SEED INDUSTRY DEVELOPMENT IN EGYPT

a study of seed policy and legislation

required by

the NARP Amendment 3 Project Paper

by

the NARP Seed Study Team
CAS, NARP, CID, MSU, USAID & private consultants

May, 1990

/-

TABLE OF CONTENTS

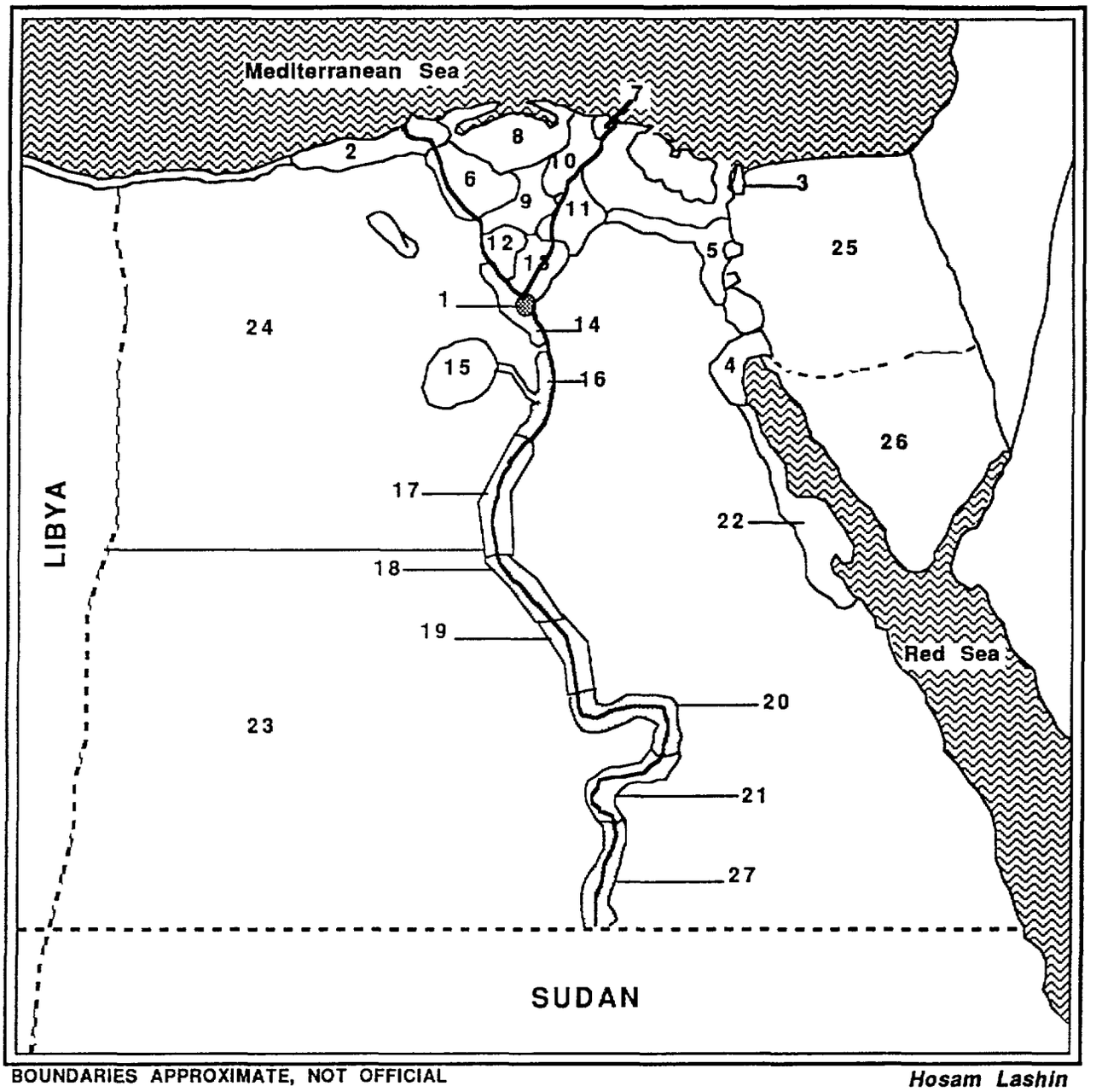
TABLE OF CONTENTS (continued 2)

TABLE OF CONTENTS (continued 3)

TABLE OF CONTENTS (continued 4)

Section **Page**

LIST OF TABLES



BOUNDARIES APPROXIMATE, NOT OFFICIAL

Hosam Lashin

Urban GOVERNORATE

1 Cairo
2 Alexandria
3 Port Said
4 Suez

Lower Egypt

5 Ismailia
6 Behera
7 Damietta
8 Kafr El Sheikh
9 Gharbia
10 Dakahlia
11 Sharkia
12 Munufia
13 Kalyubia

Upper Egypt

14 Giza
15 Fayum
16 Beni Suef
17 Menia
18 Asyut
19 Suhag
20 Qena
21 Luxor
22 Red Sea
23 New Valley
24 Matruh
25 North Sinai
26 South Sinai
27 Aswan

