Rail and barge movements must frequently make use of road transport for delivery to the final destination.

Rail is essentially inflexible and requires advance planning for movements from the factory or port (1) to procure wagons, (2) to arrange shunting engines to move the wagons for loading, and (3) to arrange locomotives and schedules to move the trainloads on the main line. The inflexibility is also evident inside the factory or port, where loading to rail tends to be discontinuous because of the need to shunt wagons for loading. Rail shunting often stops other road and crane operations. Continuous loading or ship discharge is relatively easy to arrange into lorries. In addition, the operator can control the number of lorries used, but usually has no control over supply of rail wagons.

Barge is usually the least flexible, serving a very limited number of destinations.

3.3. Energy Use

In terms of energy usage, barge is the most efficient, rail next, and road last. Currently this is not normally a consideration in transport choice.

4. Transport Constraints

Lack of transport is often cited as a constraint to fertilizer movement. Fertilizer may represent only 3%-4% of national goods movements so that there is usually more than enough transport capacity. The main problem is that use of the transport is not properly planned. Fertilizer use is seasonal, so handling and transport to inland locations must be preplanned and phased to avoid congestion and artificial transport "shortages" created by peak demands.

A second reason for alleged transport constraints is that low rates are frequently offered for fertilizer. Naturally, the transport operator will carry other goods for higher rates. We are then told there is a "shortage" of transport for fertilizer movements, but other goods are being moved.

5. Road Transport

5.1. Road Transport Costs

All transport-operating costs are made up of *standing costs* and *running costs*, also known as fixed costs and variable costs. All transport tariffs which are based on actual costs should approximate to a straight line relationship, as already seen in Figure 1.

Fixed Costs, or standing costs, have to be paid whether the vehicle is used or not. They are expressed on a time basis, such as annually, weekly, or daily. *Variable costs*, or running costs, are incurred only when the vehicle is running, so they are calculated on a per kilometer basis. The costs involved are as follows:

Fixed Costs	Variable Costs
Driver's wages Rent and property taxes Insurance Interest or vehicle cost Licenses and vehicle taxes Administration Profit	Fuel Lubricants Tires Maintenance Depreciation

(Note: Some costs, such as maintenance, may be treated as partly fixed and partly variable. Depreciation can also be treated as a fixed cost.)

These costs vary significantly from country to country. If, purely as an example we use \$100/day + 50¢/km for a lorry carrying 10 tons, the cost for a round trip of 100 km is \$150 or \$15/ton; 200 km, \$20/ton; 300 km, \$25/ton, and so on. This is illustrated in Figure 2(a). Look carefully at Figure 2(b) and note that rates quoted on a cost per ton per kilometer are not meaningful unless tied to a specific distance, yet costs are often quoted on this basis.

On main road journeys, the lorry owner may quote on a per ton basis based on distance, as above. In the factory or port, lorries are frequently used for shuttle services over very short distances. In this case the *distance* basis is clearly inappropriate and the lorry owner will charge on a time basis, *per day* or *per hour*. This is important because it is now up to the hirer to use the lorry efficiently. With any shuttle system, efficient use of the transport means reducing terminal time. Travel time is almost negligible, so loading, offloading, and waiting time must be minimized.

An overall balance of system costs must always be recognized, however, and it may be economically justified to hire additional lorries at hundreds of dollars per day, to avoid ship demurrage charges of thousands of dollars per day.

5.2. Types of Lorry

General–Familiarity with the main lorry types is useful when considering handling and movement options. A wide range exists and only the most common types are mentioned below.

Body Types–This may decide the handling system which can be used. Payload may also be limited in closed vehicles.

For bag transport:	
1. Flat deck or open lorry.	Needs careful stacking, can take pallets.
2. Sided lorry, open top.	Loaded manually from rear. Cannot take pallets.*
3. Closed or box type.	Load from rear. Best security and weather protection. Cannot take pallets.*
(*Unless special forklift truck attachments are used.)	
For bulk transport:	
1. Sides (as "2" above) fixed body.	Difficult to unload.
2. Sided, open, tipping body.	Common type.
3. Hatch top, tipping body.	Rear discharge, using fully opening door or small hatches.
4. Hatch top, fixed body, bottom discharge.	Common for grain and similar free-flowing products. Caking may be a problem.
These are illustrated in Figure 3.	

Axle Configuration–This, together with axle loadings, determines the payload of the vehicles and their maneuverability.

1. 2-axle rigid.	Most common vehicle in developing countries.
2. 3-axle rigid.	
3. 4-axle rigid.	Large and difficult to maneuver.
4. 3-axle semitrailer. (tractor-trailer or articulated vehicle)	2-axle tractor and single-axle trailer.
5. 4-axle semitrailer.	2-axle tractor, 2-axle trailer.
6. 5-axle semitrailer.	3-axle tractor, 2-axle trailer.
7. Lorry-trailer combination. (drawbar combination)	
These are illustrated in Figure 4.	

5.3.Overloading and Road Damage

Overloading is a serious problem because of the damage caused to the roads, both to the national highways and to roads and wharves inside the port. Road damage is proportional to at least *the fourth power* of the axle load. This means a very rapid increase in road damage a· overloading increases. Some calculations for 4-axle and 5-axle semitrailers (5 and .bove) are shown in Table 1.

Table 1. Road Damage Effects, 4- and 5-Axle Lorries With Evenly Distributed Loads

	Road Damage Effect		
	Number of Standard Axles Per 100 tons Carried		Relative Damage
Payload	4 Axle	5 Axle	(5 Axle Compared to 4 Axle)
(tons)			(%)
20	24	15	62
25	40	24	60
30	63	38	60
35	101	57	56

Two features are notable:

1. The rapid escalation of road damage with increasing payload (or overload).
2. The lower damage level for 5-axle compared to 4-axle vehicles. Road damage is reduced by almost 40%.

Overloading is a major problem in most developing countries because weight regulations are usually not enforced. The greatest road damage is caused by the use of 2-axle tractors in 4-axle semitrailer outfits. The requirement to use 3-axle tractors (5-axle outfits) would cut down road damage significantly, as shown in Table 1.

Overloading on movements within factories and ports is sometimes overlooked, because legal load limits are not observed. This is clearly a short-sighted policy.

6. Rail Transport

Where available, rail movement is the most effective and lowest cost method for (1) large tonnages, (2) over longer distances, and (3) on a regular basis. The most economic and effective system is a *unit train operation*, also called "block" train or "company" train.

By this we mean a complete trainload of wagons operating on a private-siding to private-siding basis, say factory to transshipment point, and on a completely regular, prescheduled and timetabled basis. The empties return as a complete trainload directly to the loading factory and are permanently allocated to that traffic. *This is a key definition and attention must be paid to every part to produce a successful operation.*

The system requires preplanning and close cooperation between, in our case, the fertilizer company distribution manager and the railway board at the top level. It also requires that a lot of traditional thinking must be discarded, such as demurrage payments, which no longer apply, and train loading and offloading times, which are not related to wagon loading times. The train does not go through the local station sidings, or shunting yards, or other marshalling points, and should only stop for changes of crews or engines.

The system works best when the train is scheduled regularly on the same day every week at the same time. This enables the railway to build the movement into its timetable, like a passenger train, and the fertilizer company to plan its operations at both the production end and the offloading end as regular permanent arrangements.

The fertilizer company has a contract with the railway and pays a fixed sum per trainload, including return of the empty train, and guarantees a minimum number of transits per year. If less than a full trainload is sent, there is therefore an automatic cost penalty.

The railway permanently allocates the required number of wagons to service the operation and must provide adequate spareage for maintenance. The fertilizer company should have adequate siding capacity at its factory so that trainloads of empties may be returned directly to the site. Wagons are then checked to be fit for loading and cleaned. The railways should also have routine checking, maintenance, and inspection available onsite so that the train can be cleared before leaving the site. Similarly at the receiving end.

At the receiving end the fertilizer company should have its own facilities. These need not involve high capital outlay, but should consist, as a minimum, of a siding (railway supply) with veranda-type covered storage space sufficient to accommodate one full trainload of material. This operates as *a transshipment center* from rail to road. It would logically be associated with storage, but this must not be allowed to confuse its purpose as a transshipment operation.

A practical schedule with enough spare days built in to guarantee regularity would perhaps allow 1 day for loading at the factory, 1 day for the outward journey, 1 day for offloading, and 1 day for the return journey. Allowing 3 days for inspection, maintenance, cleaning, and spare days, the unit train should achieve a guaranteed 1-week turnabout. Experience in most countries is that odd-wagon dispatches would normally require at least a wagon-month for the same trip (3 weeks in transit and 1 week for relocation for the next loading). This would require *four times* as many wagons to move the same tonnage as would be needed for a unit train service.

A calculation of wagon requirements for movement of a quarter million tons per year on a regular basis is shown in Table 2. A matching back traffic operating to the same level of efficiency as the planned unit train service is unlikely to be available. If such a back traffic could be integrated, greater cost savings to the railway system can be achieved, more particularly if very long hauls are involved.

In practical operation, consider the system as in Table 2, with one location taking 50,000 tpy as one 1,000-ton train *every* week, on the same day, at the same time, with 24 hours allowed for train turnaround. The fertilizer company should have its own receiving siding, with veranda-type covered storage, to accommodate the full trainload of material. This we will designate a transshipment center (TC). On arrival, labor must be available to offload, some direct to truck, but the majority to temporary storage under cover alongside the train. One week is available for dispersal of the product before the next trainload arrives. The TC manager is then able to organize dispatches by truck on a regular basis throughout the week. These dispatches should be prescheduled well in advance to dealers and retailers, in association with the Marketing Department, in line with the stock building plan. As far as possible, product should move directly by truck from the rail wagon or TC lineside storage as far down the distribution chain as possible to the point of final consumption for storage. This is where the closest collaboration between marketing and distribution is important.

Table 2a. Wagon Requirements for Wagonload and Unit Train Operations

Wagon Days in Traffic					
Odd Wagons (20 tons)		Unit Train With Matching Return Traffic (50 x 20 tons)		Dedicated Unit Train (50 x 20 tons)	
	Days		Days		Days
Request	2				
Check/clean	1	Check/clean	1	Check/clean	1
Load	2	Load	1	Load	1
Outward travel	21	Outward travel	1	Outward travel	1
		Offload	1	Offload	1
Return load factor 60%	8				
		Transfer to "B"	1	Return travel	1
		Load	1	M/CE check	1
		Return travel	1	Spare	1
		Offload	1		
		Transfer to "A"	1		
		M/CE check	1		
		Spare	2		
Total	34		12		7

Table 2b. Number of Wagons Required to Move 5,000 Tons Per Week
(5 trains of 50 x 20 ton wagons or 250,000 tpy)

Odd Wagons		Unit Train With Matching Return Traffic	Dedicated Unit Train
Calculated number	1,214	$\frac{430}{2}$ = 215 (for one-way traffic)	250
Add M/CE 15% and round off totals	1,400	250	290

It should be noted on a unit train service that:

1. *Return of empty wagons is not inefficient*; the system permits high efficiency, continuous wagon use for the product being carried, even after allowing for return of the wagons empty.

2. *Running speeds should not be high*, causing maintenance problems, but should be at normal speeds. Movement on a *timetabled* path allows continuous travel so that considerable distances can be covered, e.g., at an average of only 30 km/hour (say 20 mph), 720 km is covered in 24 hours. Delivery is much faster but running speed is not!
3. *Costs are not high*; because of considerably higher rail operating efficiencies, reduced rates per ton should be negotiable, in the range of 25%-50% of full commercial rates.
4. *Wagon availability is no longer a problem* because the wagons are permanently allocated under contract and are effectively "owned" by the unit train operator.

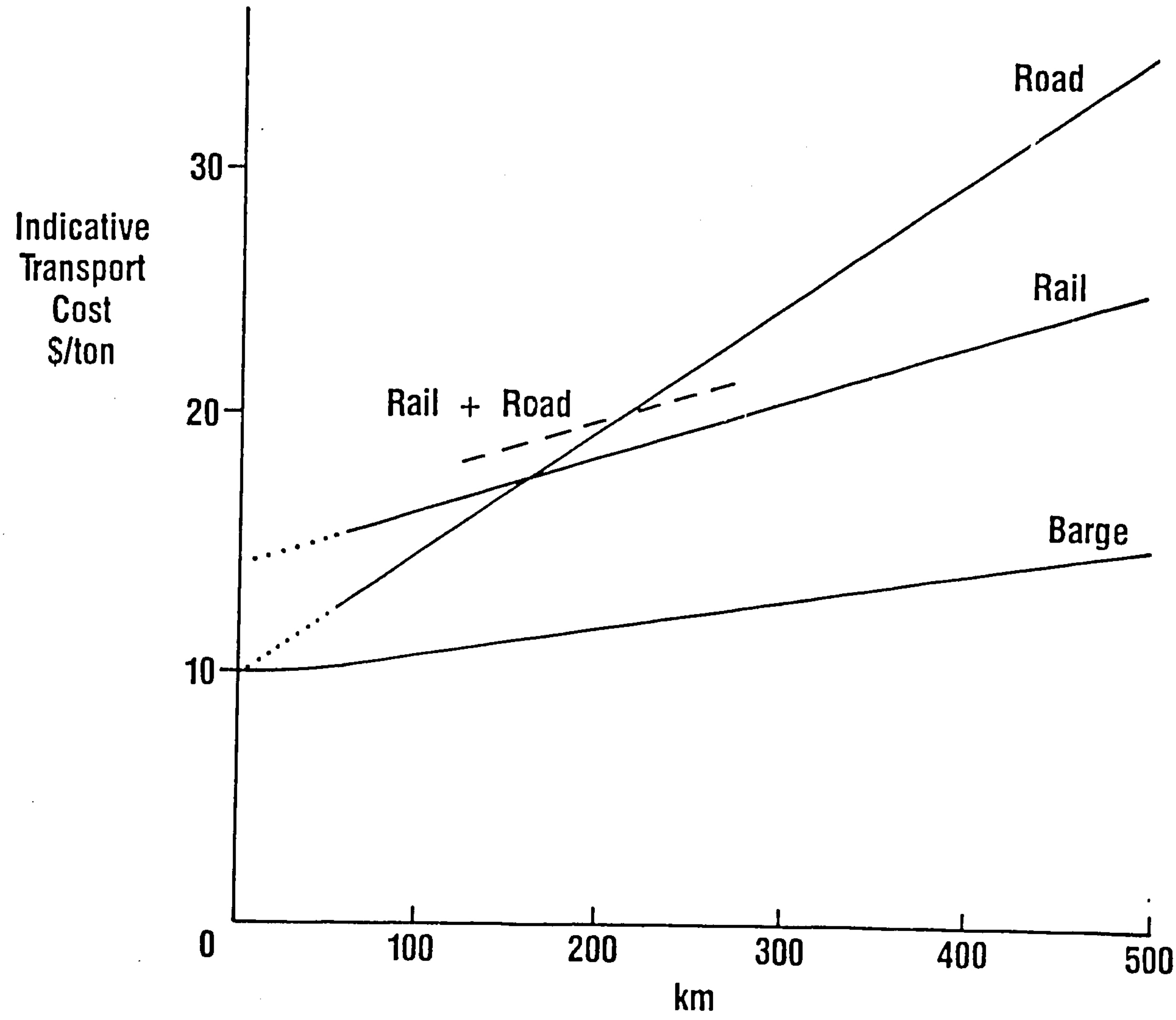
A further useful feature of unit train operation is that the system can be initiated at full operating efficiency on a one train per week basis and additional trains added as experience, organization, and equipment is improved.

7. Barge Transport

This is the least flexible of all modes in that it is rarely available on the desired routes and is slow. However, where available, it is the cheapest mode for regular longer distance movements.

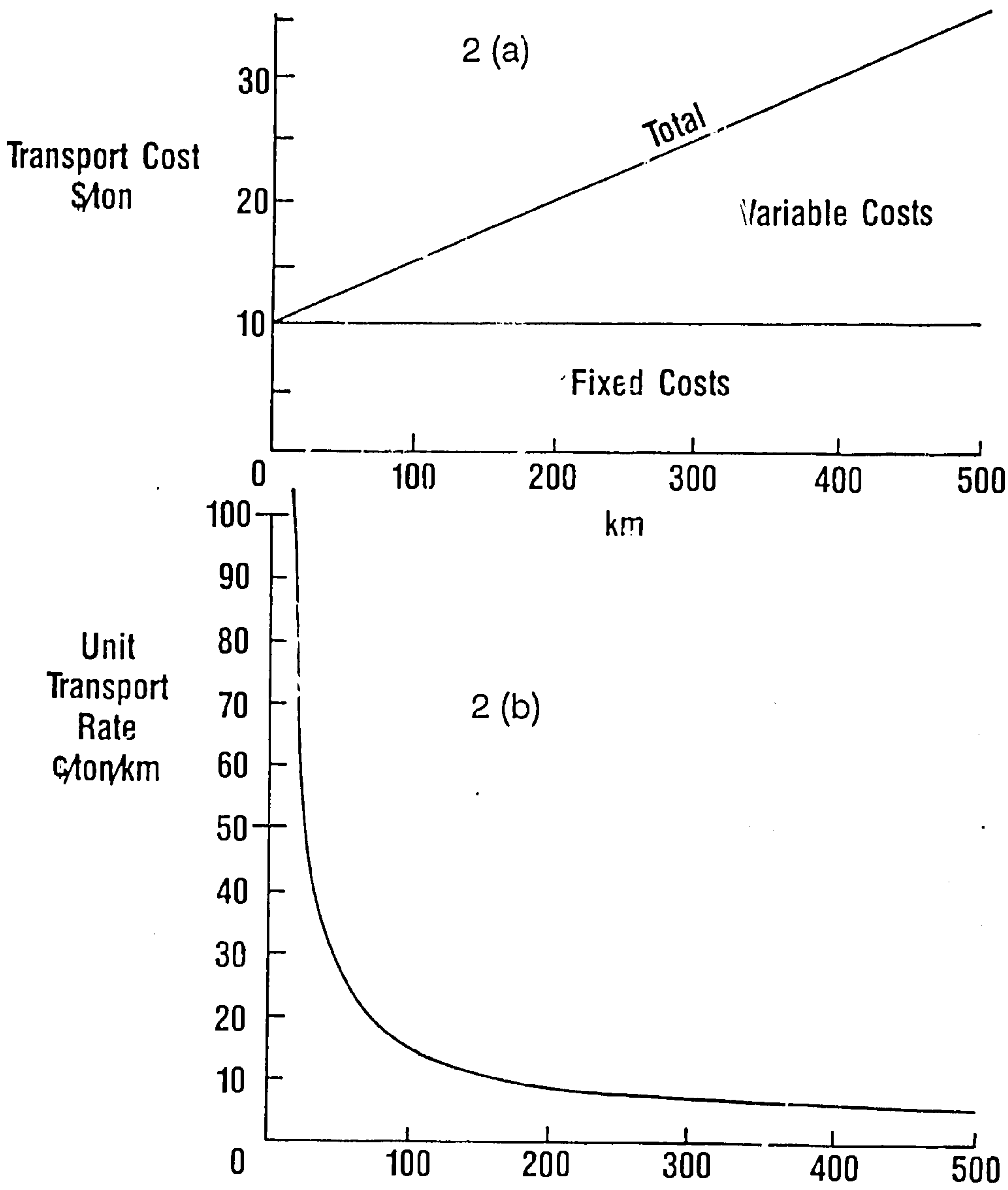
Major barge movements exist in Bangladesh; the United States, on the Mississippi and Great Lakes systems; and the Rhine, linking the North Sea with the Netherlands, Belgium, Germany, and Switzerland.

Figure 1.
Relative Transport Costs for Main Modes.



520

Figure 2.
Road Transport Costs.

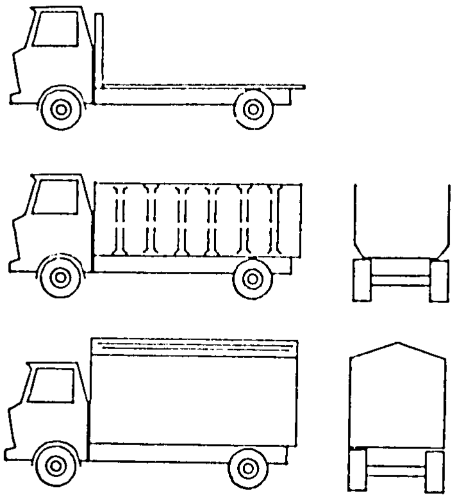


Basis	km	Cost/ton ($)	Cost/ton/km (¢)
Fixed costs, $100/day	10	10.5	105
Variable costs, 50¢/km	25	11.25	45
Payload, 10 tons	100	15.0	15
Round trip distance	200	20.0	10
	300	25.0	8.3
	400	30.0	7.5
	500	35.0	7.0

Figure 3.
Some Vehicle Body Types for Bag and Bulk Transport.

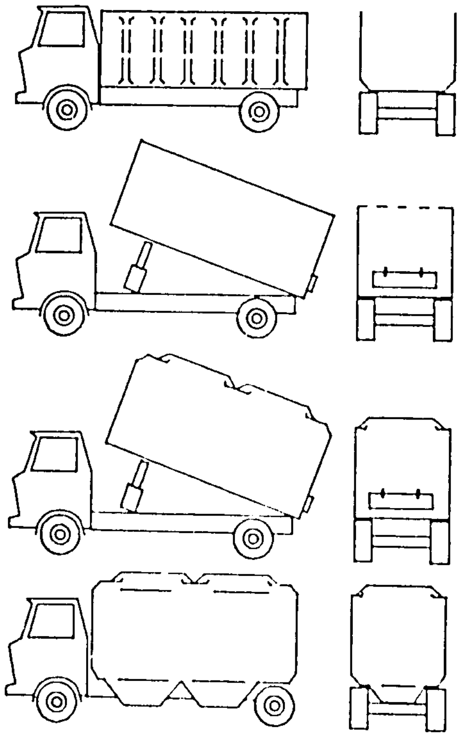
BAG TRANSPORT

1. OPEN DECK OR "FLAT"
2. SIDED, OPEN TOP
3. CLOSED VAN, BOX, OR CONTAINER TYPE



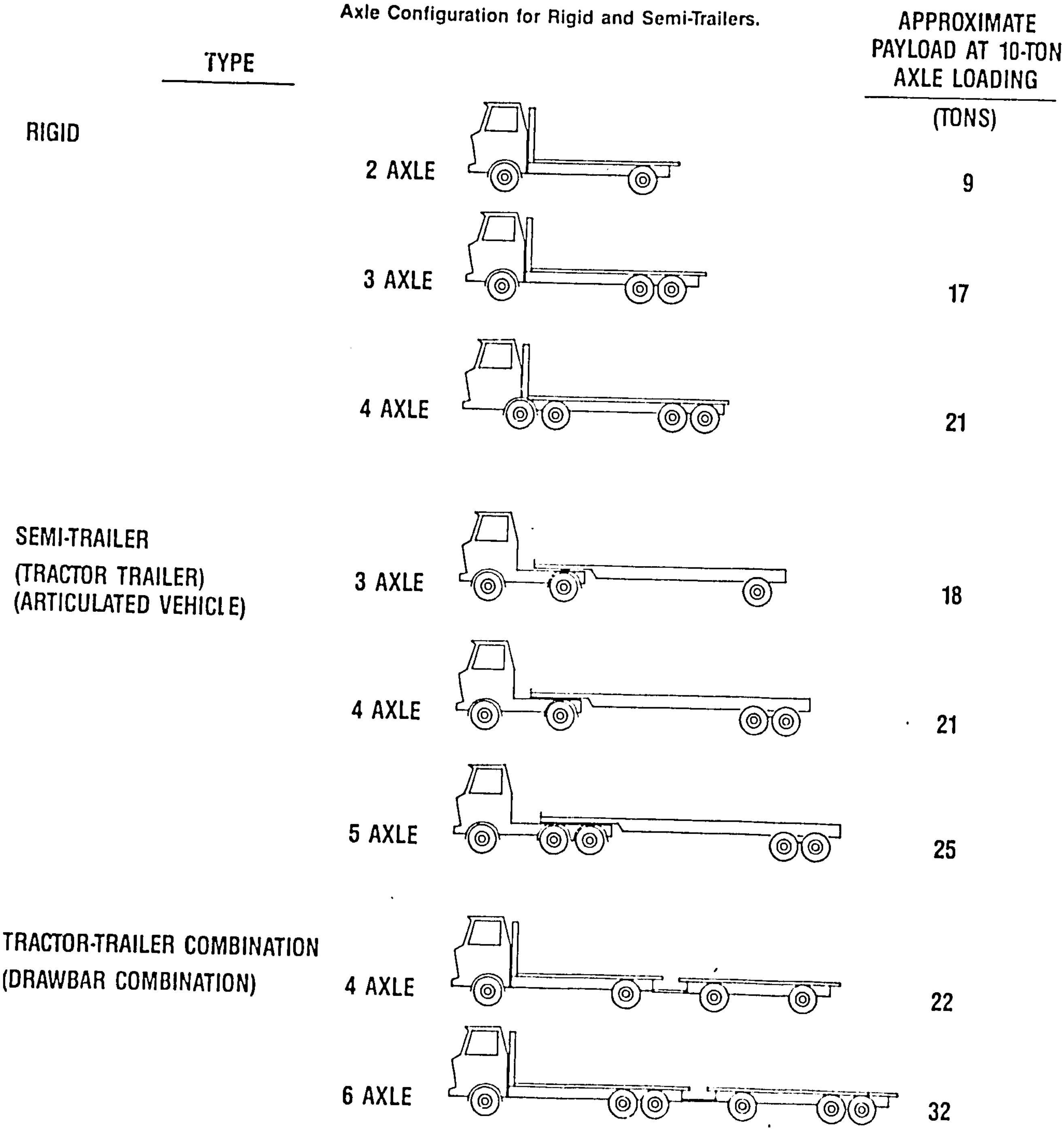
BULK TRANSPORT

1. SIDED, OPEN TOP, FIXED BODY (AS "2" ABOVE)
2. SIDED, OPEN TOP, TIPPER
3. TIPPER, FIXED HATCH TOP, REAR DISCHARGE
4. FIXED HATCH TOP, BOTTOM DISCHARGE



Note: There is an almost unlimited number of combinations of vehicle types, including: rigid or semi-trailer; fixed or tipper body (rear or side discharge); with or without trailer; open top, fixed canvan top and/or sides, closed top, hatch top; number of axles and axle configuration (discussed later).

Figure 4.
Axle Configuration for Rigid and Semi-Trailers.



Workshop on
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Consumer Identification and Buyer Behavior

by

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Consumer Identification and Buyer Behavior

That "customer is king" is not a new concept. As early as 1776 Daniel Defoe wrote in the *Complete English Tradesman*, "The sum of the matter is this, it is necessary for a tradesman to subject himself, by all ways possible to his business, his customers are to be his idols by allowance, he is to bow down to them and worship them." Marketers need to know the customer and develop philosophy in which "customer is the king." However, it is not easy to please the king.

That customer is king is accepted in all management-oriented organizations. Peter F. Drucker has said that the purpose of business is customer creation, innovation, and conversion of latent demand into effective demand. In modern marketing we often hear of the marketing concept as being the basic, guiding philosophy of a company's operations. Simply defined, the marketing concept is a *customer orientation* with a long-term profit objective. A business cannot just exist without customers. Let us consider who is a customer.

A Customer

1. A customer is not an outsider to the business; he is a definite part of it.
2. A customer is not an interruption in work; he is the purpose of it. The organization does not do him a favor; he is doing a favor by letting the organization serve him.
3. A customer is not a cold statistic. He is a flesh and blood human being with feelings and emotions.
4. A customer is not someone to argue or match wits with. He deserves courteous and attentive treatment.
5. A customer is not dependent on the organization; rather, the organization is dependent on him.
6. A customer brings his wants. It is the job of the organization to handle them properly.
7. A customer makes it possible for the organization to pay salary to staff working in the laboratory, in the refinery, in the field, or in the office.
8. A customer is a source of information which can aid in the planning, development, and implementation of the marketing strategy.

9. A customer may be a source of favorable or unfavorable communication with other customers depending upon **his opinion** of your business.
10. A customer **is the most important person to your business.**

A business therefore has the threefold task to (1) maintain relations with regular customers, (2) convince occasional customers to become steady ones, and (3) win new ones. This is a continuous task.

It is recognized that customers are neither simple in themselves nor in their behavior. An organization must know who its customers are, what they want, how they buy, and how they use and react to its products. This requires a study of the buying decision, which is only one act of the process that begins before and ends after the decision. The stages in the buying process are: need identification and assessment; prepurchase activity; purchase decision; use behavior; and post-purchase attitude. Each stage is important to the organization for building an effective marketing system. Since this program is limited to fertilizer as the product, we will limit our discussion to the customers of fertilizers.

Customers of Fertilizer

Fertilizers are distributed to the ultimate customers through a chain of intermediaries. Each intermediary is a customer and markets are thus segmented on the basis of the customers. The customers of fertilizers are:

1. Consumers (farmers).
2. Fertilizer producers.
3. Wholesalers.
4. Brokers/agents/importers/exporters.
5. Marketing organization.
6. Retailers/dealers/stockist.

By definition consumers are the end users of fertilizers. In many countries they are:

1. A few large commercially viable plantations that produce rubber, oil palm, banana, coffee, tea, etc., for export.

2. A large number of traditional farmers who produce food crops for their own family or village use.
3. A limited number of commercial farmers who produce a variety of crops, both food and export, for sale in the village or city, as well as for their own use.
4. Special government-sponsored crop production projects.

What Are the Needs of Various Types of Customers?

Farm size and types of crops grown will segment small farmers with limited individual fertilizer volume potential or large and commercial farmers with a high-volume potential and whether or not several different types of fertilizers are needed and the volume. The size of holdings and types of crops grown show that:

1. Small farmers require an intensive marketing approach and distribution network backed by technical service.
2. Large commercial farms, like tea estates, rubber estates, and coconut growers, purchase in large volume and could be served directly from product source points. A different marketing approach with different promotional and distribution programs is needed. Such type of customers are better served by personal services which are highly technically oriented.
3. Number of farms, total cropped area, crops grown in a geographic area, and past fertilizer usage history will indicate sales volume potential. This potential for a region influences the number of sales points needed; the need for warehouses; their location, size, and inventory levels; types and volumes of different products; and seasonal variations of use.
4. Whether crops are irrigated or rainfed, local or high-yielding varieties will have an impact on seasonal volume and type of product needed in an area.
5. Farm size is an important factor in determining product package size. Small farmers may require a 25- or a 50-kg bag, while larger commercial farms would possibly obtain a saving with bulk deliveries.

Where Is the Farmer?

The questions of where the farmer is and how to reach him are important factors in any marketing strategy. To build a farmer profile, it will help to know:

1. Farm crops grown by region or area.
2. Farm size and number of farms of a particular size in an area.

3. Levels of fertilizer consumption by regions or by areas.
4. Major markets where farmers market their output or buy inputs.

This information is an important working tool in helping to evaluate a marketing strategy, develop a channel system, and determine where marketing efforts should be strengthened or reemphasized.

What Is His Economic Status?

The current economic status of the farmer is important in order to determine the potential he has as a fertilizer user. Farmers' economic conditions generally vary from region to region and will range from bare subsistence farmers with little or no disposable income to large commercial farmers with large input requirements. A farmer's economic status may be categorized based on his earned cash income in a year and is one indication as to how good a user he could be.

An awareness of the farmer's need for and access to credit to purchase fertilizer is also important. He must have access to funds to purchase fertilizers. By providing farmers credit, marketers may be able to increase sales significantly.

Personal Status

Education is an independent variable and has been found to be significantly correlated with adoption of fertilizer use. Farmers who participate in social organizations or activities increase their knowledge input, of which fertilizer knowledge is a part. Social participation has been found to have a positive correlation with fertilizer use. Many investigations have proved that age is one of the significant factors influencing adoption of new practices, including fertilizer use. Marketers need to divide their customers according to their level of education, social participation, age, and also should study their attitude, level of knowledge about fertilizers, and level of their achievement motivation. These factors will assist the marketers in developing an effective marketing strategy. For example, when developing a fertilizer demonstration program, usually a leading farmer in the community is asked to participate. Only by knowing the customers can the leading, more innovative farmer in the community be identified.

Characteristics

Farmers are also identified by characteristics of their being innovators and early or late adopters. A different type of marketing strategy will be required for different characteristics. Following are the characteristics of consumers as developed by Everett M. Rogers and published in his book *Diffusion of Innovation*:

1. **Innovators** – Venturous, with access to modern technology, village leadership in state organizations, farming practices usually not approved of by everybody.
2. **Early Adopters** – Progressive, above-average education, leaders in the community, seen by neighbors as "good" farmers.
3. **Early Majority** – More conservative and traditional, slightly above average education, many informal contacts with the community.
4. **Late Majority** – Skeptical of new ideas, slightly below average education, few contacts with the community.
5. **Laggards (or Late Adopters)** – Agricultural practices based on the supernatural and on folk beliefs, fear of debt, low level of education, relative isolation from the community.