TEAM MEMBERS

Team leader

Dr Alexander Grobman
Geneticist/Businessman
Private Consultant
Lima, Peru

Team members

Mr Mohamed El Howary
Seed Technologist
CAS

Mr Youssef Abd El Khalick
Project Component Officer
Office of Agriculture
USAID/Cairo

Dr Bill Gregg
Seed Industry Development Specialist
MSU/CID/NARP/CAS

Dr Ken Laurent
Economist
Private Consultant
Florida, USA

Dr Charles Vaughan
Seed Technologist
Seed Technology Laboratory
Mississippi State University

Mr Salah Wanis
Director
Dept of Statistics & Training
CAS

Phase I was conducted from December 22, 1989, to February 8, 1990, Phase II was from May 2, 1990, to June 7, 1990 Dr Vaughan, a professional seed technologist, participated only in Phase II, and concentrated most of his efforts on training, presented in a separate report

PURPOSE OF THIS REPORT

This is a separate report, submitted by the following team members

Mr Mohamed El Howary
Dr Bill Gregg
Dr Charles Vaughan
Mr Salah Wanis

We could not professionally agree to a few points of the report submitted by the team leader While we agree on many points, some included in that report do not reflect our professional evaluations Solely in the best interests of achieving, over the long-range, improved operating efficiency and seed quality in Egypt's seed supply and without any rancor whatsoever, we are submitting this separate report In this report, we have taken the report submitted by the team leader, put it in the form required by the study's terms of reference, modified some sections to reflect our points of different professional evaluation, and edited the report to reflect more stronger positive support We have tried to be practical and realistic in terms of technical requirements for high-yielding seed, and realities of the Egyptian context Except for the points noted above and/or specified below, the report is otherwise the same as the team leader's, thus, this report could be interpreted as achieving more nearly a consensus of the entire team, including the team leader and the economist

Points of differing professional evaluation are as follows

1 EMPHASIS OF THE REPORT

A major thrust was to eliminate the seed conditioning plants included in the NARP Seed Technology Component The original purpose of this study was to focus on policy and legislation Considerable detail was given to operating/planning/structural aspects of the program, which were already based on an unusually high number of studies already made, and on intimate knowledge of program needs by highly-completent Egyptian officers The area not adequately studied, which should have received major emphasis in this study, is that of legislation and policy However, as this was not done and would require more time than is now available, we have chosen to follow the same approach as the team leader, and modify his report only in technical areas where we cannot accept his evaluation, change its layout to fit the format required by Phase I Terms of Reference, and modify it to reflect more positive support

2 CENTRAL FOCUS OF NARP

The purpose of NARP is to UPGRADE what is already the best agricultural research system in the Arab world This same philosophy of upgrading should be carried into the Seed Technology Component, rather than taking a different attitude and requiring it to continue with a minimum of investment, continuing with outmoded, inefficient facilities

3 PERSONS INVOLVED IN PREPARING THE REPORT

This report was prepared solely by the team leader and the economist, no other members of the "team" participated in preparing the report, except in data collection The report should reflect the evaluations of the entire team, which included professional seed specialists and persons familiar with the Egyptian seed program and the reasons why certain operations are performed in the manner they are

4 TONE OF THE REPORT

The tone of the report needs to be modified so criticism can be most helpful by focusing on being supportive or constructive

5 SUBSTANCE OF THE REPORT

In many areas, the report is a general discussion of a seed supply system, whereas it should demonstrate a grasp and understanding of specific needs of Egypt's specific situation and what is possible here and now, what could be done soon, and what would require longer It should reflect the reality that all things cannot be changed overnight, and that certain approaches or steps, even though not used in specified other countries or seemingly oblique, may lead to the same objectives in Egypt, and do so without causing disruptions

6 CONSIDERATION OF INFORMATION

The impression is given that information was used selectively to support the report's conclusions Egyptian conditions must be the major emphasis, and all information should be evaluated in this light to make the best possible recommendations for Egypt's particular needs

7 PROCUREMENT PLANS

It is not readily evident that the team leader and economist have the requisite training and experience in specific technical activities to evaluate the procurement plans, which are detailed technical lists of equipment prepared by Egyptian and expatriate specialists to achieve project objectives Equipment listed was evaluated as most suitable to Egyptian conditions These should not have been evaluated under this study, which should have concentrated on policy and legislation, if they were, the evaluation should have included technically-competent persons

8 PRIVATE-SECTOR REQUIREMENTS

Egypt has particular requirements for developing private-sector participation A primary requirement is that an activity which is privatized must have a ready real profit potential attainable within the short range, and government must provide the supporting services and favorable environment in which a business can be successful Private-sector participation must be considered realistically, implemented in a pragmatic manner, and the country's overall needs considered