The development of fertilizer use advances by stages, according to the total amount used, the rate of increase, and the amount applied per hectare.

1. In the introductory stage the total consumption, the rate of increase, and the level of consumption are low as most farmers have little knowledge of fertilizer use.
2. In the takeoff stage the total consumption may still be low, but the annual rate of increase is rather high, often more than 15%, and fertilizer use per hectare reaches a medium level in certain areas.
3. In the third stage a high level of fertilizer use is maintained. The total demand and the application rate per hectare are high, but the growth rate slows down to 1%-3% annually.

These three stages are important in developing a marketing strategy.

A farmer is subject to the marketplace in which he sells his farm products. An understanding of his marketing problems will give an insight into his attitudes of investing in fertilizer. Fertilizer is an investment for the farmer. He uses it because he believes that it will produce bigger and better crops and that the sales of his surplus will repay his investment and hopefully return him a profit. Without this expectation, he very likely will not buy or invest in fertilizers.

Wholesalers/Retailers

The type of customer an organization has depends to a large extent on the strategy designed to serve a market. In some markets the strategy may require wholesalers to move the product to retailers. In another situation, as in export sales, the customer might be an importer/broker. For adequately serving the customers–producers, wholesalers, agents, dealers, and marketing organizations–the required information should include the following:

1. Name, business, address, location, and age.
2. Residence address.
3. Type organization.
4. Financial position.
5. Facilities.
6. Business activities.
7. History of business.
8. Type and number of customers/consumers served.
9. Area covered.
10. Services provided.
11. Knowledge of agriculture and area.
12. Road and rail service and condition.

Motivating Forces

Customers may have the same hierarchy of needs; however, the methods of thus satisfying the need could be significantly different. If a fertilizer marketing organization were selling to both a wholesale and farmer/customer, a different approach would be called for. Forces that motivate, for example, two types of customers are:

Wholesaler/Retailer–Motivating Forces

1. Profits.
2. Assurance of satisfied customers.
3. Opportunities for repeat sales.
4. Product uniqueness.
5. Product with strong advertising/promotion.
6. Product with customer appeal.

7. Products with good storage life.
8. Fertilizer complements other lines.

Farmer – Motivating Forces

1. Increased yields with lower costs per production unit.
2. Ease of use.
3. Reliability in product, in supply, and in time.
4. Convenient supply source.
5. Credit.
6. Good fertilizer recommendations.
7. Delivery service.
8. Customized containers (e.g., small bags, large bags, bulk).

A fertilizer marketing organization should attempt to identify the motivating forces for each customer and use these to develop and improve the service offered.

Customer Profile

In general terms, the fertilizer marketing organization is responsible for obtaining the required data for a customer profile. Specifically, this task becomes the responsibility of the field representative (FR) managing a sales territory. The FR will have the support of the Market Research Department on field surveys, adoption demand studies, interviews, etc., and also assistance with the analysis of data.

Buying Behavior

Knowing the customer also means having an in-depth knowledge and understanding of the factors influencing the consumers' buying habits. The factors as shown in Figure 1 are divided into cultural, social, personal, and psychological. Some of these factors are so interrelated that it is difficult to separate a cause and effect.

Cultural and social backgrounds surely affect psychological behavior and economic circumstances often define the social class. What is important in Figure 1 is the idea that what a person actually needs can be very different than what he thinks he needs and what you think he needs. Only on the basis of a good customer survey can you identify what he really needs, and educate him to appreciate those needs. Only when you are selling to him things he really needs are you developing your market correctly.

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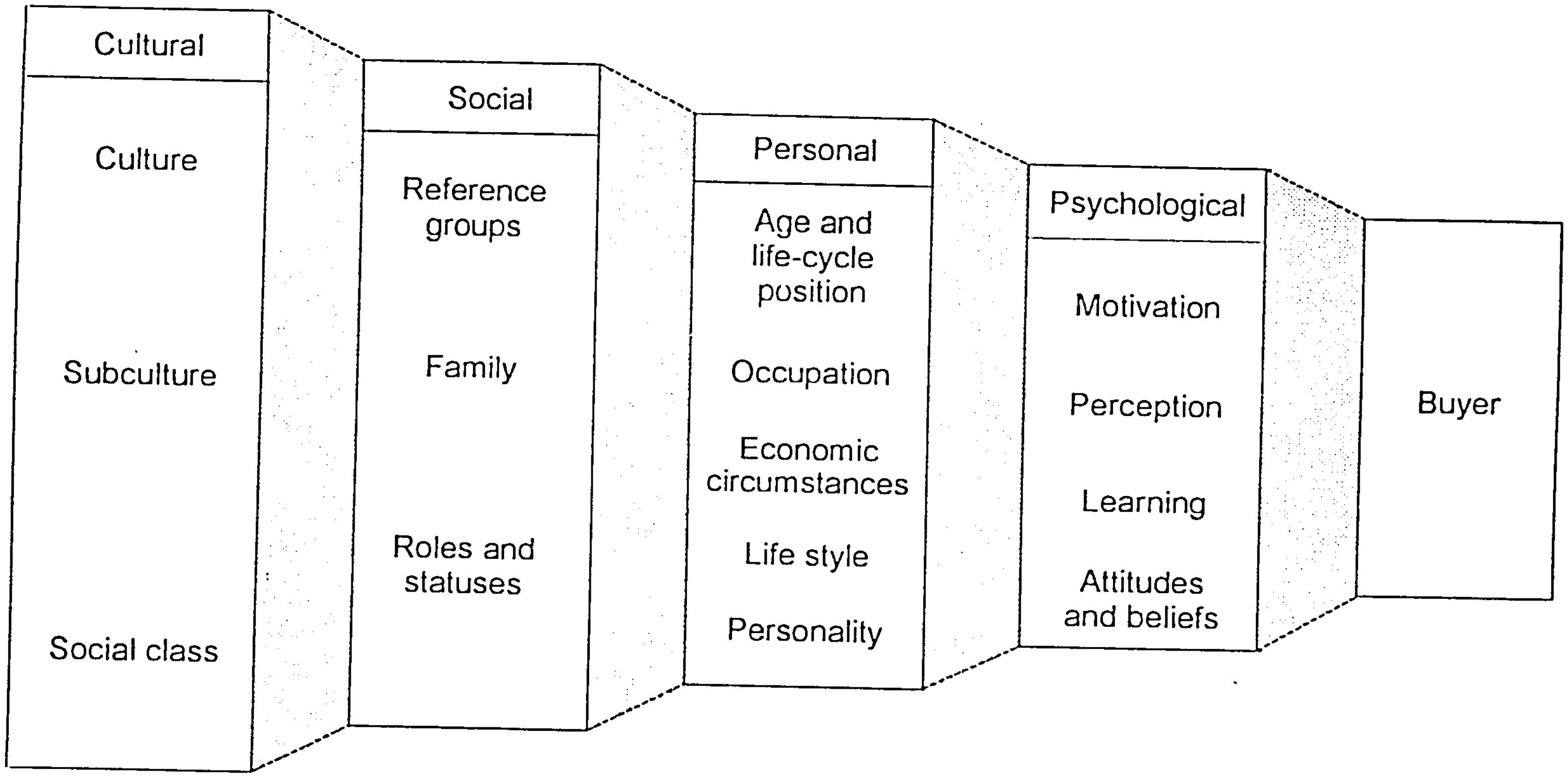

Figure 1. Characteristics Influencing Consumer Buying Behavior.

Workshop on
Efficient Marketing of Fertilizers in Cameroon

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Farmer-Customer Services
(Resource Paper)

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CHAPTER X

FARMER-CUSTOMER SERVICES

A customer is the most important asset of a business. The business may market a quality product and price it right, but the product will not move without customers. The customers are the life support of any business, and, therefore, the purpose of a business is to create new customers and retain existing ones. A business can only succeed if it concentrates on the customers.

Farm Size

The customers of an agri-input dealer in Jamaica are small and large farmers. They own 155,314 farms. The size of their holdings ranges from 0.5 acre to over 100 acres. About 93% of the farms are less than 10 acres in size. Such farms account for 36% of the total acreage (Table 1) [1].

Table 1. Number of Farmers and Number of Acres in Farms by Size Group of Farm [1]

Size Group of Farm in Acres	Number of Farms	% of Farms	Number of Acres in Farms	% of Acres in Farms
<0.5	22,227	15	3,962.5	a
0.5 - <1	18,459	12	10,689.3	1
1 - <2	31,694	20	38,313.7	4
2 - <3	22,932	15	49,874.4	5
3 - <5	24,705	16	87,742.0	10
5 - <10	22,595	15	144,122.6	16
10 - <25	9,837	6	136,315.9	15
25 - <50	1,774	1	57,567.1	6
50 - <100	591	a	38,260.0	4
100 and over	500	a	356,998.4	39
Total	155,314	100	923,845.9	100

a. Insignificant.

Source: *Provisional Farmers' Register*, 1982.

Prepared by R. S. Giroti, Program Manager, Human Resources Development, Outreach Division, International Fertilizer Development Center (IFDC), Muscle Shoals, Alabama, U.S.A. Paper presented in the Farm Services Training Program, June 1-5, 1992, Kingston, Jamaica, organized by the Ministry of Agriculture, Jamaica Commodity Trading Company, International Fertilizer Development Center, and Canadian International Development Agency.

Sales Volume

To stay in business, a dealer has to attain a certain sales volume of fertilizers, pesticides, herbicides, seeds, services, and other products. How to achieve that volume will, in turn, depend on the number of farmers who patronize the dealership. The dealership, therefore, has to make sure that it enjoys and retains adequate patronage to be in business. It has to formulate a strategy that will lead to repeat sales from existing farmers and attract new farmers to increase the volume of business. In this process, customer service assumes paramount importance.

Customer Service

In serving the farmers, distributors and retail dealers in Jamaica need to market not only the inputs but also services that will help the farmers in selection of crop varieties; determining how much and when to apply fertilizers, pesticides, and herbicides; and water and pest management. Harvesting and storage and disposal of output should also form part of the services. Further, the dealership needs to assist the farmers in obtaining short- or long-term credit from the financial institutions, in soil testing and fertilizer recommendations, and in developing a farm plan to minimize the risk to the farmer.

The dealership should realize that a satisfied farmer is the best form of business promotion. The dissatisfied farmers tend to be far more vocal than the satisfied ones. A dissatisfied farmer is likely to complain to friends and neighbors much more than a satisfied farmer will recommend the dealership to others. The difference between good and bad service leads to a rise or fall in sales volume. Dealerships with the service advantage in the marketplace are always winners in a free competitive market situation, especially when product differentiations are minimal.

What Is Customer Service?

The dealership should understand that customer service means all features, acts, and information that augment the customer's ability to realize the potential value of a core product or service. This description of customer service concentrates on the value of products and services as they are used [2].

Strategy

Without a strategy for customer service, the dealership will not know exactly who its farmer-customers are and how much it should invest to satisfy them. The essence of any strategy is to segment the customers to be served. Segmentation is the process of identifying groups of customers with common characteristics so that a program of services can be designed for each segment of the customers.

Segmentation

An agri-input dealership can segment the customers [4] on the basis of four criteria: measurability, accessibility, substantiality, and feasibility. The criterion of measurability will assist the dealer in determining whether the business that may accrue from a segment can be measured. Through the accessibility criterion, the dealer will find out whether the customer-farmers can be reached. Is adequate infrastructure developed in that area where they are located? Is there a good network of roads? Answers to these questions and others will define accessibility. The criterion of substantiality assumes importance as it will determine the volume of business. This criterion will tell the dealer if the volume is substantial or not. If the volume is not substantial, perhaps it is not worthwhile to tackle this segment. The dealer is always trying to determine whether to invest resources in one segment or the other. There are competing propositions. The final criterion of feasibility will help the dealer to decide on which proposition to act.

On the basis of these criteria, the dealership can segment the farmers and develop a package of services that will best meet the need of a particular segment. Each segment will require a different package.

The process of segmentation will assist the dealership to know where the farmers are; their economic status, personal status, and characteristics; and motivating factors [5]. This information can be used by the dealer in developing a successful customer-service program.

Where Is the Farmer?

The questions of where the farmer is, what he grows, and how to reach him are important. The answers will help the dealership to know the location of farm, crops grown, farm size and number of farms of a particular size in an area, levels of fertilizer consumption by areas, major markets where farmers market their output or buy inputs, sources of irrigation water, and the rainfall pattern.

Economic Status

The current economic status of the farmer is important in order to determine the potential he has as an agri-input user. Farmers' economic conditions will range from mere subsistence with little or no need for inputs to commercial operations with large input requirements. A farmer's economic status may be based on his earned cash income in a year, and it is one indication as to how good a user he could be.

An awareness of the farmer's need for credit to purchase inputs is also important. He must have access to funds to purchase his requirements. By arranging credit for farmers, the dealership may be able to increase sales.

Personal Status

Education has been found to be significantly correlated with adoption of use. Farmers who participate in social organizations or activities increase their knowledge of inputs. Age has also been found to be a significant factor in influencing adoption of new farm practices, including fertilizer use.

Dealerships, therefore, need to segment farmers according to their economic status, education, and age, and they also should study the farmer's attitude and level of knowledge of inputs. These factors will assist the dealership in developing an effective service strategy. For example, a leading farmer in the area is usually asked to participate in developing a fertilizer demonstration program. Only by knowing the clients can the dealer identify the leading, more innovative farmers in the area.

Characteristics

Farmers are also characterized as innovators, early adopters, informal leaders, the majority, and nonadopters. A different type of service strategy will be required for these different characteristics. These characteristics show values of farmers in terms of trying new ideas, respect, deliberateness, and skepticism [1].

A farmer is subject to the marketplace in which he sells his products. An understanding of his marketing problems will give an insight into his attitudes toward investing in inputs. Inputs are an investment for the farmer. He uses them because he believes that they will produce bigger and better crops and that the sales of his surplus output will repay his investment and hopefully return a profit. Without this expectation, he very likely will not buy or invest in fertilizers and other inputs.

Motivating Factors

Farmers, like all of us, are subject to need for food, safety and security, social recognition, and self respect; however, the methods of satisfying these needs vary significantly. For satisfaction of these needs of the farmers, the dealers should appreciate the factors that will motivate the farmers. Such factors should include:

1. Increased profit through higher yields with lower costs per production unit.
2. Ease of use.
3. Reliability in product, in supply, and in timeliness.
4. Convenient supply source.
5. Credit.
6. Good fertilizer recommendations.
7. Timely delivery service.
8. Customized containers (e.g., small bags, large bags, bulk).
9. Advisory services.
10. Efficient and prompt pre- and post-sale service.

Profile

Having segmented the customer-farmers, the next step of the dealership is to develop a customer-farmer profile. The profile is a record of the farmer's farm, family, and credit history, use of inputs, soil test values, crops grown, educational level, personality, age, and motivating factors. This record is maintained on 3" x 5" size cards or in a personal computer (PC) if the dealership has one. To assist the dealership in the construction of profiles, a worksheet has been developed which can be used to collect information for the record. This worksheet is shown in Figure 1.

Traits of Farmers in Jamaica

Large and small farmers of Jamaica possess different traits. They are products of their own environment, tradition, and culture. The dealer must, therefore, work with them differently [6].

Date ________

Customer-Farmer Profile Worksheet

1. Farmer Name ________________________ Age (Approx) __________
2. Address ________________________ Phone __________
3. Family Situation ________________________
4. Personality Description ________________________
5. Interests, Hobbies, Etc. ________________________
6. Educational Background ________________________
7. Business Situation: ________________________
   - Acreage owned, by crop ________________________
   - Acreage rented, by crop ________________________
   - Cattle (heads) ________________________
   - Labor—employees ________________________
   - Major equipment ________________________
   - Tillage practices ________________________
   - Current fertilizer ________________________
   - Years with dealership ________________________
   - Other farm input suppliers ________________________
8. Factors likely to be important to this farmer in purchasing fertilizer ________________________
9. Past experiences with the farmer ________________________
10. Anticipated problems in servicing the farmer ________________________

Figure 1. Example of Customer-Farmer Profile Worksheet.

Large farmers operate as businessmen. They estimate demand, costs, and selling prices of crops and determine the viability of producing the crop. Serving such farmers requires the dealership to have technical knowledge on NPK grades, with costs, for discussions with customers. Also, the dealer will need updated knowledge on farm technology, fertilizer recommendations, methods of application, and new products. The dealer should realize that large farmers buy in bulk. They will patronize the dealer if they are offered a high level of pre- or post-sale service on a continuing basis.

The small farmers, on the other hand, need to be tackled differently. They grow traditional crops, often in multicrop systems, whereas the large farmers generally monocrop. They purchase popular fertilizer blends and are influenced by the "going" practices in the area. Generally, they buy an "all purpose fertilizer" rather than a grade of NPK for a specific crop. While dealing with small farmers, the dealer needs to know what satisfies their specific needs.

Often the small farmers follow the practices handed down by the older generation. They will accept change but will need to be convinced of the benefits of the change. Demonstrations help in convincing them and should be used by a dealer in persuading them to accept a change.

The dealer can win the confidence of small farmers through personal contacts by visiting their farm and providing them advice while they are in the process of crop production operations.

Needs Identification

A recent article in *Farm Store* [7], discusses five methods suggested by Joel Ebbertt of Agri Business Group, Indiana (U.S.A.), to identify needs of farmers. Ebbertt's methods are surveys, monitoring complaints, probing needs, the coffee shop, and focus groups.

The dealer, through surveys can investigate specific issues by just asking farmers. Monitoring complaints provides an opportunity to uncover customer needs. People have a specific problem when they complain—a late delivery, wrong billing, poor product performance. Complaints signal a need for a change. Face-to-face meetings between business and customers remain one of the best ways to probe for needs or opportunities. Through meetings, dealers can determine if customers are happy with the level of service. During informal conversations in a coffee shop-like setting, a wealth of information can be gathered. A group of 8 to 12 key customers or prospects should be brought together to determine needs through group synergy at a breakfast or supper meeting at a local restaurant. The dealers can then ask customers about their needs and wants. Specific questions can be answered by the focus groups of customers.

Full Range of Inputs and Services

To win the customer-farmer's loyalty, the dealership should extend a full range of services, inputs, equipment, storage, and credit from one location (Figure 2). The dealership location should display posters and charts on products like fertilizer plant protection chemicals, on application methods, on retail prices, and on other factors in easy-to-understand language, as shown in Figures 3a and 3b [3].

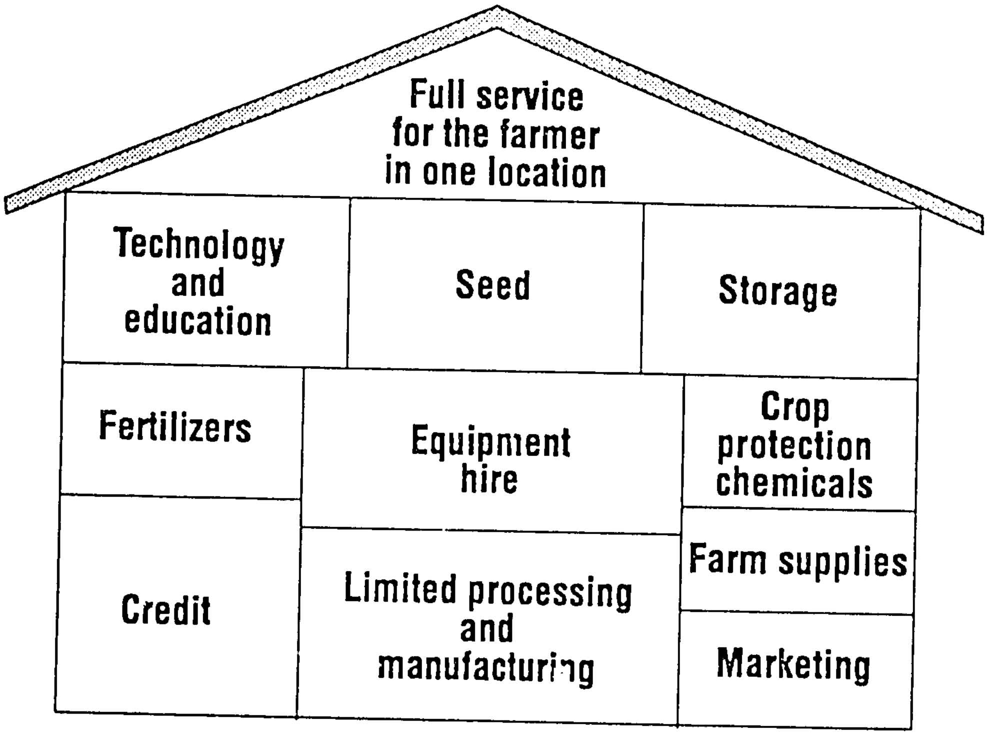

Figure 2. Range of services and inputs offered by dealership.

Conclusion

To serve the customer-farmer, the dealer should, on a continuing basis, update his knowledge on the products offered and information on his customers-farmers. He should provide advice on crops to be grown and keep up with the developments in marketing of outputs and their prices. By providing the needed services and assisting the customer-farmer in making a profit from his farming operation, the dealer will generate trust and thus build a bond of loyalty and a lasting relationship. This process will lead to repeat sales, which will enable the dealer to stay in business. A "thank you" card after each sale and prompt attention to customer needs go a long way in building relationships. A positive attitude by dealer employees is an important factor in customer service and dealer operations.

An efficient, effective, and timely customer-farmer service will sustain the business of the dealership. The dealership that concentrates on the service constantly adjusts the business to meet the needs of the customer-farmer. It is not enough to satisfy the farmer; his visit to the dealership must be made memorable.

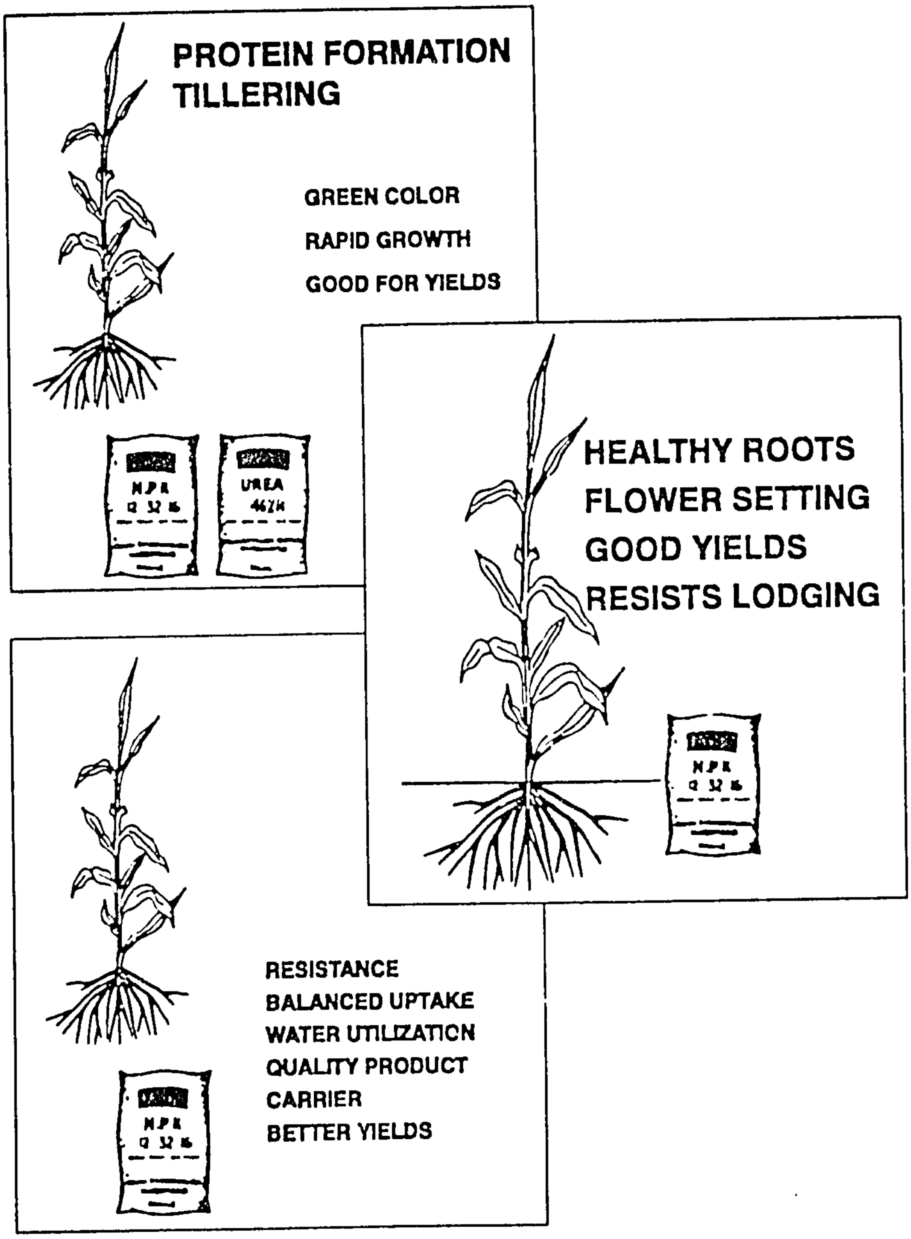

Figure 3a. Examples of visual displays promoting fertilizer use and good crop management practices [4].

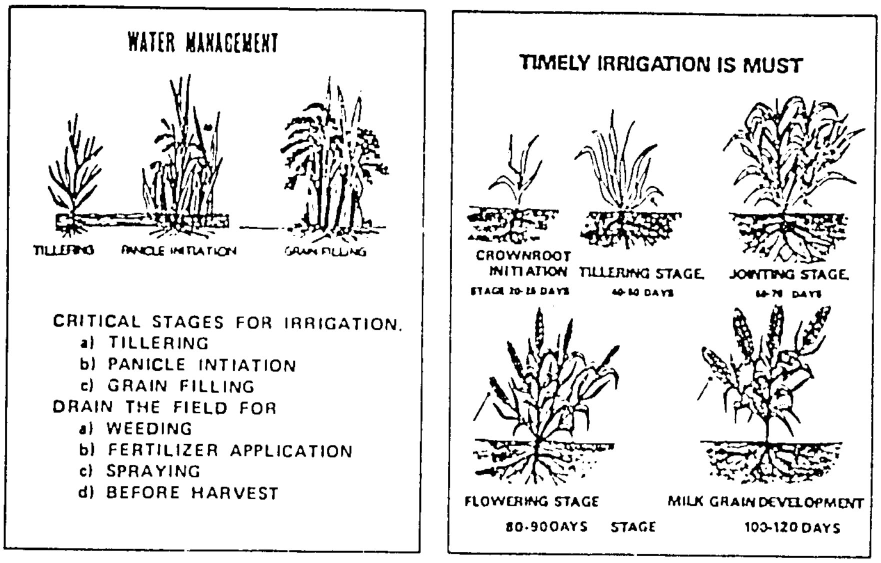

Figure 3b. Examples of visual displays promoting fertilizer use and good crop management practices [4].

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Module E: Business Management

Workshop on

Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994

Bamenda, Cameroon

Developing a Fertilizer Dealers' Association

by

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Developing a Fertilizer Dealers' Association

Introduction

This paper will discuss the potential role of a Fertilizer Association, the need for the organization, and will present the initial steps in developing the organization.

Background information about the importance of the fertilizer sector in agricultural development of a country, and the need for and role of a fertilizer Association, as part of that development will be emphasized. A stepwise plan that can be used in establishing, equipping, and operating the offices and Board meeting facilities is proposed. Staffing requirements for the Association are also discussed. Recommendations on specific outputs, services, or endeavors that the Association should undertake in monitoring of fertilizer supply and demand are made. Development of training and technology transfer activities is also discussed. Potential budget items for the first 3 years of operation are included.

Rationale for a Fertilizer Association

The gradual transition from a public to a private sector fertilizer marketing system may result in temporary difficulties. Problems such as withdrawal of the government from fertilizer distribution, development of a good commercial credit system for fertilizers, elimination of fertilizer subsidy, enactment of a national fertilizer act, and efficient port clearance of imports must be successfully resolved during such a transition period.

It is difficult for the government to serve as catalyst of change in the fertilizer market since the government may often dominate the market. As the marketing system evolves from a public system to a private system some entity must emerge to coordinate and represent the interests of the government, the fertilizer distributors, merchants and traders, various donors and most importantly, the nation's farmers. Thus, during the transition period it is important for the fertilizer marketers to begin to develop their own capability to deal with certain issues (e.g., market monitoring and intelligence, liaison with the Government on fertilizer and agriculture-related issues, distributor training and technology transfer, and dealer or retailer and farmer education on fertilizer use, etc.). A well-organized fertilizer Association can be an effective force for developing those important capabilities and representing the mutual interests of fertilizer sector on many critical issues related to continued fertilizer development and improved marketing. Furthermore, formation of the Association is another key step in the institutionalization of private sector fertilizer marketing.

Association Specifics

Description

A National Trade Association should be a recognized and registered organization under a government act. The Association should be a self-operating, nonprofit organization established by and on the behalf of the fertilizer sector and agribusiness firms in a country. As a nonprofit entity, the activiti[illegible] of the Association will be determined by its members, directed by an elected Board of Directors. A Standing Committee of Officers, elected from the Board, should be composed of the President, First and Second Vice Presidents, Secretary, and Treasurer. The Standing Committee will secure and hire, with the approval of the full Board, an Executive Vice President to staff, equip, and manage its office and be responsible for carrying out the programs and policies of the Association. The Association shall be licensed and registered under the correct government act or ordinance.

Objectives

The objectives of the Association should generally encompass the following:

1. Encourage policy reform that supports continued fertilizer market liberalization and privatization.
2. Establish a management information system (MIS). The MIS should provide accurate and timely information on fertilizer market supply and demand (domestic and

international). This information can be used in making decisions that will enhance fertilizer supply and availability.

3. Work with government agencies, ministries, and legislative bodies to obtain fair and equitable laws regarding fertilizers and their transportation, distribution, and use.
4. Improve quality assurance on fertilizer analyses (grade), weights, and measures. (To assure that the farmers, dealers, distributors, and traders are receiving a full measure of the product purchased and delivered.)
5. To work with research and extension education institutions in obtaining fertilizer use results on different crops and soils and disseminating it to members, and to inform farmers and villagers about the results.

The specific objectives, for further details, are presented in Appendix I.

Purpose

The primary purpose of an Association should be to advance the continued development of the fertilizer sector of a specific country, in general, and to improve fertilizer supply, distribution, marketing, and use for increased agricultural production, in particular.

Goals

The goals of the Association should cover the following:

1. *To represent* the collective interests of the Association members in matters related to: (a) fertilizer policy reform, (b) training and technology transfer, (c) fertilizer market information monitoring, collection, evaluation, and dissemination, (d) proper use of fertilizers for increased food production, and (e) other matters related to fertilizer sector development.

2. *To serve* as a vehicle for providing information to the Association members and training and technology transfer to dealers, farmers and villagers, the general public, and other relevant entities on matters related to the fertilizer use.

3. *To promote* development of an agricultural production system that allows for sustainable growth in meeting the food and fiber needs of a growing population through the judicious use of an adequate supply of properly manufactured, imported, and marketed fertilizers.

4. *To improve* the availability and wise use of fertilizer and its distribution and marketing throughout the country.

Description of Activities

The activities of the Association will be subject to the overall direction of the Board of Directors. The Association should be headed by the President and other officers such as First and Second Vice Presidents, Secretary, and Treasurer. These officers are normally elected by and from the Board. Collectively, the Officers form the Standing Committee of the Association. After establishment, the day-to-day management of the Association will be with a hired Executive Vice President, under the direction of the Board. The Executive Vice President will manage the operation carrying out the programs and policies of the Board of Directors. The activities will reflect the priority interests and needs of the Association members. An illustrative list of the type of activities that may initially be considered is as follows:

1. Publish a weekly/biweekly fertilizer trade bulletin.
2. Organize market-driven training, technology transfer seminars, and workshops for members.
3. Establish a mini-library of fertilizer literature for members.
4. Publish a bimonthly technical bulletin on "best use" fertilizer practices for different rops, both field and horticultural, for farmers.
5. Develop linkages with the Ministry of Agriculture, agricultural research and extension organizations to represent the member's views on key issues and questions regarding fertilizer needs and use or technology transfer.

Organizing the Association

Legal Status

The Association should be established under the specific laws or ordinances for a given country as specified for trade organizations. It should be a nonprofit, nonbargaining entity, and, as such, should be exempt from all taxes, duties, and levies, etc.

Membership

Membership in the Association by firms, companies, or individuals should be voluntary and open to all sectors of the fertilizer manufacturing and marketing (e.g., fertilizer business houses, agribusiness houses, transportation firms, etc.) and to those interested in helping achieve the objectives of the Association. There should be voting and nonvoting membership categories.

1. The voting membership might be categorized as follows:
   a. Category I–Fertilizer Manufacturers or Producers
   b. Category II–Fertilizer Importers and Exporters
   c. Category III–Fertilizer Supplier Agencies or Representatives
   d. Category IV–Fertilizer Distributors and Merchants

2. The nonvoting membership categories may be as follows:
   a. Associate Member – Associate membership is for those who are part of the agricultural input business, but do not come under any other appropriate membership category, but are interested in helping the Association achieve its objectives. Associate members shall be dues paying.
   b. Honorary Member – An Honorary membership is given by the Association to those individuals, firms, or institutions it wishes to honor because of their exceptional contribution or service to the Association and its members. Honorary members shall not pay any dues.

3. Membership Application Form – An illustrative Membership Application Form is presented in Appendix II.

Memorandum and Articles (Bylaws)

The Memorandum of the Association should list details such as the official names of the organization and location of the registered office of the Association. The memorandum of the Association may also give very specific details concerning the objectives of the Association. Appendix I details the general objectives listed earlier. The Articles or Bylaws should clearly define and govern the operation of the Association. An example of Bylaws is given in Appendix III.

Structure/Staffing

The staff required and structure of the Association will evolve over time as its value and service to its members grows. This section outlines those as being necessary during the initial organizational stages of development.

Organizational structure – Initially, the structure will be simple and reflect the limited staff/funding required for startup operations. Figure 1 is an example of an organizational structure for a Fertilizer Association.

The Board of Directors should be elected by the members at the annual general meeting. Directors should initially be elected for 1-, 2-, and 3-year terms. After that, each Director should be elected for a 3-year term.

The Standing Committee should include the President, two Vice-Presidents, the Secretary, and Treasurer elected from and by the Board of Directors. Tenure of the Standing Committee should be for 1 year or until the next committee is properly constituted.

After the first year of operation, the Association's staffing requirement will be related to the output or services desired by its members. Once the Association is successfully organized, registered, and licensed an Executive Vice President should be hired. The

Executive Vice President should hire a staff and have the office fully operational within 1 year of being hired.

Budget

The funds needed to establish and operate the Association will be from the member's own resources and will be governed by the projected cost of the startup plan and operation costs. Illustrative budgets for the first 3 years of the Association's operation, including capital expenditures and fixed and variable costs are presented below:

Budget for the First Year
Cost Classification

1. **Capital Expenditure**
   a. Land/office building
   b. Office items
   c. Desk
   d. Tables and chairs
   e. Typewriter (electric)
   f. Installation of phone

2. **Operations Cost**
   a. Personnel:
      (1) Coordinating director
      (2) Special assistant (1)
      (3) Secretary (1)
      (4) Messenger (1)
   b. Office occupancy:
      (1) Telephone
   c. Meeting expenses:
      (1) General convention
      (2) Public notice (2 newspapers)
      (3) Annual general meeting
      (4) Board meetings
   d. Office supplies:
      (1) Subscriptions
      (2) Stationery
      (3) Postage
      (4) Books
      (5) Miscellaneous
   e. Transportation:
      (1) Driver
      (2) Car maintenance

Budget for the Second Year

Cost Classification

1. **Capital Expenditure**
   a. Office decoration
   b. Desks
   c. Tables and chairs (office)
   d. Boardroom and library
      (1) Chairs
      (2) Conference table
      (3) Library shelves
      (4) Blackboard
   e. Computer and printer
   f. Purchase of car
   g. Photocopying machine
   h. Library shelves
   i. Projector screen
   j. Public address system and projectors

2. **Operations Costs**
   a. Personnel:
      (1) Executive vice president
      (2) Publications officer
      (3) Special assistant
      (4) Secretary
      (5) Driver
      (6) Messenger
      (7) Guard
      (8) Office rent plus boardroom and library
   b. Publication expenses:
      (1) BFA news bulletin (bimonthly)
      (2) Car maintenance
   c. Subscriptions:
   d. Meeting expenses:
      (1) Board meetings
      (2) General meeting
      (3) Special seminars/workshops
      (4) Stationery
      (5) Postage
      (6) Telephone
      (7) Books

      Subtotal

   Total fixed and variable costs

Potential Income Sources

1. Application fee and subscription
2. Levy a fee based on per-ton of fertilizer sold
   (might not need to implement until later in the development)
3. Membership dues

Budget for the Third Year

Cost Classification

1. **Capital Expenditure**
   a. Desks
   b. Tables and chairs
   c. Computer and printer (second)
   d. Office decoration (2 offices)

2. **Operations Costs**
   a. Personnel:
      (1) Executive vice president
      (2) Training & technology specialist
      (3) Fertilizer monitoring & evaluation officer
      (4) Publications officer
      (5) Five enumerators (one per division)
      (6) Travel allowance
      (7) Office secretaries (2)
      (8) Driver
      (9) Messenger
      (10) Offices and boardroom rent, etc.
      (11) Publication expenses:
         (a) BFA news bulletin (monthly)
         (b) Office equipment maintenance
         (c) Car maintenance
   b. Subscriptions:
   c. Meeting expenses:
      (1) Board meetings
      (2) General meeting
      (3) Training/seminars
      (4) Stationery and computer paper
      (5) Postage
      (6) Telephone
      (7) Books

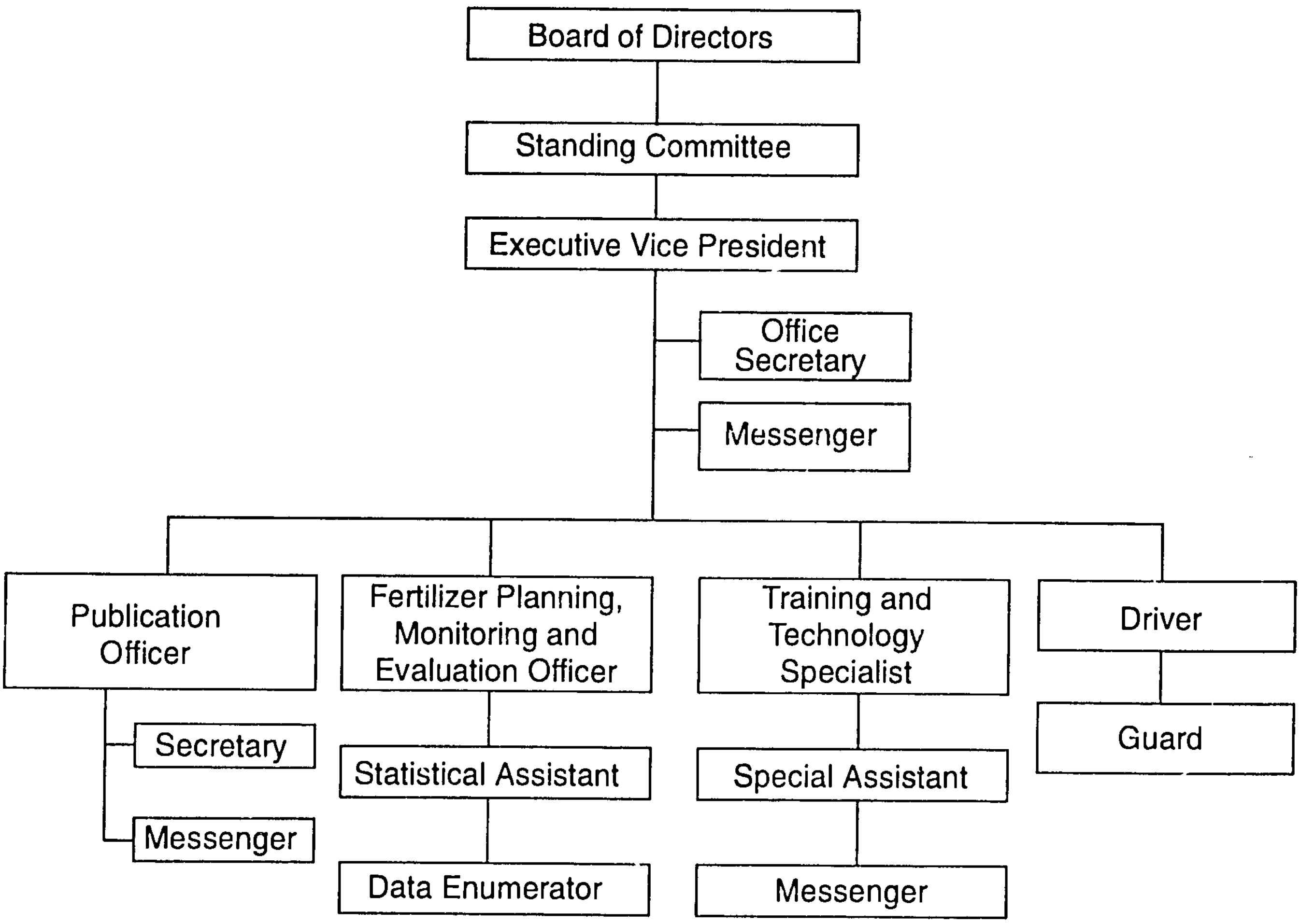

Figure 1. Example of an Organizational Structure for a Fertilizer Association.

Appendix I

Memorandum of Association of the _________ Fertilizer Association

Name

I. The name of the Association shall be the ________________________________, a representative nonprofit trade organization with individual members, agencies, firms, companies, or manufacturers of the whole country of _________.

Registered Office

II. The registered office of the Association will be situated in _________.

Objectives

III. The objectives for which the Association is established are:

1. To provide a nonprofit trade organization that will bring together and represent all sectors and members of the _________ fertilizer industry, including distributors, merchants, importers or exporters supply agencies, and manufacturers.
2. To coordinate the efforts of members of the Association in promoting the privatization and open marketing of fertilizer crop nutrients and other inputs to the farmers and villagers of _________.
3. To work with the government agencies, the Parliament, and Ministries to solve mutual problems and obtain fair and equitable laws regarding fertilizers and their distribution and use in _________.

4. To encourage research and experimentation on the proper use of fertilizer nutrients on various crops and soils by organizations mandated to research such matters.
5. To work with the Directorate of Agricultural Extension and International organizations in obtaining the results of research on nutrient needs and fertilizer use on crops and soils and to disseminate that information on farmers, dealers, distributors, and merchants to improve fertilizer use and efficiency to improve crop and food production.
6. To encourage fertilizer dealers, distributors, and merchants to conduct demonstrations that can be used to show the benefits of proper fertilizer nutrient use to farmers and villagers.
7. To collect, monitor, and publish fertilizer data and statistics needed by the members and the government for monitoring and improving fertilizer availability, distribution, and use in the country. Such information may be released to the press, radio, and TV media to keep the public informed about fertilizer consumption and benefits, and the progress being made through proper fertilizer use.
8. To promote the highest standard of business ethics, integrity, and professionalism between and among the members of the Association and others.
9. To serve as an arbitrator, but not as an attorney, in solving problems and minor disputes so that peace and harmony may exist, and the best interests of the Association and its members, as well as __________, be kept in mind at all times.
10. To promote, protect, and safeguard the interests of all the members of the Association who are distributors, merchants, importers or exporters, supply agents, dealers or retailers, manufacturers of fertilizers, or persons, organizations, or bodies directly or indirectly connected with the fertilizer trade sector in ____
11. To keep and maintain the highest standard of unity and cooperation among the members of the Association in the conduct of business carried on by them.

12. To consider and deal with all questions and matters concerning the manufacture, transportation, and trade of fertilizer in general and to devise ways and means to overcome any difficulty or problem arising in connection therewith.
13. To develop, through product promotion, wider and new uses of fertilizers and related products.
14. To discuss, promote, or oppose any measures connected with the fertilizer distribution and use, in general, and members, in particular.
15. To support and promote the concept of maximum profit yields in all sectors of agricultural production, toward an environment-friendly sustainable growth in agriculture production for the benefit of the country and its farmers.
16. To promote soil fertility in the country and to promote, sponsor, and encourage soil testing facilities in _________ to increase the effectiveness of fertilizer use and agricultural production.
17. To support and promote by all available means all types of agricultural, agronomic, soils, fertilizer, and related research efforts for the advancement of agricultural production in the country.
18. To promote experimentation and research that will assist in the general development of industries, enterprises, or objects connected with the use of fertilizer in _________ and to study the potentialities of any matters which may be conducive to the attainment of all or any of the Association's objectives.
19. To promote and become members and/or associates of all national and international organizations or bodies directly or indirectly related to fertilizer use, soil fertility and enhancement, and advancement of environment-friendly sustainable agriculture.
20. To promote by all available means the manufacture and production of all types of fertilizers in the country, provided it is economical to do so.
21. To actively promote self-sufficiency in food and agricultural production in the country and support all state policies in that regard.

22. To establish and promote contacts with foreign countries and international or foreign organizations, and develop relations with them in order to enhance the trade, distribution, and manufacture of fertilizer in _________.
23. To collect, maintain, and distribute or supply all data, statistics, and other information necessary for the promotion and advancement of fertilizer use in _________ through letters, circulars, periodicals, or through press and other publicity mediums.
24. To act as principals, agents, managers, trustees, or secretaries for any society, committee, Association, or body directly or indirectly related to fertilizer, whether incorporated or not.
25. To obtain or develop informational books, brochures, visual aids, and educational items for members and distribute them on a pro-rata, nonprofit and no-loss basis.
26. To raise funds, secure the payment of money by means considered necessary or in a manner consistent with the Association's objectives for proper or convenient promotion of the objectives of the Association and for meeting its financial obligations.
27. To purchase, lease, or exchange or otherwise acquire and to alter, improve, develop any land, buildings, houses, estates, farms, fittings, and furniture or any other movable or immovable properties, licenses, rights or privileges, as the Association thinks necessary or expedient for accomplishing the objectives of the Association.
28. To elect officers, appoint staffs, agents, managers, secretaries, contractors, and constitute agencies and/or branches of the Association in any place within _________, whatsoever.
29. To accept any request, gifts, donation or subscription towards any fund or endowment and to establish and support institutions or trusts calculated to benefit the members of the Association, its employees or ex-employees or their dependents, and to grant gratuities, pensions, and allowances, and to subscribe, donate, or grant money for and/or promotion that advances fertilizer use, agronomic research, soil fertility enhancement, and

environment-friendly sustainable growth in agricultural production, or charitable or benevolent objects or for any public, general or useful objects and for agriculture in general.

30. To arrange for giving relief, medical or otherwise, to the members of the Association, its employees or ex-employees or their dependents and to establish and maintain temporary hospital, dispensary, nursing home, and other institutions and to support them by aids, donations, or grants.

31. To bring suits and take legal actions, civil, criminal, revenue or otherwise, whether original or appellate, and to grant vokalatnamas authorizing legal practitioners to appear for and on behalf of the Association before all courts, civil, criminal, revenue, or otherwise.

32. To draw, make, accept, discount, execute, and issue checks, drafts, pay orders, promissory notes, and any other negotiable or transferable instruments.

33. To pay for services rendered or to be rendered in connection with formation and registration of the Association or for furtherance of its objectives.

34. To represent and act for the members of the Association before all Ministries, departments, or agencies of the government and all types of public and private, national and international organizations and agencies whose activities affect the manufacture, distribution, transportation, trade, and use of fertilizers and to nominate its representative(s) for such organizations, if required.

35. To contribute to the progress and advancement in every lawful manner and do all lawful acts to promote the welfare of the members of the Association.

36. To improve the efficiency of services performed by all segments of the members of the Association, fertilizer distributors, merchants dealers, and retailers throughout the country.

37. To raise and recruit membership for the Association from among the distributors, merchants, traders, dealers, manufacturers, supply agents, importers, and exporters of fertilizers and related agricultural input products in __________, and from among persons, bodies, organizations, departments or agencies directly or indirectly related to fertilizer use in __________. And,

to categorize such membership into several categories, and define eligibility requirements and attach thereto, respectively, such qualifications, preferences, rights, titles, status, conditions, and privileges as may be determined from time to time by the Board of Directors of the Association.

38. And generally to do all such other acts and things as may be necessary from time to time in connection with the affairs of the Association or for the attainment of the above objectives or any of them.

AND IT IS HEREBY DECLARED THAT THE objectives specified in several paragraphs of this memorandum shall, unless otherwise expressed in such paragraph, be regarded as independent objectives, and accordingly, shall be in no way limited or restricted in application (except when otherwise in such paragraphs by reference to the objects in any other paragraph), and may be carried out in as full and ample manner and construed and applied in as wide a sense as if each of the said paragraphs defines the object of a separate, distinct and independent Association.

Appendix II[1]

Fertilizer Association Application for Admission as Member

For official use only

Date Received		Application Number		Membership Number		Membership Category		Name of Division	

The President
________ Fertilizer Association
____
____

Dear Sir,

I desire to apply for admission as a member of the ________ Fertilizer Association. I hereby declare that I am not subject to any of the disabilities stated in Article (10) of the Articles of Association of the ________ Fertilizer Association.

1. Name of: ________________________
(person/organization)

2. Father's name: ________________________
(in case of person)

3. Address (any change in address to be promptly notified to the institute):
   a. Permanent: ________________________
   b. Present: ________________________
   c. Business: ________________________

4. From which District: ____________ Division: ____________

[1]Source: Report on the Development, Structure, and Organization of the Bangladesh Fertilizer Association.

5. Types of firm:

Proprietorship	
Partnership	
Company	

6. Types of business (Tick):

Distributors	
Dealers/wholesalers	
Retailers	
Importers	
Manufacturers	
Suppliers' agent	
Exporter	

(Certificate in support to be submitted)

7. Interested to become a membership of (Tick):

Category I	
Category II	
Category III	
Category IV	

8. Duration in the fertilizer business: ______ year

9. Source of Capital:

   a. Own ______%

   b. Borrowed ______%

10. Annual turnover: $ ______

11. Number of employees in your fertilizer business: ______

12. Membership with other Trade Associations:

Name of Association	Category	Date of Membership

13. Name and address of three persons, at least two of whom should be members of the Fertilizer Association.

Name and Address	Membership Number	

14. Any other particular/information that the candidate may like to furnish about himself or his business.

15. I enclose a Bank Draft/Pay Order/Crossed Check for sum of $ ______

(____) as:

a. Application fee $ ________

b. Annual membership subscription or dues $ ________

Total $ ________

16. Declaration

I, ______________________ the undersigned, do hereby declare that:
(PRINTED NAME)

1. The above statements are correct.

2. In the event of my admission as member of the Association, I will be governed by the Memorandum and Articles of Association of the _________ Fertilizer Association and the regulations/articles made here under, and currently in force.

3. I will advance the objectives of the Association to the best of my ability and will attend the meeting thereof as often as I conveniently can during the tenure of my Membership.

Yours faithfully,

Signature of the Applicant

Date:

Appendix III

Act VII of 1913

(Company Limited by Guarantee and Not Having Share Capital)

Article of Association

of

Bangladesh Fertilizer Association

Registered Office:

NE(D) 3A, Gulshan Avenue
Gulshan
Dhaka – 1212
Bangladesh

5/6k

Appendix III[1]

Companies Act 1913 (Act VII of 1913)
(Company Limited by Guarantee and Not Having Share Capital)
Article of Association
of
Bangladesh Fertilizer Association

Preliminary

1. The Regulations contained in Form "B" in the Third Schedule of the Companies Act 1913 shall apply along with the regulations herein adopted by this Articles of Association.

2. The marginal notes in these Articles shall not direct the construction hereof, and in these presented, unless there be something in the subject or context inconsistent therewith.

"The Act" means the Companies Act 1913 for the time being in force.

"The Companies Act" means the Companies Act 1913 (Act VII of 1913) or any modifications or reactment thereof, for the time being.

"Association" means the BANGLADESH FERTILIZER ASSOCIATION.

"Officers" means and include the President, 1st and 2nd Vice Presidents, Secretary and Treasurer who are members of the Standing Committee.

"The Directors" or "Board" means the Board of Directors of the Association for time being.

"Committee" means the Standing Committee and other committees of the Association for the time being.

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[1]Source: Report on the Development, Structure, and Organization of the Bangladesh Fertilizer Association.

"Office" means the Registered/Head Office of the Association for the time being.

"Registrar" means the Registrar of Joint Stock Companies, Bangladesh.

"Special Resolution" and "Extraordinary Resolution" have the meanings assigned thereto, respectively, by section 81 of the Companies Act, 1913.

"General Meeting" means the general meeting of the Association.

"Year" means the English calendar year.

"Month" means the English calendar Month.

"Register" means the Register of Members for the time being of the Association kept in pursuance of Section 31 of the Companies Act 1913.

"Executive Vice-President" means the Executive Vice-President of the Association who shall be a full-time paid employee of the Association.

"In Writing or Written" means printed, lithographed or any other mode of representing or reproducing words in legible form.

"Persons" shall include any firm, joint stock company, corporation or any other body of individuals, whether incorporated or not:

"Special Meeting"	means meetings called for special purposes, either for transacting business or conveying information or continuing education to members or others. Special meetings may be called by the Board of Directors or by the members.
"Board Meeting"	means meetings of the Board of Directors for development programs and making policy decisions for the Association.
"Distributor or Merchant"	means a person or business that sells or distributes fertilizer primarily to dealers or retailers.
"Importer or Exporter"	means a person or business that imports or exports (other than a manufacturer or producer) fertilizer that is then sold to distributors or merchants of other countries.
"Manufacturer"	means a factory, company. or business that manufactures or produces fertilizer nutrients.
"Proxy"	means one who acts or casts a vote for another, or the written instructions by which he is authorized to do so.

Words importing singular number shall include plural number and vice versa, and words importing masculine gender shall include feminine gender and vice versa.

Membership

3. a. The Association shall be organized on all Bangladesh basis and may have branches anywhere in Bangladesh.

   b. The number of Members of the Association shall be unlimited.

4. **Categories of Membership**

There shall be four categories of voting members: Category I, Category II, Category III, and Category IV.

There shall be two Categories of nonvoting members: Associate and Honorary.

These are outlined below:

a. **Voting Membership Categories**

(1) Category I: Fertilizer Manufacturer or Producer (voting member). Any plant or firm that manufactures or produces fertilizer nutrients or soil amendments that are sold to exporters or traders or distributors or merchants in Bangladesh.

(2) Category II: Fertilizer Importer or Exporter (voting member). An individual, business, or firm that primarily imports, exports, or trades fertilizers to distributors or merchants.

(3) Category III: Supplier Agents or Representatives (voting member). The agent or representative of a company based overseas that provides fertilizers or input supplies to importers.

(4) Category IV: Fertilizer Distributor or Merchant (voting member). An individual, business, or firm that has dealers or sells to independent dealers or retailers that market fertilizer.

b. **Nonvoting Membership Classes**

(1) Associate Member

An Associated membership is for individuals, firms, Ministries, Councils, Institutes, or groups that are interested in and support the objectives of the Association and are willing to work for the successful accomplishment of those objectives, but are not eligible for any category of voting membership.

Associate members shall submit an application fee when applying for their membership and pay a subscription or dues.

(2) Honorary Member

An Honorary membership shall be given by the Board of Directors to individuals, groups, or firms who have given or provided extraordinary service or made outstanding contributions to the Association in meeting its objectives or to the industry. Honorary members are non-dues paying.

5. **Membership Application**

a. Individuals or firms shall apply for membership by submitting a written application on a form provided by the Association, which contains specific information to determine the class of membership, along with a signed statement that the applicant agrees to comply with Memorandum and Articles of Association. All applications shall be submitted to the President or Executive Vice President of the Association to be acted upon during the next Board of Directors' meeting to correctly determine the membership category, and any additional dues according to the dues schedule.

b. The prescribed application form shall be available at the office of the Association and shall be accompanied by the prescribed application fee determined from time to time by the Board of Directors, when it is submitted.

c. No application for Membership of the Association shall be entertained unless the same is accompanied with the application fee and Membership subscription or dues paid in advance in the form of Pay Order/Demand

Draft/Crossed Check from any scheduled bank of Bangladesh in favor of the Association at the rates for the time being mentioned below:

	Application Fee	Membership Dues for One Calendar Year or Part Thereof
For Voting Members		
Category I	15,000	20,000
Category II	7,500	10,000
Category III	5,000	7,500
Category IV	1,500	2,500
For Nonvoting Members		
Associate	750	1,500
Honorary	-	-

The Directors may change the application fee and membership dues at its discretion from time to time.

The Directors may pass resolutions to specially receive donations from the Members.

d. The President shall submit Applications for Membership to the Board of Directors for their approval. Membership begins upon approval by the Board.

e. If an application for membership is rejected, the applicant shall be informed of the reason or reasons for such rejection.

f. In the event of an application being rejected, the application fee and membership fee received from the application shall be refunded to the applicant and no further application from the same applicant shall be entertained for a period of six months from the date of such rejection.

g. On approval of the application, the applicant shall be issued a Membership Certificate, as prescribed by the Board of Directors, valid for a period specifically mentioned thereon and the membership shall commence from the date of the issuance of such Membership Certificate.

h. The membership shall be renewable every calendar year on payment of annual subscription and other charges as may be determined by the Directors from time to time.

i. A member who had resigned from the Association or has been expelled therefrom shall not be entitled to refund of his application fee, annual subscription, or any other dues after he ceases to be a member. He shall however, remain liable to pay any dues or charges to the Association outstanding against him.

j. The annual membership subscription or other dues, as determined by the Board of Directors from time to time, shall pay in advance for the next year by the 31st of December of the current year.

k. Any member who fails to pay his annual subscription and dues in advance by the 31st of December of the current year, may do so within 31st March of the next year (for which the subscription is due) without any charge for late payment. Thereafter a late payment fee of Tk 2.00 (Taka two) per day shall be charged up to 30th June.

l. If the member fails to clear his dues within 30th June, then he shall be served with notice for payment of his dues, and if he fails to clear his arrear dues within 31st July, his name shall be struck off the register.

m. If a member is admitted during the course of a year, he shall have to pay the full amount of subscription for the accounting year.

6. **Register of Members**

a. A register containing the names and addresses of all the Members of the Association and their authorized representatives, if any, shall be kept at the Head Office.

b. All changes in the addresses or other particulars of the Members shall be initiated by them immediately in writing to the Executive Vice President and Members shall have the right to inspect the Register and suggest corrections, if any.

c. The names of every Member who had resigned or been expelled or had otherwise ceased to be a member shall be struck off the register.

7. **Rights and Privileges**

All members shall exercise and enjoy the rights and privileges as presented in these Articles of Association of the Association.

8. **Membership Representation**

Category I, Category II, Category III, and Category IV Members shall select one (1) individual to represent the member at meetings involving the affairs of the Association. The designated representative of the member shall be the voting representative for balloting or voting on issues. The designated representative shall be informed by providing written notice to the President or Executive Vice President.

9. **Membership Withdrawal**

A member may withdraw from the Association by giving written notice to the President or Executive Vice President. A member withdrawing will be responsible for any and all obligations to the Association incurred prior to the date of the notice of withdrawal, and shall not be entitled to a refund of any unexpired dues.

10. **Cessation From Membership**

A member shall cease to be a Member of the Association if:

a. He becomes or is found to be of unsound mind by a court of competent jurisdiction.

b. He applied for relief as an insolvent debtor, or is adjudged insolvent.

11. A member shall be liable to be expelled, or his rights and privileges with the Association shall be liable to be withdrawn by a Resolution of the Board of Directors passed by two-thirds majority of its Members present at a meeting specially convened for the purpose, for any of the following reasons:

a. Neglecting or refusing to admit, abide by, or carry out any decision of the Board of Directors.

b. Indulging in any unethical business practice in the field of trade commerce or industry.

c. Intentional violation of the Articles, Rules and Regulations, or the Bylaws of the Association.

Provided that a Member shall not be so expelled unless he had been given an opportunity of explaining his position in writing and/or in person.

12. Any Member expelled under Article 11 above shall have the right to appeal, in writing and/or in person within one month from the date of the resolution referred to therein, to the General Body of the association and the appeal shall be placed at the next Annual General Meeting and the decision of the General Meeting thereon shall be final.

13. A member who has resigned or been expelled, or has otherwise ceased to be a member, shall remain liable to pay all outstanding dues to the Association and he shall not be entitled to refund of any money paid to the association.

14. **Restoration of Membership**

Any Member whose name has been struck off the register due to resignation, or nonpayment of dues shall be eligible for re-enrollment subject to the approval by the Board of Directors, on payment of application fee afresh and all arrears dues or charges outstanding against him.

15. **Board of Directors**

The Board of Directors shall initially consist of twenty-two (22) members, plus the immediate past President as an *ex-officio* member making twenty-three (23) responsible for the management of the affairs of the Association and for discharging the functions assigned to it under these Articles.

16. **Composition of and Representation on the Board**

The board shall be composed of the following persons, namely:

a. Three (3) Directors to be nominated by BCIC.

b. Three (3) Directors to be elected by the Category II members.

c. Three (3) Directors to be elected by the Category III members.

d. Three (3) Directors to be elected by the Category IV members.

e. Ten (10) Directors to be elected, two from each of the five Divisions, by the members of the respective Divisions of Bangladesh.

17. **Election of the Board of Directors**

a. Election of the Directors mentioned in clause (b), (c), (d), (e) of Articles 16 shall be held at the annual General Meeting of the Association.

b. Where any dispute arises regarding any such election, it shall be referred by the Board, to the Directors of Trade Organization appointed by the Government.

18. **Duration of the Board**

a. The duration of the Board shall be initially one-, two-, and three-year terms. After that each Director will be elected for three-year terms, from the date of its first meeting on the expiry of which a new Board shall be constituted in accordance with the provisions of these Articles.

b. Notwithstanding the expiry of the duration of the Board under clause (a) above, it shall continue to function until new Board is constituted in accordance with the provisions of these Articles, and upon such constitution the Board so functioning shall stand dissolved.

Election Procedure

19\. a. **Date of Election:** The date fixed for the annual meeting of the Association under these Articles in a year in which election to the Directors is due shall also be the date of election of Board of Directors.

b. **Member Entitled to Vote:** A member of the Association whose name stands entered in the Register 90 (ninety) days (30 days in case of first year) before the date of election to the Board shall be entitled to vote in such election and his name shall be included in the voter list prepared for the said election. Provided that such a member shall not be so entitled if:

(1) The fees payable by him have not been cleared up to date.

(2) His name stands removed from the Register for any reason whatsoever before the date of election.

c. **Election Commission:**

(1) There shall be an Election Commission, hereafter referred to as Commission, consisting of a chairman and two other members to be appointed by the Board (*Ad-hoc* Committee for 1st year) for the conduct of election to the Board under these Articles.

(2) The Chairman and members of the Commission shall be appointed from among the members.

(3) Notwithstanding anything contained in these Articles the Chairman and the members of the Commission shall not be a candidate for election to the Board nor any of them shall be proposer or seconder of any candidate in such election.

d. **Appointment of Returning Officer:**

(1) The Commission shall for the purpose of election of the Board appoint a Returning Officer who is not a member of the Association.

(2) The Commission may appoint any person or persons not being a member of the Association to assist the Returning Officer in the performance of its functions.

e. **Procedure for Election:**

(1) The date of election, as determined by the Board, shall be notified to the members of the Association, and a list of members entitled to vote, together with a notice stating the number of seats in the Board to be filled, shall be circulated by the Commission among all the members at least sixty days before the date of election.

(2) Within thirty days of the issue of the notice under subregulation (1) nomination of the candidates for election to the Board shall be sent in prescribed Form to the Election Commission, duly proposed by the member of the Association and seconded by two other members of the Association with an undertaking in writing by each member proposed as to his willingness to be the Candidate for election and to serve the Association in the event of his election. Proposer, seconders, and candidates will be from the same category of membership. If the candidate nominated for Divisional representative, his proposer and seconders will be from same Division.

(3) The same member shall not be nominated simultaneously for a Membership Category representative and Divisional representative.

f. **List of Nominated Candidate:** The Commission shall, within five days from the last day of receiving nominations, cause to be affixed at such place as it may decide a list of candidates on whose favor nominations have been received stating their particulars and particulars of their proposers and seconders.

g. **Scrutiny:**

(1) The Returning Officer shall examine the nomination papers in the presence of any person attending the scrutiny under subclause (2) and decide any objection raised by any such person to any nomination.

(2) The candidate, their proposers and seconders, and any other person, not exceeding two, authorized in this behalf of by each candidate may attend the scrutiny of the nominations and the Returning Officer shall

give them reasonable opportunity for examining the nomination papers.

(3) The Returning Officer may, either of his own motion or upon any objection, conduct such enquiry as he may think fit and reject any nomination paper if he is satisfied that:

(a) The candidate is not qualified to be elected to the Board of Directors;

(b) The proposer or the seconder is not entitled to vote;

(c) Any provision of these Articles has not been complied with;

(d) The signature of the proposer or the seconder is not genuine or has been obtained by force or fraud:

Provided that:

(i) The rejection of a nomination paper shall not invalidate the nomination of a candidate by any other valid nomination paper.

(ii) The Returning Officer shall not reject nomination paper on the ground any defect which is not a substantial nature and may allow such defect to be remedied forthwith.

(iii) The Returning Officer shall not enquire into the correctness or validity of any entry in the voter list.

(4) The Returning Officer shall endorse on every nomination paper his decision, accepting or rejecting it, and shall, in the case of rejection, record a brief statement or reasons therefore.

(5) Where the nomination of a candidate has been rejected by the Returning Officer, an appeal shall lie within a period of three days from the date of such rejection to the Commission and any order passed by the Commission on such appeal shall be final.

h. **Publication of List of Validly Nominated Candidates:** After the scrutiny of the nominations under clause g the Commission shall, within three days from the date of such scrutiny, prepare and publish a list of validly nominated candidates in the election to the Board showing their membership number, full address, and category of Directorship (Membership category Director or Divisional Director).

i. **Withdrawal:** A candidate whose nomination has been accepted as valid may, by notice in writing signed by him and delivered within seven days of the date of scrutiny to the Commission, withdraw his candidature.

j. **Uncontested Election:** If the number of validly nominated candidates for election to the Board be equal or less than the number of seats in the Board fixed for respective category of membership the Returning Officer shall make a return to the Commission and there shall not be any election for that category.

k. **Publication of List of Contesting Candidates:** If the number of validly nominated candidates for election is more than the number of seats in the Board for respective category of membership, the Commission shall within five days from date of withdrawal day, for which the Commission shall fix a date, prepare and publish a final list of contesting candidates mentioning category of Directors specified in Article 16.

l. **Death or Cessation of Membership Before Election:** If a candidate whose nomination has been accepted as valid dies or otherwise ceases to be a member of the Association before the date of election, the election shall be conducted among the remaining candidates only.

m. **Election:**

(1) As soon as the agenda of election is taken up in the Annual General Meeting the Commission shall provide to each member or to proxy entitled to vote by following:

(a) Two ballot papers shall be prepared in such Form as the Commission may specify with its common seal for recording votes; one ballot paper for electing three Directors from his category and another ballot paper for electing two Directors from his Division.

(2) The ballot papers shall contain the names of all the contesting candidates and there shall be a vacant space against each such name for making vote by a cross (x) mark.

(3) The member entitled to vote shall mark the cross (x) mark against the names of such contesting candidates as he may consider fit for election to the Board of Directors.

(4) All the ballot papers shall then and there be put in the election box kept at the election booth and no ballot paper shall be put on the election box after specified time and shall be counted for determining the election result.

(5) A member entitled to vote shall put cross (x) marks the space against the names of any three candidates in the ballot paper specified for electing Membership Category representative and put cross (x) marks against the names of any two candidates in the ballot papers specified for electing Divisional representative.

(6) A ballot paper shall be invalid if:

(a) It does not bear the common seal of the Commission.

(b) It does not bear cross (x) mark on its blank space.

(c) The member has not put cross (x) mark in the blank space against such member of candidates as there are seats to be filled in; three cross for Membership representative category and two cross for Divisional representative.

(d) The member has put cross (x) mark in the blank space against the name of more candidates than the number of seats to be filled in.

(e) The member has put more than one cross (x) mark in the blank space against one candidate or has put any other cross mark (x) in the blank space against any candidate.

(f) The member has written such words or given such signs on the ballot paper whereby he can be identified.

(g) It is not put in the election box within specified time.

n. **Proxy Voting**

(1) Only in case of his being physically absent may a member cast his vote by proxy in a General Meeting.

(2) The instrument of proxy (Form A) shall be in writing, duly signed by the member or voting representatives and duly stamped and lodged at the registered office of the Association at least seventy-two (72) hours before the time appointed for the meeting, and in default the instrument of proxy shall not be treated as valid.

(3) Before the meeting proceeds to business, the instrument of proxy shall be scrutinized by two scrutinizers appointed by the Election Commission and the validity or otherwise of the instrument of proxy shall be ascertained.

(4) Any instrument appointing a proxy shall be in the following form:

(Form A)

Bangladesh Fertilizer Association

PROXY FORM

I, ____________________, of ____________________, being a Member of the Bangladesh Fertilizer Association hereby appoin ____________________ of ____________________ as my proxy to vote for me and on my behalf at the [ordinary or extraordinary as the case may be] General meeting of the Association to be held on the _____ day of _________ and at the any adjournment thereof. As witness my hand this _____ day of ____________________, 19__.

Revenue
stamp

Signature of the Proxy **Signature of the Member**

o. **Counting of Votes:**

(1) As soon as the specified time of election is over the Commission shall:

(a) Open the election box/boxes and arrange counting the ballot papers.

(b) Count the valid votes cast in favor of each candidate.

(c) Prepare a statement showing the number of votes cast in favor of each contesting candidate and the number of invalid votes.

(2) The Chairman and members of the Commission shall authenticate the Statement by putting their signature and thereafter hand it over to the President of the annual General Meeting for declaration of results.

p. **Determination and Declaration of Election Results:**

(1) Such number of candidate as there are vacancies to be filled receiving the highest number of votes shall be declared elected by the President and in the event to an equality of votes between two or more candidates for the last vacancy, lots shall be drawn by the President in the presence of the Commission and the candidate in whose favor lot is drawn shall be declared elected by the President.

(2) The members who are elected under Articles 19(X) shall also be declared elected by the President.

q. **Notification of Election Results:**

(1) The Secretary shall send a list of successful candidates to all members of the Association within one week of the date of election.

(2) The names of persons elected to the Board of Directors and also the names of persons nominated to the Board by BCIC shall be published in the official News Bulletin.

r. **Disciplinary Action Against Members in Relation to Elections:** A member of the Association shall be liable for disciplinary action by the Board if he adopts one or more of the following practices directly and indirectly with regard to the election to the Board of Directors, namely:

1. Bribery, that is to say, any gift, offer, or promise by a candidate or by any other person with the connivance of a candidate of any

gratification to a person whomsoever, with the object directly or indirectly, of including

(a) A member to stand or not to stand as, or to withdrawn from being a candidate at an election; or

(b) A member to vote or refrain from voting at an election, or as a reward to:

(i) A member for having so stood or not stood, or for having withdrawn his candidature, or

(ii) A member for having voted or refrained from voting at an election.

20. **Powers and Functions of the Board of Directors:**

The Board shall have the following powers and functions:

a. To carry out the aims and objects of the Association.

b. To make such arrangements as are considered necessary for the election of the new Board of Directors.

c. To constitute the Standing Committee and other committees.

d. To continue and manage the affairs of the Association until the next properly constituted Board takes over in accordance with the provisions of these articles.

e. To look after and manage all property, movable, held by the Association.

f. To elect officers and appoint committees or subcommittees for any purpose and frame such rules and regulations or bylaws in this regard as may be deemed fit.

g. To delegate any of its powers to the Standing Committee or any Sub-Committee.

h. To appoint or dismiss the Executive Vice President and other staff necessary for the efficient functioning of the Association, and to frame rules and regulations or bylaws regarding their terms, salaries, and conditions of service.

i. To keep or cause to be kept by any one or more persons appointed by the Board, proper books of accounts in which shall be entered true and complete accounts of the monetary affairs and transactions of the Association.

j. To secure for the Association membership in the Federation of Bangladesh Chambers of Commerce and Industry.

k. To present the views of the Association on any matter relating to the objects of the Association.

l. To convene ordinary or extraordinary General Meetings of the Association.

m. To nominate Members and Delegates to represent the Association in any forum, body, seminar, workshop, group, etc., related to the aim and objects of the Association.

n. To defray expenses, subject to availability of funds of delegates selected and deputed by the Association to represent it at conferences and meetings held in Bangladesh or abroad.

o. To expel any Member from the Association or re-admit such expelled Member, either on its own initiative or in compliance with the resolution of the General Members of the Association.

p. To commence, institute, prosecute, and defend all such actions and/or suits on behalf of the Association as may be deemed necessary or expedient, and to compromise or submit to arbitration any action, suit, or dispute or difference.

q. To deal with matters affecting all the Members of the Association.

r. To accept and take such measures, not inconsistent with the Memorandum of Association or these Articles, as may from time to time be considered necessary for the achievement of the aims and objects of the Association.

21. **Board Meetings:**

a. Regular Board meetings

The Board of Directors shall meet immediately after the Annual General Meeting of Association for the purpose of electing the Officers of the Association. Additional Board meetings may be scheduled monthly on the first

Monday of each month, at a location and time as determined by the Board. Notice of the meeting shall be given at least five (5) days or more prior to the meeting.

b. Special Board meetings

Special meetings of the Board may be called by the President, or by the Secretary on the written request of any three (3) Directors. Notice of special meetings shall be provided at least five days before the meeting, except in an extraordinary circumstance.

22. **Quorum:**

At any regular or special meeting of the Board, the presence of eight (8) Directors shall constitute a quorum for transaction of business.

23. **Proxies:**

A Board member may vote by proxy at any regular or special meeting, provided a signed written proxy is in the hands of the Secretary forty-eight (48) hours before vote on the specific item is called.

24. **Advisory Members:**

Advisory members of the Board may be appointed by the President, with the approval of the Board of Directors. They shall include individuals who share concern for the industry and the objectives of the Association. (Members of a Ministry, the University faculty, Agricultural Research Council or Institute staffs, or Directorate of Agricultural Extension staff are among those that might be considered to serve as Advisory members of the board.) Advisory members are nonvoting,

25. **Honorary Directors:**

The Board of Directors may appoint nonmembers as Honorary Directors. Any such appointment shall be for a fixed term and require a two-thirds (2/3) vote of the Directors present at a meeting at which a quorum is present. An Honorary Director shall be a nonvoting member of the Board and shall not constitute part of a quorum or be eligible for election as President, Vice President, or Officer of the Board.

26. **Vacancies on the Board:**

Any member of the Board of Directors who fails to attend three (3) consecutive meetings, without just cause, may be removed from the Board by a two-thirds majority vote of the Board present at any regular or special Board meeting. If a Board member terminates his employment with a member company or terminates his fertilizer business as related to the Association's objectives, he shall submit his resignation to the President, and the position is declared vacant. Such vacancies on the Board shall be filled for the remainder of the unexpired term by appointment by the Board from that specific category, until the next scheduled election has taken place.

27. **Compensation:**

No member of the Board of the Directors shall receive compensation for the time or services rendered to the Association. However, each Director shall be entitled to receive Tk 200 as fees per Board meeting attended by him.

28. **Limitations:**

The Board of Directors shall not have the power to commit the Association to expenditures beyond the funds available. No recommendation, representation, or report of any Officer, Committee, or member of the Association shall be binding upon the Association, nor shall it be considered as representing the opinion or policy of the Association, unless approved or accepted by action of the Board of Directors.

29. **General Meeting:**

a. The first General meeting shall be held at such time, not more than three months, after the incorporation of the Association and at such place, as the *ad-hoc* Committee may determine.

b. A General meeting shall be held once in every year at such time (not being more than fifteen months after the preceding General meeting) and place as may be prescribed by the Directors or, in default, at such time in the month following, and at such place, as the Directors shall appoint. In default of a General meeting being so held, a General meeting shall be held in the month next following, and may be called by any five (5) members in the same manner, as possible as the called by the Board.

c. The above-mentioned General meeting shall be called ordinary meetings, all other general meetings shall be called extraordinary or special.

d. The Directors shall, on a requisition in writing by at least one-third (1/3) or more members, call an extraordinary or special meeting.

e. Any requisition made by the members must state the object of the meeting proposed to be called, and must be signed by the requisitioner and deposited at the registered office of the Association.

f. On receipt of the requisition the Board shall forthwith proceed to call a general meeting. If they do not proceed to cause a meeting to be held within twenty-one (21) days from the date of the requisition being deposited the requisitionists or any other five members may themselves call a meeting.

30. **Quorum of General Meeting:**

If the number of members of the Association at the time of meeting does not exceed ten, the quorum shall be five, or if they exceed ten, there shall be added to the above quorum, one for every five additional members with the limitation that no quorum shall be transacted in such meeting unless there is a quorum. If no quorum is formed within thirty minutes of the time fixed for the meeting, the meeting shall be adjourned to the same day in the next week at the same time and place as was appointed for holding the meeting, and if no quorum is present in the adjourned meeting, the meeting shall be adjourned *sine die.*

31. **Notice:**

At least fourteen (14) days' notice for Annual General Meeting intended to pass ordinary Resolutions, and at least twenty-one (21) days' notice for an Extraordinary or Special General Meeting intended to pass any Special Resolutions, specifying the place, and time and date of the Meeting shall be given to all Members of the Association, either personally, or by sending it by post to him to his registered address. Accidental omission to send such notice to or its nonreceipt by any Member shall not invalidate the proceedings at such meetings.

32. **Parliamentary Procedures of Meeting:**

a. Every question submitted to a General Meeting shall be decided by a simple majority of the Members present and voting at such meeting.

b. No extraordinary or special Resolution, particularly a Resolution seeking amendments to the Memorandum of Association or these Articles, shall be deemed to have been passed unless it has received the votes of three-fourth majority of the Members present in person or by proxy.

c. The President may, with the consent of the Members, adjourn any meeting from time to time and from place to place, but no business shall be transacted at any adjourned meeting other than the business left unfinished at the time from which the adjournment took place.

d. At any General Meeting, unless a poll is demanded by at least five Members, a declaration by the President that the Resolution has been carried, and an entry to that effect in the book of proceedings of the Association shall be conclusive evidence of the fact, without proof of the number or proportion of the votes recorded in favor of or against the Resolution.

33. **Majority Vote:**

a. At all member meetings of the Association, if a quorum is present, a majority vote of those present shall rule, except as otherwise specified in these Articles.

b. The President or the Member presiding over a meeting shall in the event of equality of votes at the time have a second or casting vote, provided that no casting vote shall be exercised in connection with any election of the Association.

34. **Standing Committee and Other Committee:**

a. The Standing Committee shall consist of the President, First and Second Vice Presidents, Secretary, and Treasurer elected from and by the Board of Directors.

b. Other committee: Board may constitute other committees or subcommittees like Investigation and Disciplinary Committee, Finance Committee, Technical and Research Committee, Convention/Seminar Committee, Additional Board for News Letter, Audit Committee, Public Relations Committee, etc. Chairman of the Committees will be from Director and members may be included from general member. Duties and responsibilities of the committee will be determined by the Board.

c. Duties of Standing Committee

The Standing Committee shall receive and review all proposals submitted to the Association, and present the same, with recommendations to the Board of Directors for consideration. Three (3) members of the Committee shall constitute a quorum for transaction of business. Meetings may be called by the President or any three members of the Committee with at least five (5) days' notice.

35. **Officers:**

The officers of the Association shall be the members of the Standing Committee consisting of the President, First and Second Vice Presidents, Secretary, and Treasurer elected from the membership of the Board of Directors at the first Board meeting following the Annual Meeting. An Executive Vice President shall be hired by the Board to administer the programs and policies developed and approved by the Board will be treated as officer, but not a member of the Standing Committee.

36. **Terms of Office:**

Each officer shall take office immediately following his election and shall serve for a term of one (1) year or until his qualified successor for the office is duly elected.

The term of office for each elected officer shall not be for more than two successive terms, but after an interruption of one year an individual may be re-elected to the office previously held. Each officer will be eligible for election to another office after one or two years in a given office.

37. **Election of Officers**

The Board of Directors shall appoint an Officers' Nominating Committee, composed of the immediate past President of Association, who will serve as Chairperson of the Committee, and four (4) current members of the Association.

The Officers' Nomination Committee shall select a slate of nominees from the Board of Directors for the offices of President, First and Second Vice Presidents, Secretary and Treasurer of the Association. The Committee chair shall present this slate to the Board of Directors at the first Board meeting following the Annual meeting. Other nominations may be made from the floor, with the consent of the individual being nominated. From the nominated candidates, officers will be elected by the Directors.

38. **Duties of the Officers:**

a. President

The President of the Board shall serve as chief elected officer of the Association and shall preside at all Board meetings and all member meetings. The President is not charged with direct administrative responsibilities.

b. Vice Presidents

The First and Second Vice Presidents of the Board and Association shall, in the absence or inability of the President to act, perform the duties of the President. In addition, they will perform such other duties as the President or the Board of Directors may assign.

c. Secretary

The Secretary of the Association shall attend all meetings of the Board and members, and see that the minutes (proceedings and actions taken) are properly recorded. He shall serve as Secretary of the Board and the Standing Committee. He shall be the custodian of the official documents and records of the Association; shall give notice of all meeting of members and the Board of Directors; and shall perform such other duties as requested by the President or the Board of Directors.

d. Treasurer

The Treasurer shall have supervision of the monies and financial records and accounts of the Association. He shall work with the Audit Committee of the Board. He shall arrange for the annual audit of the Association records by a certified accountant and submit the results of the audit to the Board and to the members at the Annual Meeting. He shall periodically provide reports to the Board on the financial progress of the Association, and shall have supervision of the funds with guidance from the Board, in accordance with these Articles. He shall serve as Chair of the Finance Committee.

Executive Vice President

39. **Employment:**

The Executive Vice President shall be the salaried administrative officer of the Association. His appointment or termination shall be made by the President of the Association, with the approval of a majority of the Standing Committee. His salary and responsibilities shall be determined by the Standing Committee under whose direction he operates and to whom he is responsible.

40. **Duties:**

It is the Executive Vice President's responsibility to carry out the programs and policies under the direction of the Board, Standing Committee, and President of the

Association.

The Executive Vice President shall work closely with the Secretary and Treasurer and aid them in their work of keeping records and receiving and disbursing funds in connection with their Association duties.

The Executive Vice President shall have authority to employ and discharge other employees of the Association. He shall have charge and responsibility of the office or offices and property of the Association. He shall be responsible for conducting the everyday business affairs of the Association. He shall prepare reports on programs or projects, income, and expenditures, and keep the President, Audit Committee, and Board fully appraised of operations and items that they need to consider.

The Executive Vice President shall be the main liaison with government officials, legislative bodies, and the Ministries of Bangladesh when and where actions and activities involving fertilizer sector affairs are concerned or being considered.

41. **Bonds:**

Trust and Surety Bonds shall be furnished by the Executive Vice President and any other employee of the Association as the Standing Committee may direct. The amount of each Bond shall be determined by the Standing Committee and the premium of such Bonds shall be paid by the Association.

Activities

42. **Publication and Information:**

The Association may issue bulletins, newsletters, member handbooks, news or media releases (press, radio, or TV), or any other publication deemed necessary in keeping members or the public informed or in keeping with meeting the objectives of the Association.

Farmer and villager educational brochures on nutrient deficiencies on different crops, both field and horticultural, and proper use and amounts of fertilizer applied nutrients for optimum economic production may be published by the Association for purchase and distribution by its members.

The Association may develop informational packets for members that can be used with local Thana, District or Division press, radio, or TV stations for educational and promotional effort on fertilizers.

43. **Seal of Association:**

The Association shall have a common seal which shall remain under the custody of the Executive Vice President in the office of the Association. Every instrument to which the seal of the Association is affixed shall be countersigned by two signatories either the President and or by the Secretary and/of Executive Vice President or any Director if so authorized in that behalf.

44. **Notice:**

a. A notice to be given by the Association to any member may be given either personally or by sending the same by post to him at his address as appears in the register of members or by announcement in any local newspaper.

b. When a notice is sent by post, the service of the notice shall be deemed to have been effected by properly addressing, prepaying, and posting the letter containing the notice.

c. The accidental omission to give notice to or the nonreceipt of notice by any member shall not invalidate the proceedings at any meetings.

45. **Books of Accounts:**

a. The Directors shall keep or cause to be kept all necessary books of accounts of the Association with respect to the following:

(1) All sums of money received and expended by the Association and the matter in respect of which the receipt and expenditure took place.

(2) All assets and liabilities of the Association.

(3) All purchases and sales of goods and materials by the Association.

b. The books of accounts shall be kept at the registered office of the Association or at such other place as may be decided by the Directors. The books of accounts shall remain open to the inspection of all the members of the Association during usual office hours.

46. **Bank Account:**

All money on account of daily collection and other subscriptions realized by the Association shall be deposited in a Bank approved by the Directors. Withdrawals shall be made by means of check under the joint any two, including the President or the Secretary and Executive Vice President or the Treasurer assigned as signatory by Board Resolution.

47. **Indemnity:**

The Board of Directors shall have the power to provide indemnity (protection) for the Directors, Officers, Executive Vice President, and Agents of the Association from liability to the extent authorized by law.

48. **Financial Year and Budget:**

a. The financial year of the Association shall be from 1st January to 31st December, in each English calendar year.

b. All moneys and funds of the Association shall be under the control of the Board of Director, and money not immediately required by the Association shall be deposited into the bank account standing in the name of the Association or otherwise profitably invested as the Directors may think fit.

c. At least three months before the commencement of each financial year the Executive Vice President shall prepare a budget for the next year showing the probable receipts and expenditure of the Association for consideration of the Directors, so as to place the same before the members at the Annual Meeting for consideration and approval.

49. **Audit of Accounts:**

a. The appointment and fixation of remuneration of the Auditor who must be a Chartered Accountant shall be decided by the General body in the Annual General meeting and his duties and functions shall be regulated in accordance with provision of section 144 of the Companies Act 1913.

b. The Directors may fill up any casual vacancy of Auditor, if any, and decide upon his remuneration.

c. Appointment/charge of the Auditor will be as per Companies Act 1913.

50. **Audit Committee:**

There shall be an Audit Committee of the Board, consisting of the President, Vice President, and the immediate past President of the Association. The purpose of the Committee shall be to audit operating procedures, personnel, salary administration, provide management appraisal of performance, and advise and make recommendations to the Standing Committee and the Board of Directors concerning these items. This Committee will not function in lieu of a financial audit of the Association's books by professional auditors.

51. **Amendments:**

Amendments to these Articles of Association shall be subject to the prior approval of the Government and shall be made whenever required by the Government in public interest.

52. **Disputes:**

Any dispute or difference of opinion in regard to the interpretation or scope of application of these Articles of Association, which cannot be resolved by the Association itself, shall be referred to the Director of Trade Organizations appointed under the Trade Organizations Ordinance, 1961 (XLV of 1961) and the ruling given by the Director shall be binding on the Association, its Officers and Members.

53. **Winding Up:**

The Association shall be wound up or dissolved voluntarily whenever a special Resolution is passed requiring the Association to be so wound up. If the Association be wound up or dissolved and there should remain, after satisfaction of all its debts and liabilities, any property whatsoever, the same shall not be paid to or distributed among the Members of the Association, but shall be given or transferred to some other institution or institutions having objectives similar to the objectives of the Association to be determined by the Members of the Association at an Extraordinary or Special General Meeting convened for the purpose.

We the several persons whose names, addresses, and designations are subscribed below are desirous of being formed into an Association in pursuance of these Articles of Association.

Sl No.	Name, Address, and Designations of Subscribers	Signature of Subscribers	Signature of Witnesses
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
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22.			
23.			
24.			
25.			

Dated the ________ day of __________________________, 19___.

(Form B)

Fertilizer Association Application for Admission as Member

For official use only

Date Received		Application Number		Membership Number		Membership Category		Name of Division	

The President
________ Fertilizer Association
____
____

Dear Sir,

I desire to apply for admission as a member of the ________ Fertilizer Association. I hereby declare that I am not subject to any of the disabilities stated in Article (10) of the Articles of Association of the ________ Fertilizer Association.

1. Name of: ________________________
(person/organization)

2. Father's name: ________________________
(in case of person)

3. Address (any change in address to be promptly notified to the institute):
   a. Permanent: ________________________
   b. Present: ________________________
   c. Business: ________________________

4. From which District: ____________ Division: ____________

5. Types of firm:

Proprietorship	
Partnership	
Company	

6. Types of business (Tick):

Distributors	
Dealers/wholesalers	
Retailers	
Importers	
Manufacturers	
Suppliers' agent	
Exporter	

(Certificate in support to be submitted)

7. Interested to become a membership of (Tick):

Category I	
Category II	
Category III	
Category IV	

8. Duration in the fertilizer business: ______ year

9. Source of Capital:

   a. Own ______%

   b. Borrowed ______%

10. Annual turnover: $ ______

11. Number of employees in your fertilizer business: ______

12. Membership with other Trade Associations:

Name of Association	Category	Date of Membership

13. Name and address of three persons, at least two of whom should be members of the Fertilizer Association.

Name and Address	Membership Number	

14. Any other particular/information that the candidate may like to furnish about himself or his business.

15. I enclose a Bank Draft/Pay Order/Crossed Check for sum of $ ______

(____) as:

a. Application fee $ ________

b. Annual membership subscription or dues $ ________

Total $ ________

16. Declaration

I, ______________________ the undersigned, do hereby declare that:
(PRINTED NAME)

1. The above statements are correct.

2. In the event of my admission as member of the Association, I will be governed by the Memorandum and Articles of Association of the __________ Fertilizer Association and the regulations/articles made here under, and currently in force.

3. I will advance the objectives of the Association to the best of my ability and will attend the meeting thereof as often as I conveniently can during the tenure of my Membership.

Yours faithfully,

Signature of the Applicant

Date:

Workshop on
Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994
Bamenda, Cameroon

Effective Communication in Fertilizer Marketing

Prepared by

L. B. Williams
Consultant
IFDC

and

Ram S. Giroti
Coordinator
Human Resource Development
IFDC

Presented by

Ram S. Giroti
Coordinator
Human Resource Development
IFDC

Organized by
International Fertilizer Development Center
P.O. Box 2040
Muscle Shoals, Alabama 35662, U.S.A.
Sponsored by
The Fertilizer Sub-Sector Reform Program
(Technical Supervisory Committee and USAID/Cameroon)

Effective Communication in Fertilizer Marketing

Effective communication is an essential element in the management of any portion of a fertilizer marketing system. Without good communications there cannot be good management. Without good management we all know what happens to a fertilizer marketing program. What is communications? There are several definitions of communications. These range from highly academic technical ones to generalized versions that suggest all human activities are forms of communications. The definition that is generally used in the fertilizer industry is: "Communications refer to the transfer of information via an understandable message from a sender to others."

Communicating does not guarantee the success of a fertilizer marketing system. It is possible to communicate the wrong information at the wrong time and to the wrong people. Giving people information they do not need can interfere with their job performance. Sound information that is misinterpreted can create problems that would otherwise not have existed. Communicating instructions to an employee does not necessarily mean that the instructions will be carried out. Communications should be used selectively and with sound judgment. It is impossible to review all aspects of communications in this lecture. The discussion will center around some of the biggest communications problems in managing fertilizer marketing.

Types of Communication

Communication in fertilizer marketing usually occurs in three ways. It may be spoken, written, or transmitted via nonverbal forms. Spoken communications may be the single most important way of communicating in marketing management. Most organizations today have some informal means of talking as their most effective means of communicating. The president of one well-known fertilizer company holds monthly "No Agenda" meetings with a rotating predetermined group of marketing and production staff. Seminars that are carried out by many organizations are other forms of spoken communications. One of the objectives of the coffee break we have during this fertilizer marketing training course is to provide time for an interchange of spoken ideas. Japanese companies are keen on breaks during the day for sports activities as a means of improving communications within the organization. Management within fertilizer organizations places a top priority on effective oral communications.

Oral communications are not always easy, although we generally agree it is easier to talk than to produce the written word. Care must be taken to use the expression that produces the exact message as intended. In this course, for example, several first languages are used. English is not always easy to understand. With English we have American and British spoken where different terms are used to define the same things. Oral expressions must be clear so that the receiver can understand the message correctly.

The written word may be the most powerful drug known and used by mankind. Once a well-known politician said, "Man does not live by words alone, despite the fact that sometimes he has to eat them." Written messages are a vital aspect of the manager's job in all fertilizer organizations. Organizations are spending huge sums of money to increase the efficiency of communicating the written message. Office automation, telecommunications, and information processing machinery are all tools of speeding up communications, both oral and written; however, emphasis is on the written message.

Nonverbal communication is often referred to as body language. It, too, is an important type of communication. This type of communication supplements, amplifies, and clarifies spoken communications. Body language includes eye contact, facial expressions, gestures, and posture. These body languages can be used to suggest approval, nonagreement, boredom, anxiety, contentment, and so forth. One study reported that a message's oral content is responsible for 7% of attitude change, while vocal characteristics accounted for 38% and facial expressions accounted for 55%.

Importance of Communication

The importance of effective communications in fertilizer marketing goes far beyond the application of a managerial technique. The role of communications is to provide an informational system whereby management can plan, organize, motivate, direct, and control the various segments of the organization. Communications is the very life blood–the heartbeat–of the organization. It provides the means for accomplishing the managerial job.

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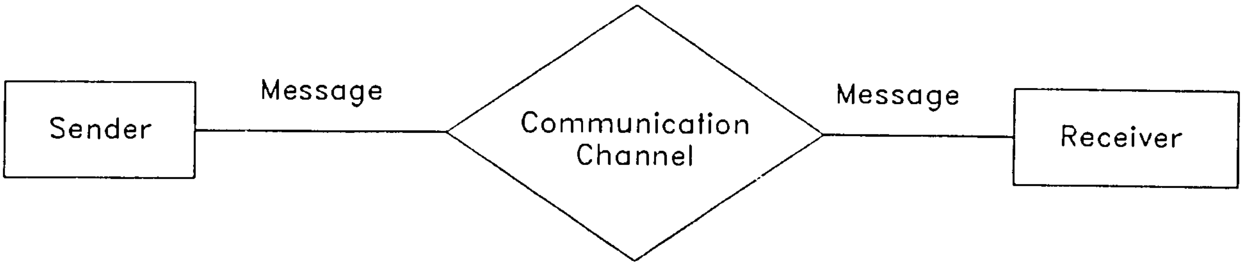
Communication Model

The most basic and simplest communication model has only four parts: (1) a sender, (2) a message, (3) a communication channel, and (4) a receiver.



If the sender in the fertilizer marketing organization is a manager, the purpose in communication is often to get an employee, the receiver, to carry out some desired action. For example, an employee may be instructed to ship 10 tons of 5-10-15 sulfate in 25-kg polypropylene bags to dealer B. B. Ogola in Serendib on May 15 with certain conditions. The task is to avoid garbling the message at any point along the communication channel to the receiver so that the right product in the right amount is shipped to the right place, in the right condition, and at the right cost.

Communication Roadblocks

There seem to be many stumbling blocks or roadblocks to effective communications in the fertilizer industry. It may seem like there are more roadblocks because of our close association with the business. The number of roadblocks is not necessarily more although it may appear to be. Roadblocks to communication include:

1. Poor Timing – A good manager must know when to communicate. You cannot assume a warehouse employee knows to unload all fertilizer, especially when it arrives in an unusual condition: wet, spilled, different bags, etc.

2. Inadequate Information – Not too much and not too little. Why include methods of paying the freight to the warehouse employee when he is not involved. Use clear symbols to convey a message. The information must be meaningful to the employee. This can mean using correct grammar, spelling, and punctuation, and correcting typographical errors.

3. Inappropriate Channels – If the task of the sender has been properly performed, then the channel will determine the effectiveness of the communication. Should the manager write the message, make a phone call, talk face to face, or use a combination of these? The medium (channel) must be matched to the message and receiver.

4. Noise – This refers to any situation that interferes with or distorts the message being communicated. Noise may be a roar of trucks or too many instructions in a given message. Scientific measures of oral messages have shown that 50% of a message will be forgotten within minutes after it is received.

5. Selective Perception – This is a very individual process. How a message will be perceived by a person depends on past experiences, emotions, mental images, observation, and beliefs to mention a few important factors. An employee may resist a message because past experiences have proved that the manager does not live up to his word. Suppose a general manager has promised to pay the expenses for one of the marketing staff members to attend a weekend seminar on improving fertilizer sales. However, time after time he has never made good on his promise. Will the marketing staff person ignore a message that he should attend another seminar?

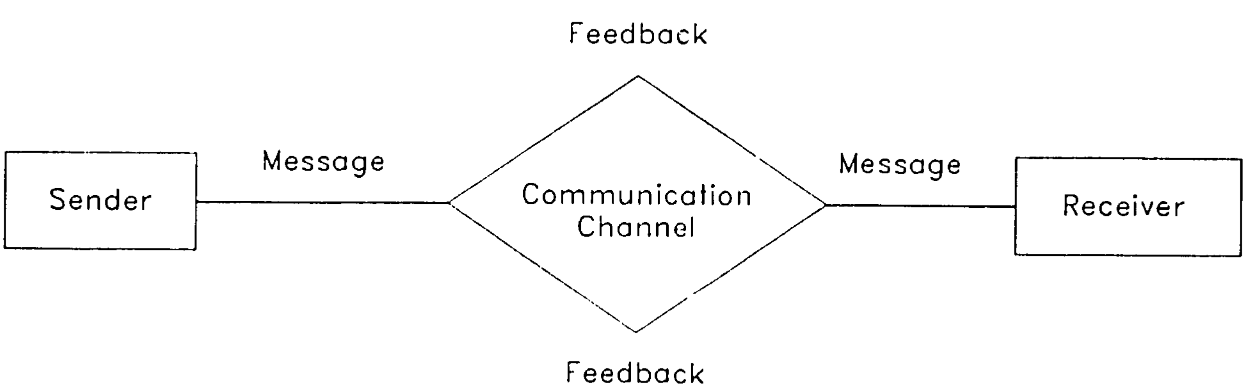
6. Premature Evaluation – This is when a receiver evaluates the contents of a message before the communication is completed. The marketing person above would most likely prematurely evaluate the manager's message to attend another seminar at the organization's expense. Premature evaluation can, however, be positive. Take this example: Suppose the sales manager tells Amit, "You are the best salesman on the marketing staff. I have a special job for you to do in starting up the new west Sabba territory. I'd like for you to put on a series of training lectures." Do you think Amit has already made his mind up to do the best job he can, even before he heard the complete message? Most likely he has.

7. Emotions – If emotions are brought into play, the outcome may be different. Now suppose Amit had just witnessed another salesman get fired because the sales manager thought a series of training lectures had failed. How receptive would Amit be to the sales manager's flattery now? The mention of carrying out a series of training lectures might prompt resistance to the message.

8. Beliefs and Attitudes–These affect communication effectiveness, although their influence is not quite as obvious. Beliefs cause people to hear or see in a message only what they want when the information causes them mental conflict. The tension state resulting from information that contradicts currently held beliefs and attitudes is called *cognitive dissonance*. Sometimes a receiver may avoid a message altogether, if there is fear that it will violate a basic belief. Hitler, for example, avoided those field commanders that insisted on telling him the war was going badly in the closing down period of World War II. What happens when the message cannot be avoided? Take Amit above. Suppose a new sales manager comes in and rates Amit as a good salesman but careless at lecturing to trainees. Amit might take the message and correct the deficiency. Amit might hear the compliment and completely reject the criticism.

Avoiding the Roadblocks

The effective communicator can take a number of actions to avoid the roadblocks to communication. Effective communication requires that the receiver feed information back to the sender. *Feedback* refers to information transmitted by a receiver back to the original sender of a message. Many communication experts believe that a true "communication" cannot take place until the sender has received confirmation from the receiver that the message has been received. The expanded communication model now appears as:



Studies comparing one-way and two-way communications generally conclude that information is transferred more accurately when there is feedback. The receiver can better clarify his or her understanding of what the sender means. Feedback costs money. Discussing, quizzing, and repeating take time, and time is money. If the delay is too long, the extra accuracy is worthless. Two-way communication appears to be most appropriate in instances when a situation is unclear and the quality of the action is important. If action must be taken quickly in a situation that is clear cut and specific, one-way communication may be adequate.

Improving Listening Skills

Stuart Chase, a well-known communication expert, stated that, "Listening is the other half of taiking." Listening definitely should be an inherent part of the total communication process. In many situations it is not. For many people listening is almost impossible; they are thinking about what they will say when they get the floor and the chance to speak. The ten commandments for good listening are:

1. Stop talking.
2. Put the talker at ease.
3. Show the talker that you want to listen.
4. Remove distractions.
5. Empathize with the talker (point of view).
6. Be patient.
7. Hold your temper.
8. Go slow on arguments and criticism.
9. Ask questions.
10. Stop talking.

God gave man two ears and one tongue, which indicates man is supposed to listen more than he talks.

Practice Empathy

Semanticist S. I. Hayakawa states: "The meaning of words are not in the words; they are in us." If meaning must be found in something beyond words themselves, then true communications must involve a degree of empathy–the identification with another person's perspective. In disagreements no person should speak before they have restated the ideas and feelings of the previous speaker accurately and to the satisfaction of that speaker. Empathy is an important component for the efficient functioning of the organizational communication system.

Basic Communication Guidelines

Numerous rules have been suggested for improving the communication in a fertilizer marketing organization. Most of the rules have been formulated to eliminate the roadblock mentioned above. Some rules for improving the organization's communications include:

1. Eliminate ambiguities.
2. Use proper followup.
3. Avoid negativism.
4. Use proper timing of messages.

Fertilizer Distribution and Handling Problems

The list of problems created in fertilizer marketing because of ineffective communications is long. We have all heard similar complaints:

1. Why did you not deliver the fertilizer by the date requested?
2. Why did you not inform me sooner that you could not supply all the fertilizers I ordered?
3. Why did you purchase the wrong fertilizers?
4. Why was the wrong price list sent to the retailers?
5. Why did you not tell me the warehouse would hold another truckload when the inventory sheet indicated it was full?
6. Why was I not told about the organizational policy and procedural changes?
7. Why did you not inform me that the supply of DAP was finished? I could have shifted the farmer to TSP and urea.

Communication in the Marketing System

The organizational structure employed for the marketing system influences the ease with which effective communication can be made. Regardless of how complex and inefficient the organizational structure might be, the communication network employed must overcome organizational weakness and provide effective communications. As stated earlier, the role of communication is to provide an informational system whereby management can plan, organize, motivate, direct, and control the various segments of the organization. The channels of communication can be formal as in a military unit or informal like the office grapevine.

Policy is made by the board of directors and communicated to the general manager for implementing. Information is gathered from the operating personnel in production and marketing and fed to the board for determining policy. This information may pass upward from (1) the warehouse staff to (2) the salesman to (3) the regional sales manager to (4) the marketing manager to (5) the general manager to (6) the board of directors. We have already illustrated what can happen to a message when it is orally received and relayed by several people. A message can and often does lose some of its true meaning. We expect the oral message (information) to become distorted, but usually we think the written message remains true. In many cases this is not so. For example, let us say that a warehouse manager records on a proper form information stating that a particular material being stored is normally received in poor condition resulting in caking and that reclaiming and rebagging are required increasing handling costs. This information is reinterpreted and rewritten several times as it is passed up the organizational ladder. By the time the information reaches the board of directors it states that the material in question is as good as similar products from other suppliers; however, reclaiming from storage is more difficult. The policymakers agree to send the same materials for another year. In this example the distorted information fed to the board could be very expensive before the fact is made known that handling costs have increased due to the use of this material.

Communication distortion is usually a greater problem for the upward flow of information than for the downward flow. It is a natural tendency for subordinates to support management's edicts and wishes and to filter out information that would be to the contrary. Managers often find it difficult to get an honest opinion from subordinates. When this is the situation the formal communication channel can be supplemented with surveys, private lines to management, suggestion boxes, etc. In the above example involving the poor material, it would appear that the subordinates were trying to tell management what they wanted to hear.

Monitoring Communication to Determine Effectiveness

What do we mean by monitoring? Like communication, the word "monitoring" means different things to different people, depending on the background one has and the context in which one uses it. For example, it could mean "to watch," "to observe," "to check," "to evaluate," "to audit," "to keep track of," "to follow up," "to control," or "to regulate." However, for our purposes, let us define "monitoring" as "keeping track of how communication efforts have resulted in maintaining or improving employees' job performance. Then, what specifically might marketing management staff monitor? There are several things which would be worthwhile to monitor. These are:

1. Fertilizer sales by retailers.
2. Fertilizer sales by sales territories or salesmen.
3. Materials loss in the handling system.
4. Days lost due to sickness.
5. Inventory level – check planned level versus the actual level for each product at each storage location regularly.
6. Operating conditions of automobiles and trucks – audit the conditions of special pieces of equipment for operating life against the planned period.
7. Product quality – check the product quality before and after storage.
8. Product and bag losses and damages – in and out of the warehouse.
9. Compare warehousing costs by months and years.
10. The quantity and quality of feedback from employees.

Next, *how is monitoring done*? Basically, there are two types of monitoring. One type is physical monitoring and the other type is written monitoring. For physical monitoring, there are several methods that can be carried out, depending on what is to be monitored. These methods, for example, are:

1. Personal visit (for spot checking, regular inspection, or special-purpose trip).
2. Computer.
3. Recording devices.
4. Weighing scale.
5. Television/camera.

For written monitoring, the methods include written or computer reports of various types. For example, a report may be a status report, an activity report, a cost performance report, a service performance report, or a job performance report. The monitoring can be carried out regularly or on the "as needed" basis.

The type and method of monitoring management uses will depend on what management wants to monitor. The type and method will also be determined by how fast, how often, how precisely, and the cost. In some instances, more than one type or method of monitoring may be required.

Summary

Fertilizer marketing managers must know how to effectively communicate with others in their organization. Managers must make communication happen. The good manager (leader) will work around or eliminate the communication roadblocks. He is a good listener and practices empathy. The good manager is prepared to build flexibility in the formal communications channels that are planned by management and designed to accomplish the task for which managers have responsibility. Good managers are also aware of the benefits of informal communication channels and prepared to use them for effective management. Communications should be monitored to determine effectiveness.

Workshop on
Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994
Bamenda, Cameroon

What Managers Do

by

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What Managers Do

The most common definition of management is "getting things done through others." It is an appropriate definition as it identifies what management does. In fact, management is responsible for effectively utilizing three types of resources: physical (material), capital (money), and human (men). Management is the activating force that combines these resources into useful goods and services so important to developing and maintaining high standards of living in any nation. In fact, all of us either manage or are managed by other people.

Management practices can be traced throughout history beginning with the *Bible*. But the systematic study of management is comparatively recent. It is based on three approaches which are discussed below.

Classical Approach

Frederick Taylor, known as the father of scientific management, is credited with certain principles that will increase productivity. The principles he developed are:

1. **Research** – Find the "one best way" to perform the work.
2. **Standardize** – Apply the "one best way" to all similar jobs.
3. **Selection** – Choose the individual best suited to perform a job.
4. **Training** – Instruct the individual how to perform the job.

Frank Gilbreth also contributed significantly to scientific management. Gilbreth concentrated on motion study and identified basic on-the-job motions. These motions helped in studying how to accomplish work most efficiently. He also developed mechanisms that could accurately time how long a job took. The work of Taylor, Gilbreth, and their contemporaries laid the groundwork for the modern industrial engineering departments.

While scientific management concentrated on managing work performed by blue-collar workers, other individuals focused on higher levels of the organization and on managing the organization as an entity. Henri Fayol identified 14 principles of management that he believed applied to managerial situations. Of these, the most widely known are the following four principles.

1. Authority should be equal to responsibility.
2. Un: ; of command (one superior).

3. The Scalor chain.
4. Unity of direction.

Fayol called these principles and not laws of management. The principles are to be applied judiciously and with common sense.

Behavioral Science Approach

Methods and findings of psychology, sociology, and other behavioral sciences have increased knowledge of human behavior. The most famous studies at the Hawthorne plant of Western Electric in 1939 brought the importance of human behavior in the work environment into sharp focus. The studies proved that productivity increased when attention was given to the workers – in this case six young women and an observer in a relay assembly test room. Through 23 different phases, various changes were made in the conditions under which women operated; rest breaks were increased from two to six, light lunches were provided, even the incentive system was changed. No matter whatever changes were introduced, productivity continued to rise until it stabilized at a relatively high level. By isolating the women from 25,000 workers at Hawthorne and by inviting their cooperation in the study, the investigators had given them a new sense of their own worth, and they had come to feel important. A later phase of the study showed the existence of informal groups in the organization, such informal groups had arisen out of the formal organization.

The Hawthorne study introduced the human relations movement in the management field. In this regard, Maslow's hierarchy of needs threw light on the motivation of workers. Maslow's hierarchy of needs covered in ascending order (1) physical and physiological needs, (2) safety or security needs, (3) love or social needs, (4) ego or status needs, and (5) self-actualization or self-realization and self-fulfillment needs. An individual, stated Maslow, would move from one need level to the next. An individual's first concerns are with meeting his or her immediate physical needs. Once these needs have been satisfied, an individual's concerns focus on security needs. When one feels secure, new needs will emerge – i.e., social needs. Once physical, safety, and social needs have at least been partially met, the individual will move to ego needs and once ego needs have been satisfied, the individual will move on to the self-actualization needs. Maslow's hierarchy of needs has become widely accepted in the management field.

Douglas McGregor contributed theory X and theory Y to the behavioral aspect of management. He propounded theory X which said that subordinates were uninspired workers who avoided responsibility and work assignments and used strict supervision. He also propounded theory Y which implied that subordinates would view work as rewarding if given a chance by their surperiors. Improved communications and greater employee participation in decisions would be a most desirable format for management.

Systems and Quantitative Approach

The systems approach sees the organization as a separate but interacting component that must work together. The output of system is greater than the sum of individual parts. The organization attracts resources in the form of inputs (3 M's) from the environment, process these into output (goods/services) which is then distributed to the society in which the organization operates. Environment influences the organization and vice versa.

The quantitative approach originated from the operations research the British developed during World War II. A small group of scientists was called on to solve numerous complex military problems, one of which was determining the best size for convoys. The chief constraints were (1) the need for minimizing shipping losses and (2) the number of escort vessels; the escort vessels could subsequently be used to prosecute the war effort directly. The researchers discovered that large convoys having the same number of escort ships as a smaller convoy, lowered shipping losses. Other wartime problems included studies of defenses against German U-boats and of bombing patterns over enemy territory.

Today, operations research is applied to whole systems or substantial parts thereof instead of merely to individual problems. It also relies heavily on mathematical modeling, that is, mathematically representing the system under study. The rise of operations research has coincided with the development of the computer, which allows manipulating large quantities of data within the models. Two examples of the systems and operations research approaches in management are a linear programming model that minimizes an objective such as costs in a manufacturing operation, and the program evaluation and review technique (PERT), a planning and controlling technique.

The three approaches – the classical, behaviorial sciences, and the system and quantitative approaches – continue to influence the present-day management which incorporates significant findings of these approaches.

Process of Management

The management process consists of four functions that must be performed by every manager. These functions are: (1) planning, (2) organizing, (3) leading, and (4) controlling.

Planning

Planning is a critical function of management and a continuing responsibility of every manager. It consists of setting objectives, assessing the future by developing planning premises, and developing courses of action designed to accomplish these objectives. Plans should contain methods for controlling the operation of the plan.

Plans are categorized on time, use, scope or breadth bases. Classifying plans on a time dimension involves three categories: short (1 year or less), intermediate (between 1 and 5 years), and long range (5 years or more). A classification scheme based upon use divides plans into single-use and standing plans. Programs, projects, and budgets are all one-time, single-use plans. Standing plans are predetermined courses of action developed for repetitive situations; they include organizational policies, standard procedures, and rules. The third classification method is based upon scope or breadth and includes two types: strategic planning and tactical planning. Strategic planning focuses upon what the organization will do in the future and involves the determining of objectives and adoption of courses of action and allocation of resources necessary to achieve these objectives. Tactical planning is much narrower in scope; its primary focus is upon how the activities specified by strategic plans are to be accomplished. Flexibility is an important ingredient for planning.

Organizing

Organizing is the act of planning and implementing organizational structure. People and other resources are organized so as to accomplish the objectives of the enterprise. The division of work activities is called departmentalization. The five bases for departmentalization are function, geography, product, customer, and process.

Coordination is an important need in any organization, particularly large, complex ones. Rensis Likert argues that managers serve as linking pins between the groups they manage and the higher level groups to which they report. These overlapping managers can play important roles in achieving coordinative efforts of different departments.

Authority is the legitimate power a manager possesses to act and make decisions. Responsibility is the obligation of the manager to carry out assigned duties. Authority and responsibility are often delegated, or assigned, to subordinates who are then held accountable for their performance. Effective delegation should be based on the scalar principle, which holds that authority and responsibility should flow in a clear, unbroken line from top management to supervisory levels. An organization where extensive delegation is commonplace is considered to be decentralized. If little authority is assigned, the organization is termed centralized.

Unity of command is a basic concept in organizational structures. In this each organizational member reports to only one superior for any single function. The span of management – the optimal number of subordinates a manager can effectively manage – is another key organizational concept. Organization charts are typically used to depict the organizational relationships.

Line and staff relationships are also important in organizations. There are three types of authority: (1) line authority, the relationship between a superior and a subordinate; (2) staff authority, which is advisory in nature; and (3) functional authority, the power to direct or require certain procedures, policies, or specific practices in other departments not under the direct supervision of the person or department possessing this authority.

Leading

Leading is the act of motivating people to perform certain tasks intended to achieve specified objectives. Leading involves the use of power, which is the ability of a person to influence the behavior of another person. Leaders have five sources of power: reward, coercion, expert, reference, and legitimate.

Leadership style is the way a person uses available power in order to lead others. These styles are: (1) authoritarian, (2) benevolent authoritarian, (3) consultative, and (4) participative.

Controlling

Controlling is a critical managerial function for determining whether objectives of the organization are achieved and whether actual performances are consistent with plans. Five general controls are used in the organization: (1) financial controls, (2) production controls, (3) organizational controls, (4) inventory controls, and (5) quality controls.

Managers are expected to observe employees at their workplaces, review the performance, and take such agreed-upon action as may be needed. On-the-job conferences are often the best means of helping a subordinate. Regularly scheduled reviews allow both the subordinate and the manager to determine if a job is being done. Training needs are discovered. Management appraisal proceeds in six steps: appraise the elements of performance; appraise overall performance; analyze performance; identify improvement and development needs; appraise capacity for advancement in current organization; and appraise capacity for advancement elsewhere. A personnel inventory of individuals within the work unit is made.

A primary function of a manager involves growth and development of his team. He understands how people learn and he can teach a job. It has often been said that the best supervisors are the best teachers.

The control process has important behavior implications for the entire organization. Managers can increase the likelihood of positive attitudes on the part of employees if they communicate the relevance, fairness, and appropriateness of the standards; encourage worker participation; and provide prompt feedback and realistic appraisals.

Management concepts have a universal application to all problem-solving situations. The concepts are appropriate for all organizations.

STANDARD CHARTERED BANK CAMEROON

"THE BANKS ROLE IN THE FERTILIZER SUBSECTOR"

Presentation at USAID FERTILIZER SEMINAR

Bamenda, 08 April 1994 - (8.30 a.m.)

INTRODUCTION :

THE STANDARD CHARTERED GROUP

The Standard Chartered Group was founded in 1853 and today operates through more than 700 offices in over 50 countries, with a worldwide staff complement of 30,000 people.

Standard Chartered is a multinational banking group, headquartered in London. We draw our main strengths from our comprehensive networks in the Asia Pacific Region, Africa, the Middle East and South Asia and from a range of products and services which are marketed across the world.

In addition, there are substantial banking and finance businesses situated in the UK and continental Europe, and in North America, plus a significant respresentation in major Latin American locations.

TRADE FINANCE

Trade Finance has been a cornerstone of our business for 140 years. Our aim is to facilitate trade between countries by combining our international business expertise with technological advances. Trade represents a particular strength based on the network of branches and subsidiaries. Speed and flexibility ensure that trade finance offices across the globe deal directly with each other through an increasingly integrated network.

Our group specialises in providing solutions through innovative structuring of cross-border transactions to meet the needs of both exporters and importers alike in respect of finance and guarantees.

As some of you are already aware, we are also the FIDUCIARY BANK in Fertilizer Sub-sector Reform Program which means that we manage the funds that have been put by USAID at the disposal of the Cameroonian People in respect of Fertilizer Sub-sector Reform, and coordinate with the commercial banks who deal directly with operators to deliver this service.

OBJECTIVES :

We are here today to talk about the banks role in the Fertilizer Sub-sector and to familiarize participants with the workings of documentary collections and letters of credit.

(Stencil objectives)

Banks are the result of a social need for particular service expertize in an economic process. In many respects in addition to being a profit generating business, they act as intermediaries in certain business transactions.

Fertilizer is an agricultural imput. Those fertilizers that we are familiar with are NPK Fertilizer, UREA and AMMONIUM SULPHATE which as you have seen is of grat advantage to the farmers and their production.

Up until 1987 Fertilizer was imported by FONADER and was highly subsidized by the government. The major implications of this was that (A) There was no competition in the fertilizer market and (B) the price at which fertilizer was being sold in Cameroon was not at all relevant to what it cost.

With the introduction of FSSRP in 1987, the sector began to be liberalized and to a larger extent Commercial banks started taking risks on individual importers. Competition was created and costs consequentially reduced. The subsidy also reduced from 60 % to 5 %.

The overall results of this is that we have farmers who know and have seen the attributes of fertilizer and who use fertilizer to boost their production and we have people whose business it is to sell and distribute fertilizer. But since fertilizer is not produced in Cameroon it has to be imported.

INTERNATIONAL TRADE

It is an accepted fact in economic theory that each individual country should concentrate its efforts on that form of production that best utilizes its resources and that will produce the optimum increse ir the country's GNP. Thus we have countries that remain primarily agricultural while other countries which have reached a more developed stage, concentrate their resources on various manufacturing activities. As a consequence of this, it is necessary to exchange commodities between countries so that what is produced in one country can be made available to other countries. This exchange of commodities is basically termed International Trade and is conducted by individual importers and experters in each country. The importers and exporters will thus be geographically separated, often thousands of miles apart. Their knowledge of each other is rarely extensive, the goods they trade in will take days or weeks before being finally delivered.

The role he bank plays in international trade is significant in view of the fact that money is used as medium of exchange when commodities change hands. When business is conducted on an international scale, it is not always possible for importeres to make payment directly to the exporteres and in this respect the Bank acts as the intermediary between importers and exporters and in this respect the Bank exporters and on their behalf effects payment or receives remittances and verifies the documents justifying the existence of the goods and their delivery.

The methods for effecting payment or receiving remittances through the medium of the bank have primarily been :

(Stencil Open-Account)

a) Cheques or bank drafts made out in favour of the suppliers in any nominated currency as in Open Account Trading.

b) Telegraphic transfers which have remained one of the quickest ways of remitting money.

c) Mail transfers which operate in a way similar to the bank draft.

d) Drawing a bill of exchange which operates in much the same way as a cheque except that it is drawn on individuals rather than a bank as in supplier credits.

Besides being an intermediary where money is concerned, the bank is also able to minimise and reduce the risks faced by both importers and exporters. Credit risks will be reduced when both the importers and exporters are able to get accurate and up-to-date reports through their banks' information service. Exchange risks are reduced when forward contracts are entered into.

One method above all which has been found to transcend many of the difficulties faced by both the importers and exporters in the use of documentary letters of credit issued by banks.

(Stencil Documentary Collection)

DOCUMENTARY COLLECTIONS

A DOCUMENTARY COLLECTION IS A PAYMENT MCHANISM IN WHICH AN EXPORTER USES A BANK AS HIS AGENT IN COLLECTING PAYMENT FROM AN IMPORTER VIA THE PRESENTATION OF FINANCIAL DOCUMENTS.

FINANCIAL DOCUMENTS
(EG. BILLS OF EXCHANGES)

ACCOMPANIED BY COMMERCIAL DOCUMENTS
(EG. INVOICES, PACKING LIST, B/L ETC.)

(Stencil Parties Involved in a Collection)

PARTIES INVOLVED IN A COLLECTION :

- **SELLER / DRAWER**
- **BUYER / DRAWEE**
- **REMITTING BANK**
  (SELLER'S BANKER)
- **COLLECTING BANK**
  (AGENT OF THE REMITTING BANK / BUYER'S BANKER).

(Stencil Considerations)

CONSIDERATIONS BEFORE USING DOCUMENTARY COLLECTION

(1) IMPORTER CREDIBILITY / REPUTATION

(2) FOREIGN EXCHANGE RESTRICTIONS

(3) SPECIALLY MANUFACTURED / PERISHABLE GOODS

(4) POLITICAL STABILITY OF IMPORTING COUNTRY

(5) IMPORTING COUNTRY REGULATIONS.

(Stencil Documentary Collections)

<u>DOCUMENTARY COLLECTIONS</u> - ADVANTAGES TO THE EXPORTER :

(1) CONTROL OVER GOODS

(2) BANK ASSISTANCE IN OBTAINING PAYMENT

(3) LOW COST

(4) FINANCING OPTION.

(Stencil Risks to Exporter)

<u>DOCUMENTARY COLLECTION</u> - RISKS TO THE EXPORTERS :

(1) NON-ACCEPTANCE OF SHIPMENT

(2) NON-PAYMENT OF TRADING ACCEPTANCE

(3) FOREIGN EXCHANGE TRANSFER RISK

(4) POSSESSION OF GOODS WITHOUT PAYMENT

(5) DOCUMENTARY RISK.

DOCUMENTARY CREDITS :

A DOCUMENT ISSUED BY THE BANK AT THE REQUEST AND ON THE INSTRUCTIONS OF ITS CUSTOMER (IMPORTER)

IN FAVOUR OF A BENEFICIARY (EXPORTER).

THE BANK UNDERTAKES TO PAY THE BENEFICIARY PROVIDED

THE EXPORTER COMPLIES WITH THE TERMS AND CONDITIONS OF THE CREDIT.

ATTRIBUTES OF DOCUEMNTARY CREDIT :

- A commercial device
- Facilitates movement of goods
- Provides protection to buyer and seller
- A conditional payment order
- The beneficiary must comply with the terms of the credit to be certain of obtaining payment.
- Ensures the expoter will receive payment for his goods.
- Assures the importer that he will not have to part with his money until documents are presented exactly in accordance with his initial instructions.

DOCUMENTARY CREDITS

ARE SUBJECT TO ICC UNIFORM CUSTOMS AND PRACTICE FOR DOCUMENTARY CREDIT

(1993 REVISION).

DOCUMENTARY CREDIT :

The buyer arranges for his bank to issue a documentary credit in favour of the xporter. This is frequently advised through a bank to the exporter, but it may be sent directly.

Once a bank's irrevocable credit has been advised to the beneficiary the issuing bank must honour all drawings made which conform to the terms of the credit. This applies irrespective of whether or not the importer reimburses the issuing bank ; hence the need or otherwise for security backing for a documentary credit application is a matter for each bank to assess relative to individual customers. The application for a documentary credit signed by the importer legally binds him to reimburse the issuing bank for all drawings made which conform to the terms of the credit.

Such reimbursement for sight drawings will be required on receipt by the issuing bank of an airmail or telex advice of drawing from a bank overseas or, if the credit provides for drawings at a term (up to, say 180 days sight) on maturity date of the term drawings.

Should discrepancies in the documents presented relative to a drawing under a credit come to the notice of the issuing bank, either by advice from an overseas negotiating/paying bank, or from their own checking of the documents, the drawing can be paid only with the concurrence of the applicant (importer). After receipt of advice of the discrepancies from the issuing bank the applicant must decide, within a reasonable time, on the basis of the documents alone, whether or not to agree to payment. If agrees, the documents are regarded as being in order, and he is bound to reimburse the issuing bank for the payment. The reasonablde time to reach a decision is a question of fact for individual cases, but it is normally no more than 24 hours ; should the importer decide not to rectify the drawing, the documents are held to the order of the overseas negotiating or paying bank which has the responsibility for giving instructions for protection of the shipment.

(Stencil L/Cs)

FUNCTIONS OF DOCUMENTARY LETTERS OF CREDIT

- ARRANGEMENT BY BANKS TO FACILITATE INTERNATIONL TRADE IN SETTLING INTERNATIONAL COMMERCIAL TANSACTIONS.

- A FORM OF SECURITY FOR THE PARTIS INVOLVED.

- PAYMENT PROVIDED DOCUMENTS COMPLIED WITH THE TERMS AND CONDITIONS OF THE LETTER OF CREDIT.

PARTIES TO A L/C TRANSACTION /

1 - IMPORTER / BUYER / APPLICAT / OPENER

2 - EXPORTER / SELLER

3 - ISSUING BANK

4 - ADVISING BANK

5 - CONFIRMING BANK

6 - BENEFICIARY / EXPORTER / SELLER

7 - NEGOTIATING BANK

8 - PAYING / REIMBURSING BANK.

THINGS TO AVOID WHEN ISSUING A L/C :

D O N O T

- CALL FOR DOCUMENTS THAT BENEFICIARY CAN'T OBTAIN.

- REQUIRE DETAILS THAT'S NOT WITHIN ISSUER'S KNOWLEDGE.

- STATE CONDITIONS THAT CAN'T BE EVIDENCED.

THE INGREDIENTS OF A L/C :

1 - ISSUING BANK

2 - APPLICANT

3 - BENEFICIARY

4 - ADVISING BANK

5 - AMOUNT

6 - TERMS OF PAYMENT

7 - DESCRIPTION OF GOODS

8 - PORT OF SHIPMENT

9 - DESTINATION.

10 - TRANSHIPMENT.

11 - PARTIAL SHIPMENT

12 - LATEST SHIPMENT

13 - EXPIRY DATE

14 - DOCUMENTS REQUIRED

15 - SPECIAL CONDITIONS OR INSTRUCTIONS

16 - REIMBURSEMENT INSTRUCTIONS

17 - UPC 1993 REVISION, ICC PUBLICATION 500.

MAIN REASONS FOR REJECTION OF DOCUMENTS :

1 - LATENESS -

Credit expired, late shipment and presentation.

2 - ERRORS

Mainly in invoices and transport documents.

AVOIDING PROBLEMS IN LETTERS OF CREDIT

1. L/C must conform with underlying sales contract.
2. Must be irrevocable and preferably confimed.
3. Description, quantity and price of the gollds are in accordance with terms of contract.
4. Comply with insurance requirements.
5. Obtain all required documents in the required time and within the validity of the LC.
6. Be able to export full quantity on a vessel direct from the port of loading to port of destination, if part shipments and transhipment are prohibited.
7. Ship goods within specified period. Present documents to the bank within 21 days from date of shipment unless a shorter time is stipulated in the LC.
8. In any case, shipment must take place before the credit expires.
9. Do not ship goods before the promised letter of credit arrives as decisions could then be taken that are not in accordance with the oriignal terms of the credit.
10. It helps if the documents are in a logical order, i.e. in which they appear in the letter of credit.
11. Strict compliance with specified LC terms. Nothing should be assumed. No spelling mistakes.
12. All documents must be consistent with each other in all respects but particularly with regard to shipping marks and package numbers, which must appear on all documents in order to identity them with each other.
13. Documents not called for in the LC should not be presented, because superfluous paper giving extra detail has been known to cause banks to refuse payment.

14. The draft must be drawn by the beneficiary on the parties specified in the credit, or as requested by the advising bank. It must be drawn in accordance with the terms of the LC and with the requisite reference number.

15. Draft must be correct in words and figures;
16. Is payable at sight or at tenor as per LC terms.
17. Draft is correctly dated.
18. Bill of lading must be issued by a shipping company or its accredited agent and signed on behalf of the shipping company.
19. Bill of lading must be shipped on board unless the LC states otherwise.
20. Any amendment of Bill of ladin should be duly signe and dated by the shipping company.
21. Bill of lading must be in a complete set, with the required number of non-negotiable copies, each negotiable copy being signed by the shipping company.
22. Bill of lading must be free from any detrimental clauses added by the shipping company to indicate damage to goods or packing.
23. Bill of lading must cover the entire voyage.

24. Precise notation on Bill of lading concerning payment. Freight prepaid or payable at destination.
25. Goods description on the Bill of lading must be quoted in either general or specific terms but wording chosen must not conflict with the credit, nor the other documents.
26. B/L must show Ports of shipment and discharge in agreement with the terms of the letter of credit.
27. B/L must be endorsed on the reverse if made out to shipper's order.
28. B/L must be presented within the time specified in the credit for presentation of document. If no such period has been stipulate, banks will refuse documents presented later than 21 days from the date of the B/L.
29. B/L must bear a shipment date on or before the last shipment date shown within the letter of credit but in any event within the validity of credit.
30. Insurance cover must agree precisely with the terms of the letter of credit.
31. The date of the insurance document is not later than the shipment date, or if dated after shipment, bears a clause to the effect that cover commences not later than the date of shipment, to ensure that the goods are fully ensured.
32. Insurance amount payable is in accordance with the terms of the LC and is in the same currency as the credit.
33. The marks, weight, description of goods on insurance douments, agree in total with the bill of lading and all the documents.
34. Invoices are completed by the beneficiary, are in the name of the buyer, unless the credit specifies otherwise.
35. Totals of all invoices agree with letter of credit.
36. Shipment terms on invoice agree with the letter of credit.
37. If visa required on invoice, this is done by the authority stipulated in the credit.
38. Full and exact description of goods is hown on the invoice as detailed in the letter of credit and that the quantity and specification are as called for.
39. No additional charges or deductions not authorized in the letter of credit should be shown on the invcice.
40. Proforma invoice numbers or reference numbers are as required by the letter of credit and are shown.
41. Marks and weights, numbers and name of vessel on the invoice agree with the Bill of lading and the documents are consistent with the marks and weights detailed in the letter of credit.
42. All the details quoted and the description of goods in the Certificate of Origin, agree with the letter of credit, the B/L and other documents. THE Certficate of Origin should not conflict with other documents with regard to value and country of origin.
43. Packing list must show the content of each individual package.

When you approach a bank as an importer of fertilizer or for the distribution of fertilizer, there are certain conditions that make you eligible to work with them.

(Stencil Eligibility)

Either you have the money to do the operation in which case if you are a businessman of good reputation there is no problem, or you are going to ask for credit.

CREDIT in simple terms means You ask the bank to assist you by advancing either to you or to someone on your behalf money or a commitment to pay a certain amount of money.

The eligibility for credit in general terms is based on the FIVE Cs CREDIT

1 - Capital : How much is the owners stake in the businesses ; Does he work with borrowed funds ?

2 - Competence : Is he trained ? Does he have experience and is he familiar with this area ?

3 - Confidence : Does he command confidence in the market ? Does he have a good reputation ?

4 - Credit Worthiness : Has he got a good credit track record ? Does he honour his engagements ? Has he taken credit before and how did he handle it ?

5 - Capacity : Is he overtrading ? Can he handle the level of business that he is contemplating to do ?

If the answers to all of these are satisfactory the bank would then examine essentially two aspects of this customer which relate to opportunities provided and threats imposed by external fatcors and his individual performance.

These are defined as follows :

BUSINESS RISK given by the environment, the economy, the market, the competitors, the product, the logistics, the terms of a sales contract (External factors affecting his performance).

THE FINANCIAL RISK given individual performance by the figures and the balance sheet, profit and loss and projections.

CREDIT is either given on a clean basis meaning without security but this is not common in developing countries because in order to this the bank would have to be sure without reasonable doubt, beyond occurrences that are created by man, or acts of God that this meny would be repaid ! Or it is advanced backed by guarantees ; and this is more common.

(Stencil Types of Guarantees).

Some types of Guarantees are :

a) Cash collateral meaning that money has been set aside or is available should there be a default in payment.

b) Bank Guarantees, meaning bank of good standing is commited to pay should there be a default in payment.

c) Pledge on stock meaning that good have been consigned to the bank.

d) Charge on floating assets, meaning that movable assets like equipement, cars, furniture, have been promised to the bank in case of a default in payment.
e) Mortgage on fixed assets or property. Mortgages are also of two types but we are not going into the details.

Guarantees in themselves should not substitute a repayment source. Banks are not interested in owning or selling your property but in doing straight forward business. No matter how good the security is, if the bank is not sure that repayment will come from conduct of normal business or other specified source accepted by the bank, customer will not be able to get credit facilities. More specified assistance is available through your various banks for importation and distribution, and you should ask them how you can go about this. There are however banks that have preferred business sectors.

Workshop on

Efficient Marketing of Fertilizers in Cameroon

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Warehousing: Location, Sizing, Technical Aspects

by

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Table of Contents

WAREHOUSING: LOCATION, SIZING, TECHNICAL ASPECTS[1]

1. Why Warehouse?

Ideally, fertilizer should move from the point of production or import directly to the retailer or consumer on a regular basis, without any intermediate handling or storage, and preferably as a full load in the transport vehicle. The consumer or retailer would then store the product, with offtake seasonality determining the rise and fall in stock levels.

In practice, this ideal is not attainable but should still be retained as a target and a key objective. We should still plan to move fertilizer through the system on a regular basis throughout the year, as far as possible towards the point of final use for storage. The key level for storage and redistribution for marketing purposes is then likely to be at the district level. The district warehouses may then serve as transit centers from where material is transshipped, preferably directly to the retail level (retailer or co-op).

Because of predictable variations in consumption patterns and uncertainties in the supply system, it is therefore necessary to maintain a network of such warehouses serving as intermediate storage.

2. Location

A variety of factors may be quoted as criteria in selecting locations for warehouses. One such group is as follows:

Theoretical Approach to Selecting Warehouse Locations

2.1. Proximity to market area.

2.2. Locate in areas allowing the least freight expense.

2.3. Ready availability of onward transportation, utilities and labor.

2.4. Areas affording the lowest tax and insurance rates.

2.5. Locate in the proximity of the least expensive mode of transportation and supply route.

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1. Prepared by W. E. Clayton, Transportation/Distribution Specialist, IFDC, Muscle Shoals, Alabama.

2.6. Avoid areas susceptible to natural disasters.

2.7. Locate in areas affording the best security and law enforcement protection.

Most of these, however, are unrealistic or of only academic interest in the real-life situation in a developing country. The principal determining factor is obviously the need to be located centrally in a major offtake area. The next is to be located on a major supply route. In almost all cases, this location is the only major town in the entire area. It is the communication center, the center of administration, and the focus of agricultural activities. The major locations thus effectively select themselves. The exact siting at the selected location is much more difficult and requires further detailed onsite study. As far as possible, the warehouse should be served directly by the primary transportation mode, usually rail or barge, but availability of land at such favorable locations is likely to be very limited, and transshipment may be necessary.

Practical location factors may then be outlined as follows:

Practical Approach to Selecting Warehouse Locations

1. Locate in a principal demand area.
2. Locate on a major supply route.
3. Serve directly by primary transport (i.e., make road, rail, and/or water connected).
4. Consult local experts.

3. Sizing

Many factors are involved in determining the required capacity. They may, however, be broken down to three principal items:

3.1. Offtake Pattern.

3.2. Supply Pattern.

3.3. Safety Stock.

We have previously stressed the importance of an accurate and reliable demand forecast. Definition of the offtake pattern on a monthly basis, with projection for the required number of years ahead, takes into account factors such as seasonality, types of product, availability of transport and the marketing situation, present and future.

Supply is hopefully on a fairly regular basis, but must be defined as well as possible, taking into account all production, import and transportation variables and probabilities.

Safety stock is decided as a consequence of the first two factors and is laid down largely as a policy matter, but based on experience, judgment and calculation of supply and offtake probabilities on as simple or sophisticated a level as required. Account must of course be taken of factors such as availability of alternative hired accommodation to cover peak requirements, or use of temporary outdoor storage. In Bangladesh this has been up to five months for some locations but this level is now being reduced.

It will then be appreciated that sizing of a warehouse requires consideration of the overall supply, distribution, and marketing system, as well as local features. Calculation of storage capacity is considered later.

4. Types and Construction Costs

We will not go into great detail, but will recognize principal types of structure, divided very generally as follows:

4.1. Permanent Structures--Reinforced concrete (RC) foundations and flooring with built-in waterproof layer. RC beam or steel frame structure, with brick walls, asbestos or corrugated iron cladding. Roof of concrete slabs or steel frame and corrugated sheeting. High capital but good long term investment. As provided under USAID programs in Bangladesh.

4.2. Local--May be concrete or brick flooring, brick or corrugated sheet sides and corrugated sheet roofing with steel or wooden frames. A good investment in the intermediate and smaller size ranges.

4.3. Village--Great variety. Concrete, brick, or mud flooring, walls of local brick, corrugated sheeting or wood. Roof of corrugated sheet or tile, usually on wood frame.

4.4. Outdoor Storage--Requires sound, well drained base and dunnage platforms (such as pallets). Cover with double waterproof sheets, tarpaulins or plastic. Secure with net, ropes or weights.

This option should not be overlooked for storage to cover peak demands or for emergency. With proper management, there is no significantly greater loss or damage. Minimal costs.

Construction costs are both type- and country-specific. A reinforced concrete, permanent-type structure in the United States currently costs around $250/m^2$ or $23/sq. ft. The USAID warehouses in Bangladesh are around the same level. A locally designed and constructed warehouse seen recently in India, with concrete floor, brick walls and corrugated sheet roofing, cost $87/m^2$ or around $8/ft^2$.

5. Corrosion

Almost all fertilizer materials are corrosive to some degree. Water is the most important factor in enhancing corrosion effects and it is therefore of the greatest importance to minimize this effect by keeping fertilizer and water (as liquid or as vapor in humid air) as far apart as practicable by:

5.1. Correct design.

5.2. Use of correct materials.

5.3. Proper operation.

We generally have little control over the first two, but should be able to do something about the last. Roofs and drainage must be kept in good condition. Any water or spillage should be cleaned up immediately. Control of humidity is of critical importance and is discussed in the following section.

It should be appreciated that we are concerned with protection of both the warehouse and the fertilizer.

Using care and common sense in the selection of materials of construction avoids many problems. For example, concrete floors should be resistant to fertilizer materials, particularly ammonium nitrate, and should have a dampproof course to protect against rising ground water. Steel should be well protected with suitable paint. Fittings for corrugated roofs should preferably be of stainless steel, although ordinary steel roof trusses have given long and satisfactory service in fertilizer warehouses in port locations. Steel frame structures with corrugated sheet cladding can give satisfactory service, although the bottom of the walls tends to corrode. This can be overcome by making the lower sections of brick or concrete.

6. Ventilation

This is a critical factor in storage under tropical conditions because of the potential for pick-up of moisture by the fertilizer, with subsequent deterioration of physical quality. The significance of ventilation is often not appreciated in both design and operation of warehouses.

The controlling factor is the Critical Relative Humidity, or CRH of the fertilizer. This may be broadly defined as the value of the relative humidity (RH) of the atmosphere, above which the fertilizer will pick up moisture and below which it will not (and if wet, may lose moisture). Some CRH values for commercial fertilizers and their mixtures are shown in Figure 1.

In addition to the value of CRH as an indicator of moisture pickup, factors such as solubility and tendency to caking also play an important part. As we know, urea is more susceptible than DAP or MOP to the effects of moisture because of these factors. It is also the material handled in the greatest quantities.

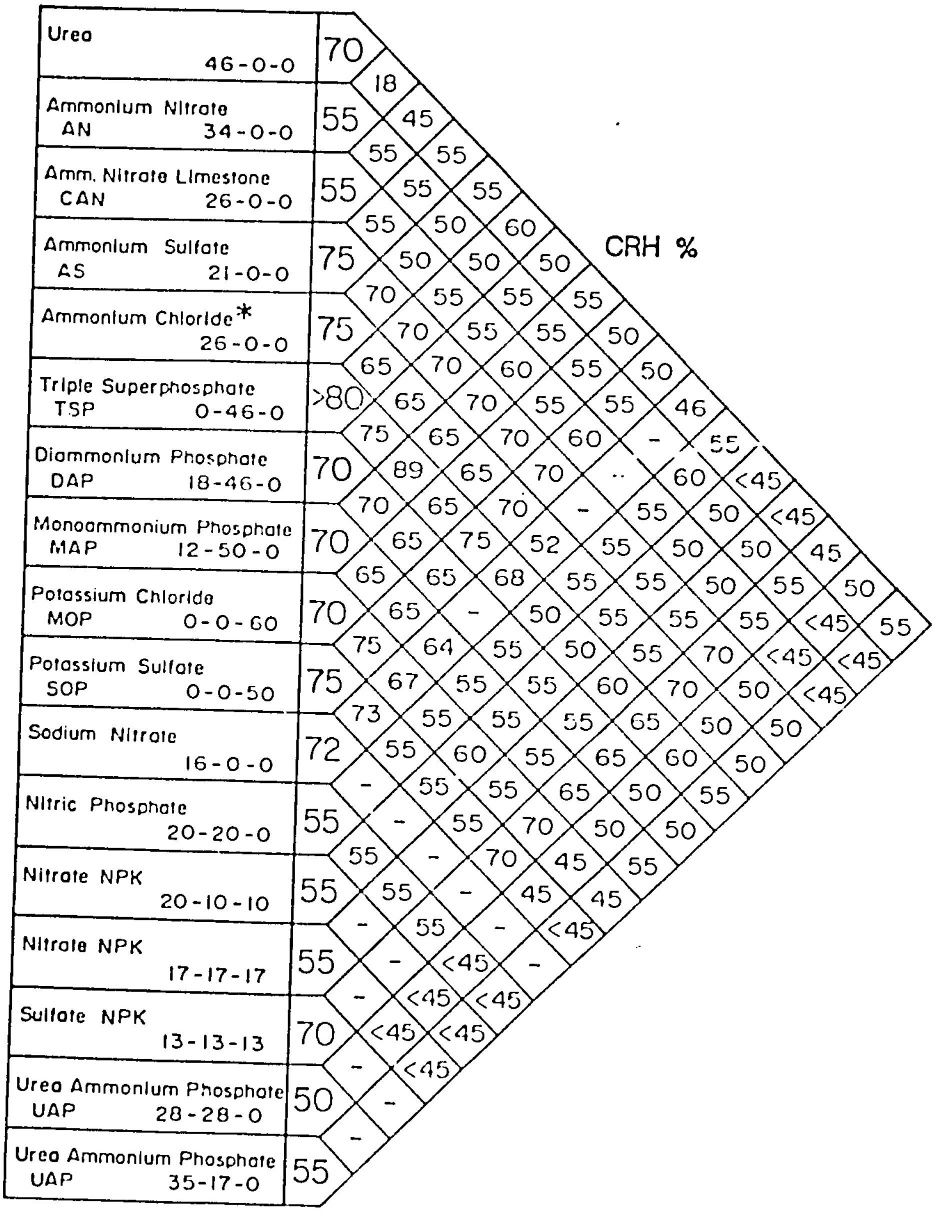
The CRH value of urea decreases with increasing temperature, although not very rapidly, e.g. CRH of pure urea at 70°F = 78%, and at 100°F = 70%. At relative humidities above the 70% range, urea will therefore pick up moisture. Unfortunately, such high relative humidities are very frequently encountered in the tropics.

Atmospheric relative humidity changes fairly rapidly with change of temperature, increasing as temperature decreases. As temperatures drop in the evening, relative humidities increase to very high levels overnight. Data for Bangladesh are given in Figure 2. It will be seen that overnight levels in or above the 70% range are experienced throughout the whole year, together with high daytime levels over a good part of the year.

In order to protect fertilizer in storage from the effects of moisture, the first line of defense is obviously the package, which must be of water resistant construction, securely closed and undamaged. The next protective measure is to avoid unnecessary introduction of "wet" air into the warehouse (i.e., any air with a relative humidity above the CRH of the fertilizer). We may then have to consider measures to control moisture levels

Figure 1

Critical Relative Humidities of Commercial Fertilizer and of Mixtures at 30°C



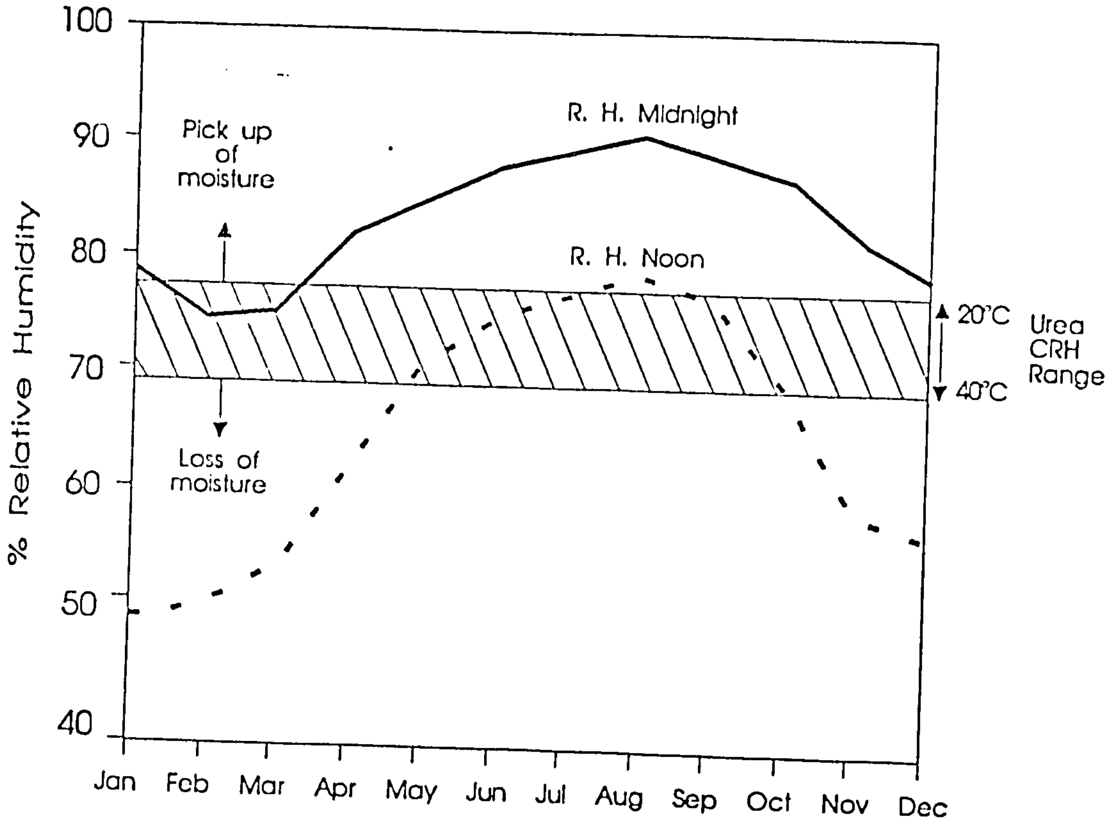
*Reagent Grade Salt.

Note: Determinations were made on commercial materials by TVA. CRH Values are approximate and may vary several points depending on production method and source of material.

Source: IFDC. 1984. *Humidity Factors Affecting Storage and Handling of Fertilizers*, Paper Series P-5, International Fertilizer Development Center, Muscle Shoals, AL, U.S.A.

Figure 2

Chittagong: Average Relative Humidity
3-Year Monthly Averages



in the warehouse, since it is impractical to seal off the warehouse completely. Conventional methods for control of moisture levels include: (1) air conditioning, (2) dehumidifying, (3) heating of the air (to lower its RH), together with (4) limiting the entry of moist air. In most cases, the first three are uneconomical or impractical and only the fourth is a practical option.

In a humid climate, it is therefore recommended that entry of humid air to the warehouse must be avoided to the maximum extent possible. It is recommended that warehouses should not have permanent ventilation. They should, however, be capable of being ventilated. In principle, a warehouse should be ventilated only when the humidity is low--60% RH or less. In practice, this is likely to be when the sun is shining and conditions are dry. At all other times, the warehouse should be kept closed, except for working access or when working conditions are unacceptable.

When a product which may be affected by moisture is in storage for an appreciable time, it could be beneficial to encase the stock in plastic or other waterproof sheeting. In fact, a well-protected stack of bags in outdoor storage may store at least as well as an unprotected stack in a warehouse which is open daily.

Statements have been noted to the effect that high temperatures contribute to caking of fertilizers in storage. At the temperatures encountered even in closed warehouses in the tropics, this effect is not considered significant for the most commonly used fertilizers. It is not, therefore, necessary to ventilate warehouses on temperature control grounds for the benefit of the product, but may be necessary to allow reasonable working conditions.

7. Calculation of Capacity

A knowledge of storage capabilities is necessary for preparation of storage plans, when negotiating hire of warehouse accommodation or when calculating costs of providing storage by alternative methods.

It is possible to calculate approximate storage factors from first principles, knowing only the bulk density of the particular products. The storage density of the bagged product is assumed about 5% less than the density of the loose product in bulk because of the spaces between the bags. Factors for three common products are as follows:

Product	A Bulk Density (ton/m^3)	B Storage Factor for Bagged Product (5% Less Than A) (ton/m^3)
Urea prills	0.74	0.70
Granulated TSP	1.12	1.06
Granulated MOP	1.04	0.99

Assuming bagged fertilizer, block stacked without pallets, some calculations using these factors are shown in Table 1. These relate fairly well to actual experience. In establishing storage standards, measurements for your particular products and particular methods and height of stacking must be made. Bulk density in storage is a useful tool and simpler than attempting to define numbers and dimensions of bags, which can vary considerably, e.g., a 50-kg bag of a particular product may pack tightly, whereas a slightly wider bag will pack loosely and be thinner in the stack, but spread over a greater area. However, once you have established a storage factor for a particular product, it is a simple matter to measure a stack, calculate the volume, and then the approximate weight in the stack.

Table 1. Warehousing Storage Capabilities

Product	Density	Height	Capacity
Urea, prills	0.70	3.5 m	2.45 tons/m^2 of stacked area
TSP, granular	1.06	3.5 m	3.71 tons/m^2 of stacked area
MOP, granular	0.99	3.5 m	3.46 tons/m^2 of stacked area
		(11-12 ft)	
Weighted average for 60/30/10 mix =			2.93 tons/m^2
		say	3 tons/m^2 of stacked area
Allowing 1/3 access space =			2 tons/m^2 of warehouse area

Remember this calculation is only an indicator and is for the stack height specified. Higher or lower stacks give correspondingly higher or lower capacities.

An allowance of one-third for access space may appear generous, but is fairly realistic in practice. It is a figure that is frequently underestimated. Consider Figure 3 for a 40 x 100 m warehouse. Allowing 1 m between wall and stacks and 1 m between stacks, with 5 m for main access corridors and a 100 m^2 working area for re-bagging damaged material, the area available for stacking is only 70.5%. This is a maximum, since if material is being moved in and out, working space in the stacks is needed. If this is as little as 10%, then a maximum of 60% of the total area is usable for stacking fertilizer, with 40% access space. In general, it can be assumed that at least 1/3 of warehouse space is required for access purposes. The figure can be much higher. For example, a design for a 20-ton village storage unit is shown in Figure 4. The space occupied by stacked fertilizer when completely full is only 54% of the storage section.

On the previously calculated basis of around 3 ton/m^2 of stacked area, the 4,000 m^2 warehouse used as an example can accommodate 8,000 tons maximum at 67% available area.

It should not be forgotten that we are paying for space in a warehouse, i.e., volume, not area. If we can stack twice as high, we can halve the cost of the storage space. (Against this, where plenty of storage area is available, there is no point in stacking high; this only adds to handling costs.)

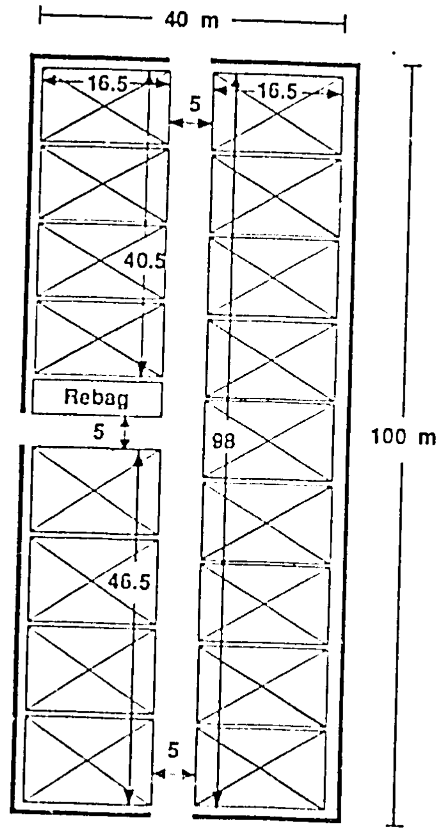
This is illustrated in Table 2.

Table 2. Warehouse Capacities and Capital Costs

	Permanent Structure	Local Construction	Village Warehouse
Construction cost, \$/m^2	250	94	62.5
Stacking height, m	5	4	2.5
Capacity of stacked area	4.2 ton/m^2	3.4 ton/m^2	2.1 ton/m^2
Capacity allowing access areas	2.9 ton/m^2	2.4 ton/m^2	1.5 ton/m^2
Capital cost per ton of warehouse capacity, \$/ton	86	39	42

Figure 3
Warehouse Area Utilization

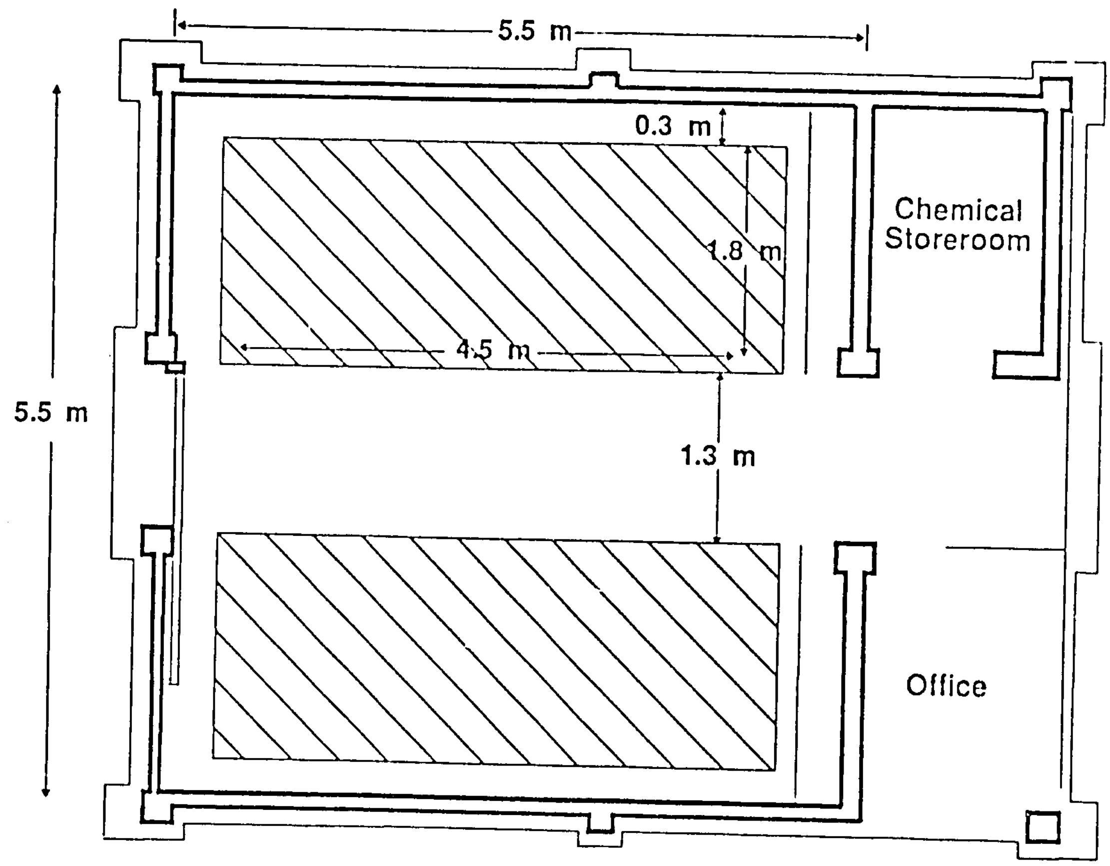
Separation between stacks	1 m
Distance of stacks from wall	1 m
Main access corridors	5 m



Total area	4,000 m²
Rebagging area	100 m²
Stacking area	2,820 m²
Access area	1,180 m² = 29.5%

Figure 4

Fertilizer Storage (20 ton)



Total area*	30.25 m^2
Stacked area	16.20 m^2
Access area	14.05 m^2 = 46%

*Excluding office and chemical storeroom.

8. Stacking Height

Considerable misunderstanding exists regarding the height to which bagged fertilizer can be stacked, manually or in palletized form. Positive statements are sometimes made, such as "you cannot stack more than 20 bags high." It is assumed that above this number, bags may split, granules may be crushed, or the product will cake. These effects are not generally experienced in practice, except for caking of the lower layers. This is only a problem in longer term storage, say 6 months or more. With good quality fertilizers, the caking in the bottom layers in short-term storage is usually easily broken up on handling.

A stack of 20 bags of urea is around 3 m high. Stacks of 35 bags are not uncommon and CCM in Malaysia reported a few years back that on stability grounds, stacks were limited to 35 bags for woven polypropylene rather than 45 for single-film polyethylene.

At these heights, properly constructed bags and reasonable-quality granules should not suffer any damage. Fertilizers stacked in bulk piles may be up to 15 m, or more than twice as high as a 45-bag stack.

In practice, for any particular type of bag, stacking height is determined mainly by the safety and stability of the stack, as determined by the skill and experience of the workers and judgment of the supervisor or manager, assuming no limitation due to the height of the building.

In short, we should not accept arbitrary limits on stacking height. This should be determined for a specific location on the grounds of safety and stability and the quality and caking characteristics of the product.

For palletized material, manually formed pallets are less stable than autopalletized materials. For 6 layers x 5 bags (1-1/2 ton), manually formed pallets may be stacked 3 or 4 high, autopalletized units 4 or 5 high.

9. Protection of Stacks

Consideration should always be given to placing a plastic sheet (or sheets) over the top of a stack to protect it from (a) leaking roofs, condensation, etc., (b) bird droppings, dust, and dirt. This is especially important in long-term storage.

Additionally, for long-term storage, consideration should be given to wrapping the entire stack in a plastic sheet. This may be of light gauge since its purpose is to stop the flow of air, specifically moist air, through the stack.

10. Warehousing Costs

Rather than attempt to detail costs in a particular country let us consider the relative contribution of the main cost components. These are:

10.1. Inventory Costs

10.2. Costs of Rental or Ownership

10.3. Operating Costs

10.4. Handling Costs

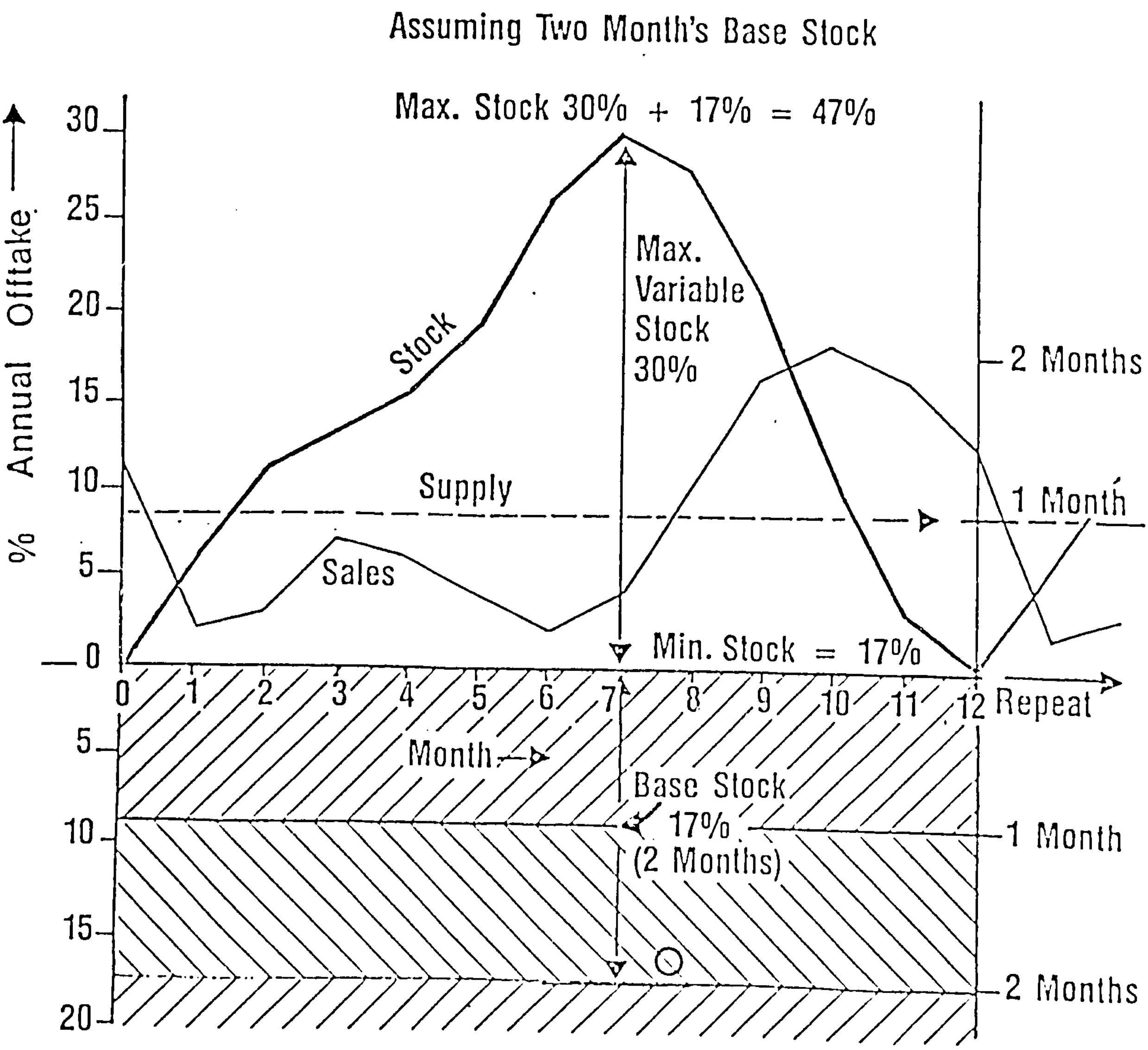
10.5. Product Loss and Damage Costs

Using the two-season offtake pattern (Figure 5) we will consider regional warehouse with a throughput of 25,000 tpy. Inventory levels and costs are then as shown in Table 3.

Table 3. Inventory Levels and Costs

	For 25,000 tpy Throughput Two-Season Offtake Pattern		
Maximum Stock Levels			
Peak of variable stock above base level	30%		7,500
Base stock level (2 months)	17%		4,250
Maximum Inventory	47%	=	11,750
Warehouse Size Allow	Approximately 6,000 m^2		
Average Stock Levels			
Average stock above base level	15.3%		3,850
Average base stock (2 months)	17.0%		4,250
Average Inventory	32.3%	=	8,100
Value of average inventory at $250/ton	$2,025,000		
Annual interest at 15%	304,000		
Cost of inventory for 25,000 tpy throughput	$12.2/t		

Figure 5. Variation of Total Stock Levels.



If the warehouse was constructed at a cost of around \$250/m^2, then a 12,000-ton or 6,000-m^2 building has a capital value of \$1.5 million. Assuming a 20-year life and return on capital of 10%, the capital recovery factor is 11.7%. Allowing 2.5%/annum maintenance, the owner must therefore recover 14.2% or \$213,000/annum without profit. In our case, this is \$3/m^2/month or \$8.6/ton throughput at 25,000 tpy to cover capital charges and building maintenance costs only. These costs would of course be proportionately less for lower capital cost structures, also for existing older buildings which may already be substantially or fully depreciated.

On these bases, approximate warehousing costs are shown in Table 4. Points to be noted are:

10.1. The overriding importance of inventory cost.

10.2. Part of the inventory cost, the base or safety stock level, is controllable, the other part is not.

10.3. If not strictly controlled, loss and damage costs [5] could easily exceed total operating costs ([3] plus [4] in Table 4).

Costs may be spread by using as a multiproduct location, e.g., for storage of crops, pesticides, seeds, or equipment.

As discussed separately, consideration should also be given to pricing incentives or early delivery rebates to reduce peak stock requirements and inventory levels, as well as options for short-term storage or outside storage to cover peak periods.

Table 4. Principal Warehousing Cost Components, 25,000 tpy Throughput
(Assumptions as in text.)

		Two-Season Offtake Pattern ($/t)
1. Cost of Inventory		
i. To cover offtake variations	3,850 t	$5.8
ii. Base stock (2 months)	4,250 t	6.4
TOTAL	8,100 t	$12.2
2. Warehouse Rental at $\$3/m^2$/month 6,000 m^2		8.6
3. Operating Management, supervision, secretarial, labor $35,000/year		1.5
4. Handling In and Out $1/ton each		2
5. Loss and Damage		
Loss 1%		2.5
Damage 1% (half recovered)		1.2
		$28.0

11. Inventory Turnover

The rate of turnover is essentially the number of times the inventory is sold in a given period of time, usually 1 year. It is calculated by dividing the annual sales by the average inventory over the year. A figure used more frequently, perhaps because it is easier to calculate, is the warehouse turnover or the annual sales divided by the warehouse capacity.

Inventory turnover is often quoted as a measurement of warehousing efficiency. It must, however, be used with great caution. It may be a useful measure in a developed economy where the warehouse manager is able to vary his ordering pattern, use different suppliers, or hire storage accommodation at short notice to cover peaks. In considering movement and storage of fertilizers in developing countries we are, however, often talking of centrally controlled systems with regular movement through the system, and storage at receiving locations. There is an inevitable stock buildup within the system dictated by the offtake pattern. This inevitable amount of fertilizer must be stored somewhere, preferably at receiving locations in the market areas. Overall inventory costs are virtually fixed and warehousing costs must be paid for somewhere in the system. Inventory turnover is then not necessarily a measure of efficiency at the district warehouse level, more a reflection of location of stocks. It is dictated very largely by the offtake pattern, over which we have very little control. Comparing the two-season pattern with a sharply peaking one-season pattern, we may find the following on sales of 25,000 tons.

In the examples used previously we had:

	Two-Season Offtake Pattern	One-Season Offtake Pattern
Av. Inventory	8,100 t	11,000 t
Inventory turnover	3.1	2.3

For equivalent operations, the difference in inventory turnover is no indication at all of relative efficiency. Higher throughput at the same location will give lower cost/ton on paper. In the present case, additional storage (a larger warehouse) is needed in the one-season pattern so the differential is even greater than indicated by a "turnover ratio."

12. Operating Features

Detailed operating procedures need to be worked out for each specific location. There are, however, a number of fairly obvious basic features for efficient operation which should be implemented by any efficient warehouse manager as follows:

12.1. Preparation of a layout plan.

12.2. Correct stacking, including use of a dunnage base, close control of handling methods, uniform stacking methods, one product per stack, separation between stacks and walls, separation between stacks, adequate gangways which are kept clear.

12.3. Keeping a stock card for each stack as well as a stock record in the office.

12.4. Good housekeeping, i.e., removal and rebagging of all damaged bags; immediate cleanup of all spillage; a clean and tidy warehouse at all times.

12.5. Maintaining the building in good condition.

12.6. Close supervision of labor, safety, and security arrangements.

12.7. Limiting access only to those with business in the warehouse.

12.8. Recording all movements.

13. FIFO: First In-First Out

Storage operations should generally be on a first-in first-out basis. This must not, however, be applied as a fixed principle. Each situation should be studied on an overall cost basis.

For example, consider an intermediate warehouse of 1,000-ton capacity serving a district with an offtake of 12,000 tons/year, i.e., an average of 1,000 tons/month. If offtake is fairly regular, or at least two seasonal, and if all fertilizer is passed through the warehouse (perhaps for administrative reasons), the turnover ratio is 12, which would be viewed by some as highly efficient. However, two points to note are:

1. Handling 1,000 tons/month into a warehouse while loading out 1,000 tons/month appears highly inefficient. Direct delivery, bypassing the warehouse, should be possible, with major savings in transport cost and some savings in handling in and out.
2. FIFO is not important because residence time is short.

However, in all cases where extended storage is involved, FIFO should be applied. Older stocks should always be moved out first, and old or damaged stocks should always be moved out as soon as possible.

14. Inventory Control

We cannot cover detailed procedures in this short presentation. Good record keeping is, however, essential.

The Manager should know on a daily basis for all products:

14.1. Opening stock

14.2. Quantities received

14.3. Quantities dispatched

14.4. Closing stock

14.5. Any losses or damage

14.6. Quantities in transit

14.7. Orders outstanding

These figures should be maintained on a daily basis and normally transmitted daily to central management, with summaries, weekly, monthly, quarterly and annually as may be agreed.

Stock checking should be undertaken at least on a monthly basis with a more detailed stocktaking quarterly. A formal annual stocktaking should be undertaken for audit purposes.

Independent unannounced spot checks on stocks and operations should also be made by central management.

15. Management

Good warehousing management is vital, yet its importance is often not appreciated.

The warehouse is the last point to handle the goods before they are accepted by the customer and the documents initiated here are critical to all company financial activities.

In the examples discussed previously, for the one-season offtake pattern, the average inventory is over $3 million, with another $1 million for the structure!

A good manager will ensure firm control over all activities associated with care of the warehouse and stock under his control. While he must accept responsibilities in these areas, he must also be given sufficient freedom of control and authority to operate efficiently within established company limits.

Central management must lay down company warehousing policies and procedures and ensure that they are complied with. At the same time, they must maintain close contacts with managers at District level and be responsive to problems which develop and be prepared to assist with information, services and training as necessary.

Workshop on

Efficient Marketing of Fertilizers in Cameroon

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Developing an Agrochemical Marketing Plan

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Developing an Agrochemical Marketing Plan

Introduction

Planning is an indispensable activity that we all must do. Without doubt, some individuals are better at planning than others. Then, on the other hand, some people are more successful than others which may be because they are better planners. Even to be here participating in this training course required some planning. Such things as who would fill in at your work during your absence, where the funding was coming from, when you would leave, and maybe who would take care of your family while you are away are examples of routine activities that had to be planned.

What is planning? Is planning something we all do without giving much consideration to the process involved? Webster's Third New International Dictionary defines planning as "to devise procedures or regulations for in accordance with a comprehensive plan for achieving a given objective" or "a method of achieving something" or "an orderly arrangement of parts in terms of an overall design or objective."

Written Plan

It is not necessary to write out and analyze every little plan that we carry out. Some plans are so simple and routine that they can be formulated in our minds. For example, you have two loads of different fertilizers to deliver to the warehouse. Should you take the urea before the DAP or should you eat your lunch before starting the delivery are simple decisions in an overall plan that will not require a written plan. The alternatives are so limited that an analysis of each can be made in the mind and an appropriate action can be decided upon.

The break-even point for written plans versus simple planning seems to be when significant amounts of time and money are involved. A written plan identifies and records the desired objective and possible actions that may be necessary to accomplish the objective. This allows the manager time to reflect on the actions and equate them with available time, resources, costs, and priorities. The written plan can be set aside and taken up again for analysis without a loss in the issues to be decided. Additional staff can be requested to review the plan and possible actions. Everyone will be considering the same factors. A written plan aids in communicating and leaves less room for misinterpretation. By writing down possible courses of action based on an analysis of the facts and issues at hand, there is less possibility of leaving out some important activity.

A National Agrochemical Subsector Plan

The purpose of this paper is to discuss an agrochemical marketing plan, but before doing so, the importance of a national agrochemical subsector plan needs to be addressed since the marketing plan should impact the objectives of the subsector plan.

Every developing country should have a detailed written plan for developing its agrochemical subsector. The plan should be an action schedule of events designed to produce desired results. As government staff and administration change, the new people can continue to work the plan toward completion. It takes several years to develop an efficient and effective agrochemical subsector. Once a plan has been established and set in motion it is important to have continuity in carrying the plan out to completion. A good plan that is in harmony with a country's strategy of self-sufficiency in food production through the most cost-effective manner does not necessarily have to change with the new administration. Many countries attempt 5-year plans. Generally this is not adequate time to develop an efficient agrochemical subsector. A plan covering a period of 10-15 years is normally required.

In many developing countries agriculture is a major contribution to the GNP and provides a livelihood to a high percentage of the labor force. Since agrochemicals are a major contributor to increasing yields, a national plan seems essential. There are some 11 components of an effective agrochemical subsector.

1. A basic agricultural research program.
2. A research program to develop indigenous materials.
3. An efficient agrochemical and other essential crop production input marketing systems.
4. An effective agricultural extension system.
5. A structured crop produce marketing system.
6. A program for agricultural personnel development.
7. Infrastructure to assist the agriculture and agrochemical subsectors.
8. An effective agriculture credit program.
9. Complementary support by government and private organizations.
10. Positive government policy.
11. A national plan.

A national agrochemical subsector plan should contain action programs and commitment to the following:

1. Identify national agricultural goals and action plans by time periods required by the

agrochemical subsector in reaching the goals.

2. The country's expectations and strategy for supply and manufacturing.
3. Identify the type agrochemical marketing systems that can best meet the needs of the country.
4. Provisions for the allocation of resources required to carry out the plan.
5. Make plans available to all key participants so roles can be fully understood and executed.
6. Include timeframes for monitoring and evaluating different components of the plan.
7. Establish provisions for taking corrective measures and keeping the plan on the right course.

The Marketing Plan

In discussing a marketing plan one specific agrochemical will be addressed. Since fertilizer marketing is often a problem, fertilizer will be used as an example, however, the principles would apply to other products.

One of the first steps in building a fertilizer marketing organization is to study the potential markets and determine a marketing strategy for servicing the markets. The organizational structure and staffing will be designed to serve the markets in the most cost-effective manner. The next step is the development of an annual fertilizer marketing plan by the marketing manager and the marketing staff. Plans are normally for a 5-year period. Each year, one year is dropped because it is history and another year is added to the plan. The plan should become more realistic with the passage of time since the prior year's experiences can be utilized in adjusting the existing 4 years in the plan and formulating activities for the new year to be added.

Grass Roots Planning

Successful modern fertilizer marketing organizations use the grass roots method of developing an annual marketing plan. That is, plans for marketing are developed from the bottom up and not from the top down. Based on the available information and recommendations from staff, the marketing manager will announce the marketing strategy or concept of operation for the marketing organization. The concept will usually include:

1. Geographical boundaries of the market to be served.
2. The market segments, i.e., small farmers, estates, etc.
3. The channels of distribution and number to be employed, i.e., company-owned stores, wholesalers, independent dealers.
4. The profit objective.
5. The marketing organization structure with staffing to be employed.
6. The financial policy.
7. Target dates for marketing operation.
8. The required sales volumes.
9. Training objectives.
10. The organizational image desired to be established.

These decisions guide the preparation of detailed programs of action which form the marketing plan. It becomes the means of coordinating all activities so they can be used to the best results. It sets out what is to be done by whom, when, and where. It allocates the resources necessary to accomplish the tasks outlined.

The retailer is very much involved in helping to produce the marketing plan for the marketing organization. The marketing organization staff will normally help the retailers formulate their own individual miniplan. The marketing organization will then add the retailer plans together, add their own needs, and decide upon a course of action to satisfy both the retailer network and the marketing organization in servicing the targeted markets.

Plan Outline

The annual marketing plan can be prepared in several different styles and formats. Each functional plan that makes up the annual plan will usually have some nine different subheadings. The following is an outline for guiding preparation of the plans.

1. **Scope of Plan** – Make a statement of how and why this function ties into the objectives of the organization.
2. **Abstract and Analysis of the Information Base** – State the information that pertains to this marketing function within the industry and the market. Identify the fertilizer market, the competition, current products, government policy, and the organization's internal resources, both strengths and weaknesses. Where information is incomplete, state and justify assumptions.
3. **Identify Opportunity Areas** – State what could be done to expand or change the market. Cite new uses for the product, new products, new technology, and changes in farming conditions.
4. **Objectives** – Statements of what are to be done by each marketing function in quantitative terms. State long-range goals as a marketer and the provision of services.
5. **Strategy** – Carefully state the strategy to be employed to reach objectives.
6. **Tactics: Action Schedule** – Set forth specific and detailed action schedules, timetables, key tasks, responsibilities, personnel, and budget needs.
7. **Assumptions** – In planning, certain assumptions are made. The assumption that can impact the plans should be listed.
8. **Appraisal and Control** – Identify a system for reviewing progress toward achieving the objectives. Set dates of review and the individual responsible for the appraisal, control, and revision.
9. **Government Policy** – A statement of governmental policy needed to support fertilizer marketing and use.

A "self-fulfilling" prophecy is that when people are convinced that objectives and goals are worthwhile and attainable, they will find ways of attaining them. People influence the outcome of their organization by attitudes and concerns they adopt, and planning is a method of selling positive attitudes to the marketing organization. Care should be taken to always set attainable goals and objectives.

Marketing Plan Components

The annual fertilizer marketing plan will normally have eight functional component plans:

1. Product.
2. Sales.
3. Promotion.
4. Distribution.
5. Price.
6. Finance.
7. Personnel development.
8. Audit.

When these component plans are combined together and form the annual marketing plans, they create a powerful synergistic effect. The weight or importance assigned to each plan determines the marketing mix. The marketing mix changes over time because farmers will shift to new products and practices.

The key features of each plan are offered as a means in helping to understand the functional aspects and what should be contained in each.

1. Product Plan

The purpose of the product plan is to ensure that the fertilizer marketing system has a good product to meet the farmer's requirements. As mentioned above, products must change to meet the changing demands of agricultural production. The product plan must be based upon research findings and improved practices. For example, the agronomic requirements for crop production at present can be met with the following:

20-10-10

10-30-10 + 5S

6-24-24

0-20-20

10-25-5

18-46-0

Urea

The method for supplying the quantities needed as forecast in the sales plan is determined. The DAP, urea, and 20-10-10, for example, may be imported through stipulated ports while the other products could be blended locally.

The packaging specifications by quantities should be stated. Some quantities may need to be in 50-, 25-, and 10-kg woven polypropylene bags while other quantities may need to be in jute bags. The liner requirements should be given and the methods for closing the bags should be indicated. Marking on the bags should also be indicated. If some quantities of the products are to be imported or supplied in bulk, the handling and shipping requirement should be detailed.

In some countries a part or all of the fertilizer products required may be manufactured locally. The product plan should include quantities to be manufactured by time periods along with any quantities that may need to be imported.

2. Sales Plan

The sales plan establishes sales objectives and action programs for accomplishing the objectives. The plan establishes sales targets for each fertilizer product in each market for the approaching year and the next 4 years. Opportunities for increasing fertilizer sales, i.e., new marketing channels, new crops, additional irrigation, etc., should be highlighted. The sales plan establishes the sales organization and administrative procedures to be followed.

The sales plan should identify the customers to be served and the quantity of fertilizers by products, bagging, and timeframes required. Each retailer should make a sales plan. The marketing organization will consolidate the sales plan for each retailer into one sales plan for the organization. The sales plan must be adjusted to meet the needs of each sales organization.

An example of each component plan is not presented in the Appendix. However, an example of a sales plan is shown in the Appendix. This does not signify that the sales plan is more important than the others. They are all equally important.

3. Promotion Plan

Promotion includes personal selling and educational programs. Personal selling consists of such activities as point-of-sale giveaways, farm visits, talking with farmers, etc. Educational programs include dealer and farmer meetings, demonstration research programs, etc. The promotion plan outlines the promotional strategy for the organization. By necessity it must be tied very closely to the sales plan and marketing strategy of the organization. The plan should include:

a. National advertising plans for radio and newspaper.

b. Gifts such as pencils, calendars, planting guides, and informational booklets.

c. Farmer field days and demonstrations.

d. Fertilizer research to be supported.

e. Dealer demonstrations.
f. Retailer educational meetings for farmers.
g. Crop production contest.
h. Soil testing campaigns.

The objective for each activity by time periods and methods of accomplishing each should be included in the plan. The agronomist, promotion manager, salesmen, and retailers will assist with developing and carrying out the promotional activities.

4. **Distribution Plan**

The distribution plan identifies how the tonnage of fertilizer that is forecast to be sold will move from the supply point (factory, warehouse, port, or where title passes) to the farmer. The plan should achieve a balance between the economics of the operation and such factors as the desired level of service, warehousing, and frequency of handling. The costs are determined and the level of service established in consultation with sales. The plan should include:

a. Warehouse requirements.
b. Modes of transportation to be used.
c. Delivery schedules.
d. Documentation information.
e. Communication techniques with accounting, sales, and supply.
f. In transit control procedures
g. Railway, trucking firms, and ports to be utilized including contracts.

Place utility is added to fertilizer product as they move through the distribution network. Values in the form of profits and crop production are added. Fertilizers left in warehouses and stores and farmers that did not receive a supply for use at planting can be very costly to the marketing organization and to the country.

5. Price Plan

The price plan identifies and recommends the company's terms of sales and needed government action required for fulfilling the objectives. The price plan sets forth the marketing organization's method of determining fertilizer prices as to a fixed return on investment or a cost-plus basis. The organization's response to competitive pricing should be established. The price plan should identify a course of action on donor fertilizers and government fertilizer subsidies to prevent a downturn in the growth of the fertilizer subsector generally and the marketing organization specifically. The price plan should be closely linked to the finance plan. The price plan should contain the following information:

a. Current importing and manufacturing costs by product.
b. Fertilizer subsidies (if any).
c. Desired versus actual return on investment.
d. Donor fertilizer price effects.
e. Elasticity of demand.
f. Crop prices and markets.
g. Inventory policies.
h. Finance, distribution, transportation, and sales costs.
i. Company policies on how prices are set, how often they are changed, and who has this authority?
j. Discounts for off-season, volume, etc.
k. Projected prices by product.

6. Finance Plan

The finance and price plans are interrelated because each affects the other one substantially. Working capital costs money. If the collection of fertilizer sales is not timely, the cost for working capital can be extended. The cost of capital can be minimized by utilizing low interest loans and the time period the capital is needed. Large carryover of fertilizer stocks from one season to the next can also be costly. The finance plan should outline those things necessary to keep finance costs to a minimum and should include:

a. Sources of funds.
b. Interests rates.
c. Procedures for obtaining funds.
d. Terms of purchases and sales.
e. Payment collection procedures.
f. Repayment schedules.
g. Capital required by timeframe, product, zones, or territories.
h. Accounting, allocation, and audit procedures to be used.
i. Inventory policies and projections.
j. Financing costs for budgeting.

7. Personnel Development Plan

The marketing organization will only be as good as the people employed and developed to operate it. Management should select the best possible candidate for each position and develop them to their full capacity. The function of training is to develop each staff member of the marketing organization to their highest level of performance. Too often staff members are brought into a fertilizer marketing organization because of family connections, etc. This should not be the case. The best person for a job should always be selected. This policy pays dividends in the long run. The purpose of the personnel development plan is to identify training requirements in a career development framework. The plan should be developed in conjunction with the training officer, agronomist, salesmen, and the manager of departments. The plan should include the following information:

a. Establish organizational policy for staff selection and training.
b. Identify orientation training programs for new staff including retailers by time periods.

c. Identify longer term training programs by time periods and subjects, i.e., accounting, salesmanship, agronomy, required for staff members.

d. Establish dealer meetings to be conducted by time periods and subjects.

e. Identify self-development programs for individuals as needed.

f. Schedule the preparation of educational materials that are needed for training.

g. Establish a monitoring procedure for determining the effectiveness of training programs.

8. **Audit Plan**

The marketing organizations must have established procedures to ensure quality control and ensure honesty and integrity at all levels. Any chance for fraud or theft must be eliminated. The plan should establish controls and information on the following:

a. A procedure for safeguarding assets.

b. Provide checks to ensure that quantities produced, imported, sold, and inventoried account for all products.

c. Measure and verify performance.

d. Monitor planning and forecasting operations.

e. Define authority limits.

f. Maintain proper accounting techniques and standards.

g. Ensure a high-quality unadulterated product and correct weight.

h. Establish procedures for handling cash.

i. Ensure that debts are paid and revenues collected on a timely basis.

j. Ensure that all responsible employees understand the monitoring and audit plan.

Executive Summary

Many times an executive summary of the marketing plan may be advantageous. It can also be harmful in some instances because management that should know the plan in detail never gets around to studying it as they should in order to have a complete picture of fertilizer marketing.

The executive summary is an abbreviated edition of the fertilizer marketing plan. It should be designed for senior staff who need to have a quick understanding of the plan or need to have a ready reference from time to time.

The executive summary should highlight and summarize the important issues in the marketing plan. It provides the important issues but not the details. Normally, the executive summary should not be more than 5-10 pages.

Appendix

Example of a Sales Plan

I. Scope of Plan

The purpose of this is to specific targets for each product in each market for the coming year and to forecast sales for the next 4-year period.

II. Abstract and Analysis of Information Base

A. Sales by product during current year or year just concluded ('000 tons).

Product	Total	North	South
Urea, 45-0-0	62.2	42.2	20.0
Ammonium sulfate, 21-0-0	8.1	2.1	6.0
TSP, 0-46-0	92.8	54.1	39.2
Potassium sulfate, 0-0-50	26.2	12.0	14.2
15-15-15	2.1	1.5	0.6
TOTAL	191.9	111.9	80.0

B. The fertilizer market is increasing at 10%/year. The organization's current share is 15.2%.

C. Estimate the total tonnage of products sold in the country or region served.

D. The fertilizer is used on the following crops:

Crop	Percentage of Annual Total
Rice	62
Corn - beans - vegetables	15
Estate crops	23

E. Establish where supplies in excess of plant or supplier capacity can be obtained.

F. Our competitive situation is: (fill in blanks)

Competitor	Plant Location	Market Share	Estimated Tonnage
1. Grow More Ltd.	Nakuru	5%	5,000
2. TDY Company	Nairobi	3%	7,500
3. ____________	____________	____________	____________
4. ____________	____________	____________	____________

5. Other factors concerning competition are:
   a. Co-op selling 20-20-0 below cost.

   ____

   b. ____

   ____

   c. ____

   ____

6. Assumptions: (Planners should make assumptions in a clear, simple statement and obtain approval for them from the supervisor. Some examples are cited.)
   a. A field representative can call on an average of 30 dealers.
   b. The average dealer will sell 200 tons of products during the year.
   c. Urea is more profitable to the organization than ammonium sulfate, and P_2O_5 is more profitable in mixed goods than in TSP.
   d. Manufacturing capacity can reach 38,711 tons of N, 19,267 tons of P.
   e. Sales will be for cash at point of delivery.
   f. Two (2) demonstrations with 1 field day for each will be sponsored by the retailer.

   ____

   g. ____

   ____

   ____

7. Describe NPK company's resources, capabilities, and weaknesses. (Write in two or more short sentences.)

III. **Opportunity Areas for NPK Company Sales** (Examples could be:)

A. Diversify market to solicit business in new areas by the establishment of 50-plus independent dealers to serve the vegetable and flower producers.

B. Develop a separate sales system to reach the estate market directly.

C. Implement an agronomically oriented sales-support program through retailers to ensure movement to farmers.

D. (fill in others) ______________________________

____

E. ______________________________

____

IV. **Objectives and Strategy**

A. (Complete the blanks in the table below using your best judgment and information obtainable.)

Product Sales Forecast ('000 tons)

Product	Example This Coming Year (1)	2nd Year Hence	3rd Year Hence	4th Year Hence	5th Year Hence
Urea	75.2	____	____	____	____
Ammonium sulfate	8.3	____	____	____	____
TSP	44.8	____	____	____	____
Potassium sulfate	32.7	____	____	____	____
Muriate of potash	49.0	____	____	____	____
15-15-15	20.0	____	____	____	____
16-20-0	10.0	____	____	____	____
TOTAL	240.0	____	____	____	____

B. Define NPK and straight material marketing approach and strategy.

V. **Action Schedule** (Some Examples)

	Action	Person Responsible	Completion Date
A.	Training field representatives	Hy Rater – (Training Manager)	November 1
B.	Dealer selection	Dean Master – (Marketing Manager and Salesman)	December 15
C.	Dealer training initiated	Hy Rater (Training Manager)	January 5
D.	Dealer identification	Albert Falusi – (Salesman and Promotion Manager)	February 10
E.	Assist dealer with demonstrations	John Doe (Agronomist and Salesman)	March 1
F.	Farmer educational meetings	John Doe (Agronomist and Salesman)	April 1

G. (Note: Planner should add any actions that involve special effort by field sales force. Check with other marketing functions.)

H.	______	______	______
I.	______	______	______

VI. **Appraisal and Control**

A. Performance of each individual will be evaluated. Salary adjustment and bonus will be given as needed.

B. Monthly reports of progress will be summarized by salesmen and/or forwarded to managers of sales, marketing services, and distribution managers.

VII. **Pricing**

A graph of pricing history and projections should be made here.

(Note: Any other information relating to pricing can be presented here, as the sales planner may elect.)

VIII. **Future Action Programs** (Examples of Type Questions to Answer)

A. How many dealers will be needed next year? ____________________

B. How many new field representatives or salesmen will be needed to service new dealers added?

____

C. How many end users (customers) will be served in the system?

____

D. Will satellite stores or truck sales in day markets be required and, if so, where and how many ____________________

E. How many sales campaigns should be mounted? ____________________

____

F. New criteria to be used for dealers' selection in the future include:

1. ____________________
2. ____________________
3. ____________________
4. ____________________

G. New items to be included in a dealer agreement (contract) are?

1. ____________________
2. ____________________
3. ____________________
4. ____________________

H. An early season discount program to take advantage of the farmer's storage is needed. The following program is recommended for Year 2 from now.

____

____

____

____

I. What government policy is needed to support increased fertilizer consumption?

____

____

____

Module F: Conclusion

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Summary Report

Workshop on

Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994

Bamenda, Cameroon

Project Number	631-0063
Contract Number	631-0463-C-00-4534-00
PIO/T Number	631-0063-3-70153

Organized by

International Fertilizer Development Center
Muscle Shoals, Alabama 35662, U.S.A.

Sponsored by

The Fertilizer Sub-Sector Reform Program
(Technical Supervisory Committee and USAID/Cameroon)

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SUMMARY REPORT

Workshop on

Efficient Marketing of Fertilizers in Cameroon

Bamenda
March 28-April 8, 1994

INTRODUCTION

The Fertilizer Sub-Sector Reform Program (FSSRP) has introduced many reforms in the fertilizer sector. The reforms have led to liberalization in fertilizer imports and to improvements in fertilizer distribution through privatization and brought in elements of competition. It is important that the improvements are sustained and enhanced. This can be achieved by making available for the fertilizer sector a cadre of well-trained, motivated and dedicated, private-sector entrepreneurs. To develop this cadre, IFDC, on behalf of USAID-Cameroon, designed, developed, and conducted a 2-week in-country workshop on "Efficient Marketing of Fertilizers in Cameroon."

OBJECTIVE

The workshop aimed at strengthening selected business skills of private-sector entrepreneurs in Cameroon's fertilizer sector. In the near term, training would facilitate operations at all levels of the marketing activities in Cameroon; and in looking ahead, the training would increase the likelihood that reforms achieved to date under the FSSRP will take hold and be sustainable.

LOCATION AND DATES

The workshop was held March 28-April 8, 1994, in Ayaba Hotel, Bamenda, North West Province. This location was ideal as Bamenda is situated in the fertilizer consuming area; thus it provided an opportunity for field trips in the coffee and cocoa growing areas.

INAUGURATION

The workshop was inaugurated by the Honorable Mr. Daway Rou, Secretary of State for Agriculture, Government of Cameroon, in the absence of the Honorable Minister for Agriculture, Mr. S. Njinyam. Present at the opening was Mr. Alinga Ateba Innocent, Secretary General, Ministry of Plan and Regional Development and Chairman of FSSRP Technical Supervisory Committee, and other distinguished invitees.

CONTENTS

The workshop dealt with subject matter in 6 modules. These covered key aspects of fertilizer marketing, agronomy, management and communication, fertilizer use and promotion, pricing, privatization, and doing business in open and free markets. The modules and coverage under each module follow:

Module A: Introduction
Registration; Inauguration; Program Description; Introduction; Baseline Exercise, IFDC Story

Module B: Cameroon Agricultural Sector
Agriculture in Cameroon; Global Fertilizer Use Perspectives; Fertilizer Use Data in Cameroon; Cameroon Fertilizer Sub-Sector Overview; Subsidized/Small Farmer--FSSRP; SODECOTON--PSIE; Modern Agricultural Sector; Cameroon's Agri-Input Markets; The FSSRP Technical Support Unit and New Agriculture Policy

Module C: Fertilizer - Technical Aspects
Essential Nutrients and Their Role in Crop Production; Fertilizer Products and the Product Decision; Developing A Soil Testing Program; Economics of Fertilizer Use; Price Policy Analysis/Fertilizer; Fertilizer Quality Control and Regulations; Response Database Presentation

Module D: Fertilizer Marketing
"What is Marketing?"; Introduction to Marketing Fertilizer; Fertilizer Marketing Channels in Cameroon; Fertilizer Marketing in Cameroon; Market Information Sources for Fertilizer; Fertilizer Procurement; Fertilizer Pricing; Fertilizer Packaging; Fertilizer Storage; Fertilizer Transportation; Fertilizer Bulk Blending and Bagging; The Fertilizer Marketing Plan; Consumer Identification and Buyer Behavior; Fertilizer Promotion Programs; Demand Forecasting Techniques; Dealer Selection and Development; Role of Credit in Fertilizer Marketing; Presentations on Case Study, "Reaching the Small Farmer," and participants presentations on their respective organizations.

Module E: Business Management Skills
Developing a Fertilizer Dealers Association; Effective Communication in Fertilizer Marketing; "What Managers Do"; "Work Smarter, Not Harder"; Financial Management and Analysis; Financing of Fertilizer Importation and Distribution

Module F: Conclusion
Program Summary; Followup Exercise/Program Evaluation; Closing Ceremony; Individual Meetings with Faculty

DAILY PROGRAM SCHEDULE

The daily program schedule listing dates, time, title of presentations with briefs on each, and responsibility is given in Appendix 1. A total of 50 training activities was conducted.

FACULTY

The core faculty consisted of 5 IFDC specialists and a regional consultant who were primarily responsible for the conduct of the workshop. These specialists and the consultant were:

1. Mr. Ram S. Giroti, Coordinator, Human Resource Development (Workshop Coordinator).
2. Mr. T. Alan Nix, Production/Marketing Specialist, Outreach Division.
3. Mr. Souleymane Diouf, Marketing Specialist, IFDC-Africa Division, Togo.
4. Mr. Henny G.M. Gerner, Economics/Data Base Manager Scientist, IFDC-Africa Division, Togo.
5. Mr. Pim Volkert, Agricultural Economist and Associate Expert, IFDC-Africa Division, Togo.
6. Mr. Ian J. Scarr, Technical Director, Fertilizers and Chemicals Ltd., Kaduna, Nigeria.

The above faculty was supplemented by speakers from FSSRP, Cameroon fertilizer sector, and Cameroon's Ministries of Agriculture and Plan and Regional Development.

A list of faculty is given in Appendix 2.

PARTICIPANTS

Forty-two participants from the fertilizer sector of Cameroon attended. The participants were drawn from the following organizations.

1. Private commercial banks
2. Fertilizer importers
3. Fertilizer distributors
4. Cooperative organizations
5. Ministry of Agriculture
6. Ministry of Plan and Regional Development

The participants were experienced professionals and were highly motivated with a strong interest to learn new ideas. The FSSRP Technical Supervisory Committee (TSC) selected highly qualified and motivated participants. The list of participants is attached as Appendix 3.

FIELD TRIPS

To supplement the classroom discussions and to provide participants with firsthand information on the agriculture and fertilizer sectors, two field trips were organized on March 30 and April 1, 1994.

On March 30, participants visited The Farmers House, a fertilizer retailer. Here the participants saw a one-stop center where all the needs of farmers for fertilizers, seeds, agricultural chemicals, and advice are available. Participants visited the North West Cooperative Association (NWCA) in Bamenda where they observed the unloading of fertilizer bags from trucks and general warehousing practices. This field trip also included a visit to the NWCA coffee processing plant at Santa Union. The Chairman and Manager of this cooperative plant were on hand to brief the participants on the operations.

The field trip on April 1, 1994, took the participants to the Soil Testing Laboratory at the University of Dschang; and a visit was also made on this day to PROLEG, a free trade zone where green peas are grown for export. The participants were taken to the Foumbot Market where they saw small retailers selling fertilizer in 50-kg bags and in small quantities. The retailers which the participants visited were L Maison der Plantuer and Protecton des Soles et Vegetoux.

METHODOLOGY

Participants were quite attentive throughout the training period. Their active participation and interaction enhanced the learning process. Lectures, case studies, panel discussions, and group discussions techniques were employed for best results. An environment in which the maximum level of learning took place was created. Slides and overheads were used for quick and easy grasp of the subject matter of each presentation. Videos on management, communications, financial management, bulk blending, and customer service was used.

PARTICIPANT PRESENTATIONS

Participants were given an opportunity to make presentations on their respective organization and operations. In all, presentations were made on 17 organizations. These presentations offered an opportunity for the participants to exchange information and develop business contacts among the group. This proved to be useful as the workshop was the first opportunity for the professionals and entrepreneurs to come together at one place.

CASE STUDY AND PANEL DISCUSSION

A case study on "How to Reach the Small Farmer" was conducted as a means to encourage interaction among the participants. For discussion of the case study, the group was divided into 4 subgroups for problem solving and case presentations. The case study also offered participants an opportunity to use the knowledge and skills learned during the program. The case study dealt with all aspects of fertilizer marketing in which each group had to make decisions on promotion, credit, and service to the farmers. A panel discussion on the role of credit in fertilizer marketing was organized in which constraints to flow of credit for distributors and farmers was discussed.

LANGUAGE

The primary language of instruction was English. However, simultaneous interpretation in English and French was provided throughout the program duration.

TRAINING MATERIALS

IFDC provided 50 copies of each presentation made by its specialists at the workshop together with copies of three publications: *The Fertilizer Handbook* published by the Fertilizer Institute of the U.S.A., *Farm Servicing Handbook* and *World Fertilizer Market Information Sources* published by IFDC.

Also, training materials consisting of program booklet, pens, writing pads, notebooks, hats, tote bags, and leather portfolios were provided. Copies of presentations of Cameroon speakers were made available to participants. The materials provided to participants are valuable references for their work.

FORMATION OF A FERTILIZER ASSOCIATION

As a result of the discussions which followed IFDC's presentation on "Developing a Fertilizer Dealer Association," participants initiated a move to form an association. A small group was formed to work out the details of the association.

COORDINATION

Mr. Daniel C. Moore, Program Coordinator, FSSRP, was the prime contact for the workshop. Mr. Moore was assisted by Mr. Richard Molu, Technical Coordinator, FSSRP, who was present throughout the program and Mr. Felix Nkonabang, Administrative Coordinator, FSSRP. Mr. Rostand Longang of USAID was present in the first week and Mr. Amin Pakzad of USAID was present in the second week to render assistance during the program.

FSSRP provided secretarial staff which handled logistics in assisting participants with accommodations and photocopying of presentation papers.

CONCLUDING SESSION

The concluding session consisting of an evaluation of the workshop, participants' recommendations, and certificate distribution was held on April 8.

PROGRAM EVALUATION

Evaluation formed an integral part of the workshop. The feedback on various aspects of the program was obtained from the participants through an evaluation form. The program received an overall rating of 4.424 corresponding to very good to excellent on a scale of 1 to 5 (1 being poor and 5 excellent).

PARTICIPANTS' RECOMMENDATIONS

Also during the closing session, Mr. Nwatchok à Yakan, a participant from Societe Nationale Des Hydrocarbures (SNH), thanked, on behalf of all participants, the Government of Cameroon, USAID, and IFDC for organizing and implementing the workshop and expressed that similar programs should be organized regularly. In particular, he made the following recommendations on behalf of the participants.

1. Improvement of the fiscal/customs requirement related to fertilizer importation. More specifically, the elimination of the 5% taxes on fertilizer importation.
2. The organization of agricultural products markets and the elimination of various constraints affecting agricultural marketing. This will improve farmers' revenues and help in increasing fertilizer use.
3. The creation of bulk blending facilities and even the local production of fertilizer.
4. The creation of an enabling environment that will facilitate the use of a credit line at the disposal of distributor in the FSSRP.
5. The continuity of activities of the Technical Support Unit and its development.
6. The creation of a Fertilizer Dealer Association which will help in harmonizing policies in the sub-sector.

A copy of the participants' remarks is given in Appendix 4.

CERTIFICATE DISTRIBUTION

Mr. Alinga Atebe Innocent, Chairman of FSSRP Technical Supervisory Committee and Secretary General of the Ministry of Plan and Regional Development, gave certificates to the participants. In his closing address, he echoed the sentiments of the participants in acknowledging the benefits which the participants had derived during the two weeks of the workshop. He thanked USAID and IFDC for the workshop and, in particular, mentioned formation of the Fertilizer Dealer Association.

FOLLOWUP

IFDC will place the names of the participants on its mailing list to receive the IFDC Quarterly Newsletter and brochures of training programs. These will keep the participants informed of IFDC activities.

ACKNOWLEDGMENT

IFDC thanks USAID-Cameroon for allowing IFDC to participate in human capacity building for the Cameroon fertilizer sector. IFDC hopes that the professionals and entrepreneurs trained in the workshop will be able to bring about improvements in the fertilizer sector and will remove constraints to free and open markets in fertilizers. IFDC is pleased at the formation of the Association as a result of tne workshop. The assistance given by Mr. Daniel Moore, Mr. Richard Molu, and Mr. Felix Nkonabang is greatly appreciated.

Appendix 1

Workshop on

Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994

Bamenda, Cameroon

Serial Number	Activity Number	Time	Activity	Responsibility
			Monday, March 28, 1994	
			Module A: Introduction	
1	A1	0830	**Registration**	R. S. Giroti IFDC
2	A2	0900	**Inauguration** Official opening. Welcome speech to participants.	S. Njinyam Minister Ministry of Agriculture
		0930	**Break**	
3	A3	1000	**Program Description, Participant Introductions, and Baseline Exercise** An overview of program objectives and activities. Participant introductions. Opportunity for participants to obtain an indication of their knowledge of fertilizer marketing and use through an IFDC test exercise.	R. S. Giroti/ T. A. Nix IFDC
4	A4	1130	IFDC Story An overview of IFDC, including a summary of program activities, staffing, funding, physical facilities, etc. with focus on IFDC-Africa.	R. S. Giroti/ H.G.M. Gerner IFDC
		1200	Lunch	

Serial Number	Activity Number	Time	Activity	Responsibility
			Monday, March 28, 1994 (Continued)	
			Module B: Cameroon Agricultural Sector	
5	B1	1300	**Agriculture in Cameroon** An overview of the agricultural sector in Cameroon, including policy, production, marketing, and outlook.	B. Nami Ingénieur Général d'Agriculture H.C. Director Department of Agriculture Ministry of Agriculture F. Nkonabang Ingénieur Agro-Planificateur Sub-Director Sub-Department of Agricultural Production Administrative Coordinator FSSRP Technical Support Unit Department of Agriculture Ministry of Agriculture
6	B2	1400	**Global Fertilizer Use Perspectives** Perspectives on world fertilizer production and consumption. Africa and Cameroon's place therein.	H.G.M. Gerner
		1430	Break	
7	B3	1500	**Fertilizer Use Data in Cameroon** Presentation of time-series farm- and macro-level data on fertilizer use in Cameroon. Distribution of reports.	B. Tarounga Statistician AEERD
8	B4	1615	**Cameroon Fertilizer Sub-Sector Overview** Breakdown and overview of sub-sectoral breakdown of Cameroon's fertilizer sector.	R. Molu Ingénieur Agro-Pedologue Technical Coordinator FSSRP Technical Support Unit Department of Agriculture Ministry of Agriculture
		1645	Adjourn	

Serial Number	Activity Number	Time	Activity	Responsibility
			Tuesday, March 29, 1994 **Module B: Cameroon Agricultural Sector** (Continued)	
9	B5	0830	**Subsidized/Small Farmer–FSSRP** Overview of the FSSRP program: Characteristics and results, including discussion on the role of the subsidy.	F. Nkonabang
		1000	**Break**	
10	B6	1030	**SODECOTON–PSIE** Overview of the PSIE program: Characteristics and results.	D. F. Siméon Economist/Statistician Ministry of Plan and Regional Development
		1200	**Lunch**	
11	B7	1300	**Modern Agricultural Sector** Series of brief, 20-minute presentations by representatives of Cameroon's plantation sector.	Representatives of Modern Agricultural Sector
		1445	**Break**	
12	B8	1500	**Cameroon's Agri-Input Markets** Overview of seeds and pesticide sectors in Cameroon.	J. Elang Deputy Director Department of Agriculture Mr. Djongue Sub-Director Sub-Department of Plant Protection Department of Agriculture
13	B9	1600	**The FSSRP Technical Support Unit** Presentation of the GRC's Fertilizer Information Unit, its role and functions.	R. Molu
		1630	**Adjourn**	

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Serial Number	Activity Number	Time	Activity	Responsibility
			Wednesday, March 30, 1994	
			Module C: Fertilizer–Technical Aspects	
14	C1	0830	**Essential Nutrients and Their Role in Crop Production** The essential nutrients (including micronutrients) needed for crop production are discussed. Nutrient deficiency symptoms in crops are identified and the need for a balanced fertilization program in sustaining good yields is discussed.	F. Meppe Soils/Systems Agronomist Institute of Agricultural Research Ministry of Scientific and Technical Research
15	C2	0930	**Fertilizer Products and the Product Decision** Physical and chemical specifications of fertilizer materials are discussed. Recent trends in nitrogen, phosphate, and potash fertilizers are examined.	T. A. Nix
		1030	**Break**	
16	C3	1045	**Developing a Soil Testing Program** A discussion of the use of soil tests to assess fertilizer needs. Methods of assessing soil nutrients, estimating nutrient needs to satisfy yield targets, and determining expected nutrient uptake efficiency are examined. Fertilizer use and soil pH relationships are discussed. Customer service is emphasized. Availability of soil testing in Cameroon.	M. Doube Chief Soil Science Department University of Dschang
		1200	**Lunch**	
17	C4	1300	**Field Trip: North West Province** 1. Fertilizer Retailer: The Farmers House 2. Fertilizer Storage: NWCA–Nkwen Rural Development Center 3. Fertilizer Stockist: Akum Farm Services Center 4. Coffee Processing: NWCA, Santa Union	Provincial Delegation of Agriculture North West Province
		1630	**Adjourn**	

Thursday, March 31, 1994

Module C: Fertilizer-Technical Aspects
(Continued)

Serial Number	Activity Number	Time	Activity	Responsibility
18	C5	0830	**Economics of Fertilizer Use** The profitability of fertilizer use is discussed. The most commonly used indicators of the profitability of fertilizer are examined. Data for Cameroon are presented.	F. Kamajou Dean, Faculty of Economics and Management University of Dschang and H.G.M. Gerner
19	C6	0930	**Price Policy Analysis/Fertilizer** Data from a UCD study sponsored by the FSSRP are presented by the investigator for discussion.	F. Kamajou
		1015	Break	
19a		1030	**Devaluation and Fertilizer Use** A brief examination and discussion of the effects of the recent devaluation of the FCFA on fertilizer use and crop production in Cameroon.	R. Longang Economist Office of Economic Analysis and Policy Reform Implementation, USAID
20	C7	1100	**Fertilizer Quality Control and Regulations** Discussion of the importance of quality control and fertilizer legislation in fertilizer sector development.	S. Diouf, IFDC/ Representative of Société Générale de Surveillance
		1200	Lunch	
21	C9	1300	**Response Database Presentation** Presentation of the IFDC-Africa fertilizer data base.	R. Molu/H.G.M. Gerner

Module D: Fertilizer Marketing

Serial Number	Activity Number	Time	Activity	Responsibility
22	D1	1415	**What is Marketing?** Film/discussion on the evolution of marketing.	T. A. Nix
		1500	Break	
23	D2	1530	**Introduction to Marketing Fertilizer** Marketing is defined and the marketing functions required at the macro/micro-levels are discussed. Examination of major decisions confronting marketing managers to match resources of organization with needs and opportunities in their markets.	H.G.M. Gerner
		1630	Adjourn	

Serial Number	Activity Number	Time	Activity	Responsibility
			Friday, April 1, 1994	
24	C8	0830	**Field Trip: West Province** 1. Fertilizer Stockists: Foumbot Market 2. Modern Agricultural Sector: PROLEG 3. Coffee Plantation: COOPAGRO 4. Soils Testing: UCD	Provincial Delegation of Agriculture, West Province
			Saturday, April 2, 1994	
			Rest	
			Sunday, April 3, 1994	
			Rest	

Serial Number	Activity Number	Time	Activity	Responsibility
			Monday, April 4	
			Module D: Fertilizer Marketing (Continued)	
25	D3	0830	**Fertilizer Marketing Channels in Cameroon** As a lead-in to participant presentations, an overview of Cameroon's fertilizer marketing channels is presented.	R. Molu
26	D3	0845	**Fertilizer Marketing in Cameroon** Participants from each company make 10-minute presentations including company profile, their role within the company, and the company's fertilizer marketing system and/or strategy. For commercial banks, their bank's perspectives on financing fertilizer importation and distribution are presented.	Participants/IFDC
		1000	**Break**	
	D3	1030	**Fertilizer Marketing in Cameroon** (Continued)	Participants/IFDC
		1200	**Lunch**	
	D3	1300	**Fertilizer Marketing in Cameroon** (Continued)	Participants/IFDC
27	D4	1530	**Market Information Sources for Fertilizers** The importance of accurate and timely market information to support fertilizer business decision-making is discussed. The availability of market information from various sources is discussed.	P. Volkert IFDC
		1630	**Adjourn**	

Serial Number	Activity Number	Time	Activity	Responsibility
			Tuesday, April 5	
			Module D: Fertilizer Marketing (Continued)	
28	D5	0830	**Fertilizer Procurement** Key factors involved in efficient fertilizer procurement are outlined, with focus on market intelligence, procurement techniques, financing considerations, cargo inspection, etc.	S. Diouf
		0945	Break	
29	D6	1000	**Fertilizer Pricing** Fertilizer pricing practices are discussed. A recommended approach to pricing in a market-based economy is presented.	S. Diouf
30	D7	1100	**Fertilizer Packaging** The principal considerations in fertilizer packaging are discussed. Bag specifications, method of closure, and handling and storage considerations are examined.	T. A. Nix
		1200	Lunch	
31	D8	1300	**Fertilizer Storage** The principals of fertilizer storage are discussed, including facility location, warehouse size, inventory control, and technical considerations.	I.J. Scarr Fertilizers & Chemicals, Ltd. Nigeria
		1400	Break	
32	D10	1430	**Fertilizer Bulk Blending and Bagging** The characteristics of fertilizer bulk blending and bagging facilities, and their role in product flexibility and price. An examination of bulk blending and bagging potential for Cameroon.	I. J. Scarr
		1630	Adjourn	

Serial Number	Activity Number	Time	Activity	Responsibility
			Wednesday, April 6	
			Module D: Fertilizer Marketing (Continued)	
33	D14	0830	**Demand Forecasting Techniques** A discussion of fertilizer demand forecasting techniques.	P. Volkert
		0930	**Break**	
34	D15	1000	**Dealer Selection and Development** The role of the fertilizer (and agri-inputs) dealer is reviewed. The dealer selection and development process is discussed.	S. Diouf
35	D13	1100	**Fertilizer Promotion Programs** The importance of promotion in fertilizer marketing is discussed, with emphasis on farmer meetings, fertilizer demonstrations, production contests, promotional literature, and radio advertising. Examples from Cameroon are presented. Group assignment: Develop a cost-effective fertilizer promotion campaign for a target market in Cameroon.	S. Diouf
		1200	**Lunch**	
36	D16	1300	**The Role of Credit in Fertilizer Marketing** The role of farm-level credit in fertilizers marketing is discussed. Types of credit arrangements are presented, with examples from Cameroon.	Representative of Cameroon Cooperative Credit Union League (CamCCUL)
		1400	**Break**	
37	D17	1430	**Group Presentations** Work groups present their marketing projects.	R. S. Giroti/ T. A. Nix
		1630	**Adjourn**	

Serial Number	Activity Number	Time	Activity	Responsibility
			Thursday, April 7	
			Module D: Fertilizer Marketing (Continued)	
38	D9	0830	**Fertilizer Transportation** The principles of fertilizer transportation are discussed, including technical and efficiency considerations.	T. A. Nix
		0930	Break	
39	D12	1000	**Consumer Identification and Buyer Behavior** A discussion of the techniques used in evaluating buyer behavioral patterns and in identifying target markets for the fertilizer marketing organization. Examples from Cameroon are discussed.	R. S. Giroti
			Module E: Business Management	
40	E1	1100	**Developing a Fertilizer Dealers Association** The potential role and utility of a fertilizer trade association for Cameroon. Guidelines for formation of such an association. Examples from other associations are discussed.	R. S. Giroti/ T. A. Nix
		1200	Lunch	
41	E2	1300	**Effective Communication in Fertilizer Marketing** Effective methods of communication are discussed. Participants will be involved in a "hands-on" exercise.	R. S. Giroti
42	E3	1400	**What Managers Do** A film presentation on the role of the manager in the modern business world.	R. S. Giroti
		1500	Break	
43	E4	1530	**Working Smarter, Not Harder** A film presentation on improving time use efficiency.	R. S. Giroti
44	E5	1600	**Financial Management and Analysis** Techniques of financial management used in business management and planning are discussed.	T. A. Nix
		1700	Adjourn	

Serial Number	Activity Number	Time	Activity	Responsibility
			Friday, April 8	
			Module E: Business Management (Continued)	
45	E6	0830	**Financing of Fertilizer Importation and Distribution** Methods and arrangements of financing fertilizer importation and distribution are discussed, with specific examples drawn from Cameroon.	A. Ngu Account Relationship Manager Standard Chartered Bank Cameroon A. Khan Corporate and Institutional Banking Manager Standard Chartered Bank Cameroon
		0945	**Break**	
46	D11	1015	**The Fertilizer Market Plan** A discussion on the components of a marketing plan.	T. A. Nix
			Module F: Conclusion	
47	F1	1100	**Program Summary**	R. S. Giroti
48	F2		**Followup Exercise/Program Evaluation** Participants are allowed an opportunity to test their post-course knowledge of fertilizer marketing.	R. S. Giroti/ T. A. Nix
49	F3	1230	**Closing Ceremony**	A. A. Innocent Secretary General Ministry of Plan and Regional Development Chairman FSSRP Technical Supervisory Committee
		1300	**Lunch**	
50	F4	1430	**Individual Meetings** Participants and/or IFDC staff may schedule individual meetings to discuss points of interest.	IFDC
		1630	**Program Concludes**	

Appendix 2

WORKSHOP ON EFFICIENT MARKETING OF FEPTILIZERS IN CAMEROON

March 28-April 8, 1994
Bamenda, Cameroon

Speakers/Resource Persons

Mr. Stephen Njinyam
Minister
Ministry of Agriculture
Yaounde
CAMEROON

Mr. Alinga Ateba Innocent
Secretary General
Ministry of Plan and Regional Development
Chairman
FSSRP Technical Supervisory Committee
Yaounde
CAMEROON

Dr. Amit H. Roy
President and Chief Executive Officer
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Muscle Shoals, Alabama 35662 U.S.A.

Mr. Souleymane Diouf
Marketing Specialist
International Fertilizer Development Center-Africa
B.P. 4483
Lomé
TOGO

Mr. S. Njoumgue
Sub-Director
Sub-Department of Plant Protection
Department of Agriculture
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CAMEROON

Dr. Maurice Doube
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Mr. Joseph Elang
Deputy Director
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Mr. Henny G.M. Gerner
Scientist--Economics/Data Base Manager
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Mr. Rostand Longang
Economist
Office of Economic Analysis and Policy Reform Implementation
U.S. Agency for International Development
Yaounde
CAMEROON

Speakers/Resource Persons (Continued)

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Soils/Systems Agronomist
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CAMEROON

Mr. Richard Molu
Ingénieur Agro-Pedologue
Technical Coordinator
FSSRP Technical Support Unit
Department of Agriculture
Ministry of Agriculture
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Mr. Daniel C. Moore, II
Program Coordinator
Fertilizer Sub-Sector Reform Program
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Dr. Benjamin Nami
Ingénieur Général d'Agriculture H.C.
Director
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LISTE DES PARTICIPANTS AU SEMINAIRE

"EFFICIENT MARKETING OF FERTILIZERS IN CAMEROON"

NOMS & PRENOMS	TITRE	SOCIETE	ADRESSE
1. Monsieur ANYE Joseph	Distributeur	Independent distributor	Tél. 42.41.62 BP . 591 Douala
2. Monsieur BANKOUE Dieudonné	Directeur d'Agence	ADER (Bafoussam)	Tél. 44.24.59 49.15.15 BP . 989 Bafoussam
3. Monsieur BATOCK Daniel DIKANDA	Directeur Général Adjoint	AFRICAN TRADING COMPANY	Tél. 43.20.00 43.32.32 BP . 1613 Douala
4. Monsieur BETRU GEBREGZIABHER	Directeur Général	IBEX CAMEORUN	Tél. 43.04.18 BP . 5853 Douala
5. Monsieur BEUNANG	Chef Service Adm. Fin	Coopérative des Planteurs de Melong	BP . 121 Melong
6. Monsieur Dominic ASONGANYI	Marketing officer BMBC Bamenda	MERIDIEN BIAO	Tél. 42.80.11 42.98.05 BP. 4001 Douala
7. Monsieur DOUNTSOP KAFO	Director	Ets DOUNTSOP and Cº	BP. 3481 Douala
8. Monsieur EBOT ABAH	Chargé du Marketing	AFRICAN TRADING COMPANY	Tél. 43.20.00 43.32.32 BP . 1613 Douala
9. Monsieur EL-HADJ MBOHOU M.	Directeur	Ets MBOHOU	Tél. 39.01.45 BP . 9071 Douala
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11. Monsieur FOTSO DOPNA Siméon	Chargé d'Etudes Assistant	(MINPAT) Secrétariat Général	Tél. 23.32.91 Yaoundé
12. Madame Grace N. TIMA	Chief of Section Extension and Training	Provincial Delegation of Agriculture N.W.P Bamenda - Cameroon	Tél. 36.11.29 36.32.39
13. Monsieur Henry NGOMESIA	Trainee	AMITY BANK	Tél. 43.20.55 BP . 2705

NOMS & PRENOMS	TITRE	SOCIETE	ADRESSE
14. Monsieur John AKWAR	Managing Director AKWAR NATIONAL & INT. ENT	Distributeur IBEX (Nord-Ouest)	Tél. 36.17.23 BP . 337 Bamenda
15. Madame Laura STOTZ	Managing Director	The IBE GROUP INC	Tél. 42.61.62 BP . 591 Douala
16. Monsieur MBOU	Directeur	Coopérative Agricole des Planteurs de la Mifi	Tél. 44.12.20 Bafoussam
17. Monsieur MOUMIE MAMA LINDOU		The IBE GROUPE INC	Tél. 42.61.62 BP. 591 Douala
18. Monsieur MUNANG Samuel MUFUA	Chief of service	North West Coop.Association LTD	Tél. 36.12.12 BP. 41 Bamenda
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20. Monsieur NANGA NDY Etienne	Chef de service Com.	GROUP ONE CAMEROON	Tél. 23.42.98 BP. 11 574 Yaoundé
21. Monsieur NDIBEWU Peter PAPOH	Marketing and Technical Development Manager	PELENGET (Farmers House)	Tél. 21.01.72 BP . 597 Yaoundé BP . 178 Bamenda Tél. 36.17.73
22. Monsieur NGALIM WIRBIR	Provincial Delegate	MINPAT (Délégation du N.O)	Tél. 36.13.87 Bamenda
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24. Madame NGUFOR Rosemary	Manager	FARMERS HOUSE	Tél. 36.17.73 36.41.02 BP. 178 Bamenda
25. Monsieur NGUIMKENG François	Directeur T.DS	Distributeur	Tél. 31.74.06 BP . 1222 Yaoundé

NOMS & PRENOMS	TITRE	SOCIETE	ADRESSE
26. Monsieur NGOULAYE	Gérant	Ets NGOULAYE	Tél. 48.24.24 48.22.00 BP . 05 Foumban
27. Monsieur NINTIDEM André	Président Directeur	COOPAMOR MENOUA	Tél. 45.15.08 BP . 107 Dschang
28. Monsieur NWATCHOK A YAKAN	Chef de Service des Etudes Stratégiques	S.N.H.	TéL. 20.19.50 21.04.30 BP. 955 Yaoundé
29. Monsieur NZE KOULY Emmanuel	Chargé d'Etudes	SOGAPE	Tél. 36.16.22 BP . 183 Bamenda
30. Monsieur ONGUENE Alphonse	Cadre Exploitation Responsable du Service des Projets Spécifiques	Crédit Agricole du Cameroun	Tél. 23.23.60 BP. 11801 Yaoundé
31. Monsieur OUSSIL Jean-Marie	A.C Broker	The IBE GROUP INC	Tél. 42.61.62
32. Monsieur SEMA DJOUMBI Lazare	Directeur Général	Union des Coopératives Agricoles du Littoral.	Tél. 49.25.00 BP . 728 Nkongsamba
33. Monsieur SECKE Jean-Claude	Chef Service Etudes et Projets	S.N.H.	Tél. 20.19.10 21.04.30 BP . 955 Yaoundé
34. Monsieur SIMO TEKUE Jean-Marie	Attaché de Direction	Union des Coopératives Agricoles de l'Ouest.	Tél. 44.14.39 BP . 1002 Bafoussam
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37. Madame TERRI BIENG	Assistant to the Managing Director	The IBE GROUP INC	Tél. 42.61.62 BP . 591 Douala

NOMS & PRENOMS	TITRE	SOCIETE	ADRESSE
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39. Monsieur TICHA Nelson ABAM	Distributeur	GROUP ONE CAMEROON	Tél. 23.09.46
40. Monsieur TIEMANI YOUMBI Alphonse	Directeur	CAPEN	Tél. 23.76.20 20.61.10 BP. 7723 Yaoundé
41. Monsieur Yves PEKOKEY			
42. Monsieur ZAMBOU T. Samuel	Chef Service Achat, Transport Approvisionnement A.T.A.	Coopérative Agricole des Planteurs de la Ménoua	Tél. 45.11.25 Fax 45.12.84 BP. 130 Dschang

THE PRESIDENT OF THE TECHNICAL SUPERVISORY COMMITTEE

the participants thank the Government of the Republic of Cameroon for its initiative to organize a workshop on efficient fertilizer marketing in Cameroon. For two weeks, we had the opportunity, in a very excellent environment and coupled with useful materials, to listen to presentation made by high level experts.

Fertilizer marketing, as we finally learnt from this seminar, is a very complex business which require a lot of skills. Hence, the necessity to have a very efficient information collection and dissemination system. Documents handed out during the workshop and exchanges of ideas among participants help them to raise major problems and issues remaining to be solved at the governmental levels. The following represent problems raised during the workshop: (1) the elimination of subsidy that will make it difficult for farmers to use fertilizers; (2) lack of access to credit because of high interest rate and mismanagement of resources; (3) lack of good working relationship between bankers and importers/distributors of fertilizer; (4) the non-use of line of credit at the disposal of distributors; (5) the imminent phase-out of the Technical Support Unit (TSU) of the Fertilizer Sub-Sector Reform Program (FSSRP); (6) the government has tried, within the present economic crisis, to solve some of the problems. We have take them into account in the following recommendations:

- Improvement of the fiscal/customs requirement related to fertilizer importation. More specifically, the elimination of the 5% taxes on fertilizer importation.

- The organization of agricultural products markets and the elimination of various constraints affecting agricultural marketing. This will improve farmers' revenues and help in increasing fertilizer use.

- The creation of bulk blending facilities and even the local production of fertilizer.

- The creation of an enabling environment that will facilitate the use of credit line at the disposal of distributor in the FSSRP.

- The continuity of activities of the TSU and its development.

- The creation of a fertilizer dealer association which will help in harmonizing policies in the sub-sector.

This seminar has been extremely useful. Once again, we truly thank the government, USAID and IFDC, hoping that such initiatives will be replicated in the future.

Done in Bamenda on April 8, 1994

MONSIEUR LE PRESIDENT DU COMITE TECHNIQUE DE SUPERVISION DU PRS

Les participants remercient le gouvernement Camerounais pour l'heureuse initiative qu'il a eue d'organiser le séminaire sur la Commercialisation Efficace des Engrais au Cameroun.

Pendant deux semaines nous avons eu droit, dans de très bonnes conditions matérielles et pédagogiques, à des communications d'excellente qualité présentées par des orateurs d'un haut niveau de compétence.

La commercialisation des engrais, nous nous en sommes finalement rendu compte grâce à ce séminaire est très complexe en ce sens qu'il y a plusieurs composantes dont il faut tenir compte. D'où la nécessité d'un système efficient de collecte, de production et de diffusion de l'information.

L'abondante documentation qui nous a été remise, et les échanges entre participants ont permis d'une part d'évoquer les problèmes pouvant être résolus dans un cadre contractuel arrêté d'accord parties entre les opérateurs et d'autre part d'en relever d'autres qui seraient du domaine de compétence des pouvoirs publics et qui feront l'objet de recommandations.

Parmi les problèmes évoqués :

- La suppression des subventions qui met les instrants agricoles hors de portée des utilisateurs.

- Les difficultés d'accès au crédit dues

  - Aux taux d'intérêts élevés qui n'encouragent pas ce mode de financement;

  - A une gestion approximative des demandeurs qui ne répond pas aux canons en vigueur.

- Le manque de conviviabilité entre les institutions financières et les importateurs/distributeurs d'engrais.

  La non utilisation jusqu'à présent de la ligne de crédit mise en place dans le cadre du PRSSE à la disposition des distributeurs.

- La cessation prochaine des activités de l'unité de soutien technique.

- L'incertitude quant à l'écoulement des produits agricoles qui décourage l'utilisation des engrais.

Les pouvoirs publics nous en sommes conscients essayent de s'acquitter au mieux de leurs obligations dans le contexte difficile de crise économique actuelle en gérant les contraintes imposées par celle-ci. Nous avons essayé autant que faire se peut d'en tenir compte dans nos recommandations qui sont les suivantes.

- L'amélioration des conditions fiscalo-douanières pour les importateurs/distributeurs d'engrais notamment la suppression de la taxe de 5 % à l'importation.

- L'organisation du marché des produits agricoles et la suppression des entraves de toute nature qui permettront d'accroître les revenus des agriculteurs et encourageront la consommation des engrais.

- L'incitation à l'installation sur le territoire national d'une unité de mélange et pourquoi pas de production d'engrais.

- La création de conditions propices à l'utilisation pour les distributeurs de la ligne de crédit mise en place dans le cadre du PRSSE.

- La nécessité du maintien et du développement des activités de l'unité de soutient technique qui devra améliorer son système de diffusion de l'information.

- La création d'une association des opérateurs économiques de la filière engrais qui serait un cadre de concertation et d'harmonisation des stratégies de commercialisation rendues aujourd'hui nécessaires.

Enfin nous ne le dirons jamais assez, ce séminaire nous a été d'un grand apport. Nous remercions une fois de plus le Gouvernement, l'USAID et l'IFDC tout en émettant le voeu que cette initiative soit sans cesse renouvelée.

Fait à Bamenda, le 08/4/1994

Put Your Name if You Wish

International Fertilizer Development Center

Program Evaluation Form

Workshop on
Efficient Marketing of Fertilizers in Cameroon

March 28-April 8, 1994
Bamenda, Cameroon

In seeking to improve IFDC's program activities, we rely on your feedback. Complete and sincere answers are appreciated.

I. Technical and administrative aspects of this program (place an "x" on the line opposite each item under one of the numbers)

A. Technical Aspects

Item	1 Poor (P)	2 Fair (F)	3 Good (G)	4 Very Good (VG)	5 Excellent (E)
Achievement of objectives					
Individual consultation with the participants					
Individual consultation with speakers					
Knowledge gained from program					

B. Administrative Aspects

Item	1 Poor (P)	2 Fair (F)	3 Good (G)	4 Very Good (VG)	5 Excellent (E)
Length of daily schedule					
Planning of activities					
Length of program					
Amount of free time					

C. Methodology

Item	1 Poor (P)	2 Fair (F)	3 Good (G)	4 Very Good (VG)	5 Excellent (E)
Presentation/discussion					
Case studies					
Depth of information (elementary-advanced)					
Value of reference material					
Quality of discussions					

D. Program Structure Design

Item	1 Poor (P)	2 Fair (F)	3 Good (G)	4 Very Good (VG)	5 Excellent (E)
Contents in general					
Marketing factors					
Fertilizer background and product knowledge					
Fertilizer distribution and promotion					
Pricing					
Demand forecasting					
Marketing management					
Agronomics					

E. Physical Factors Related to Program Location

Item	1 Poor (P)	2 Fair (F)	3 Good (G)	4 Very Good (VG)	5 Excellent (E)
Physical arrangements of training facilities					
Quality of living arrangements, lodging, and transportation					
Quality of audiovisual used					
Frequency and arrangements of daily schedule breaks					

F. Field Trips Organization and Relevance

Item	1 Poor (P)	2 Fair (F)	3 Good (G)	4 Very Good (VG)	5 Excellent (E)
Planning and coordination of field trips					
Relevance to program content					
Frequency of field trips					
Duration of field trips adequate					

II. In general, I would rate this program (circle one number)

1 Poor (P)	2 Fair (F)	3 Good (G)	4 Very Good (VG)	5 Excellent (E)

III. Additional Comments (if any):

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If you need additional space for comments, please use reverse side of this page.