9 UNDERSTANDING OF SEED CONDITIONING

A major thrust of the report seems to be to eliminate the seed conditioning plants in the Seed Technology Component's procurement plans In doing this, the report demonstrated inadequate knowledge or consideration of separation requirements of seed conditioning, how seed are handled through conditioning, cost- and time-efficiency required, operating support and preparation activities, conditioning as it relates to seed Certification, wear and replacement of facilities, the fact that conditioning is only a tool used in the overall program, and other aspects

10 DETERMINING SEED CONDITIONING NEEDS

"On'the'ground" seed conditioning plant requirements are not determined by the "national per hour conditioning capacity per year" method, as the team leader's report did Seed plants are tools, used where needed to improve efficiency of the overall program and its goal of seed supply The need is for cleaning seed within the time available, and cleaning it properly to the desired standards The objective is not maximum use of seed plants (seed conditioning is a seasonal operation, as are all agricultural activities), but to get the seed cleaned The method used in the

team leader's report is generally only an administrative/ bureaucratic guideline

11 PREPARING SPECIFICATIONS

Detailed specifications were prepared by in-Egypt specialists, to ensure that the NARP Seed Technology Component got equipment which would fit its specific needs However, the report includes specifications which have been changed so they are incomplete and general, and would permit a supplier to sell to NARP "what he has to sell, rather than what NARP needs" This cannot provide efficient, cost-effective facilities which meet needs, and does not follow the tried and time-honored method/sequence of preparing technical specifications

12 THE "INFORMAL SEED SYSTEM"

A current fad is the Peace-Corps-level effort to help people in the lowest economic/educational level, with lowest use/understanding of modern efficient inputs/methods This worthy goal has sometimes worked well with individual-person activities which do not require advanced technology/organization or coordination between persons or extensive marketing, these have been activities such as making/selling handicrafts, making keys, repairing shoes, etc However, the "informal sector" can never supply higher-yielding, higher-technology seed, this is an applied high technology, higher than locally-used farmer technology This capability or potential does not exist with poor uneducated farmers, who cannot be used as the base of a supply of high-yielding varietally-pure seed, even for themselves They are not "informal seedsmen", they are only low-income persons who simply plant grain instead of seed, because it costs no cash, and they do not understand what seed improvement is or how to do it The Pakistan program cited to justify financial aid to the "informal seed industry" in Egypt, has not yet demonstrated that it can supply national needs for high-quality seed--which is the basic objective in Egypt

13 CAS AS A SEED PRODUCER

CAS, strictly speaking, is not as a seed producer, CAS does not produce seed or contract seed production for its own account CAS organizes production, and supervises it as part of its responsibility to implement the MOA seed supply policy The actual owner of the seed, for whom CAS acts as a contract seed program manager (similar to hired farm management firms/operations in the US), is the PBDAC

14 SEED STORAGE

Taking funds from the planned seed plants, and investing it in a network of seed storages, is technically dangerous, the need for seed storage is recognized, but as a second priority as compared to seed conditioning Egypt has the perfect natural climate--a dry desert with low humidity--for seed storage, this has prevented disaster for centuries, as Egypt has managed to keep seed viable under natural conditions slightly modified to keep seed as cool as possible Major problems are not heat and moisture, but poor insect and pest control Storages, like conditioning plants, cannot be justified economically, or balanced in terms of full-capacity use, they will normally be used only a few weeks each year Storages can be used for carryover seed, this is not economically justifiable but but is technically necessary to provide "security" seed stocks and prevent loss of seed which is not sold If a network of seed storages are built with NARP funds, who will operate them? Will construction of a series of storages lock out private sector seed marketing for a long time to come? What is the ideal location for some now unknown future agency? Would this replace the present PBDAC "seed distribution monster" with a second "monster" that would prevent development of the private sector until the lifespan of the storages ends?

15 TRAINING

The NARP Seed Technology Component needs trained persons NOW to move the program toward technological upgrading, its approved training plant includes a small number as compared to the needs The training plan amply describes this, briefly, these persons must take the lead, identify under Egyptian conditions workable solutions to problems, get them accepted, and then guide/train their implementation M S degree training is the most efficient way to do this A number of persons need training, because (1) a single person recommending a technology change needs equally-trained colleagues to support him, and (2) there are many activities which require trained leaders In early planning, an Arabic-language university seed technology curriculum, to serve the Arabic-speaking region, was proposed However, it was pointed out that the present seed component is limited in comparison with total needs, this project is in the MOA and university education is in a different ministry Because of the large funding and time requirements of establishing such a curriculum, it was decided that it should be left for a separate project, which should be coordinated with other Arabic-speaking countries

16 ECONOMIC STUDIES

The limited time available during Phase II for economic studies forces them to be hurried, based on hurriedly-collected information, so its accuracy must be considered suspect This is complicated by the fact that technical operations are inadequate, based on inadequate and outmoded facilities, and must be changed, therefore, economic studies at this time are of little value At present, the emphasis in improving the seed supply must be based on technological improve This study should be used only as the basis for a more detailed study with adequate time for thorough compilation and accuracy, and recognizing that economic data should be compiled only after facilities and operations are improved

We would like to express our sincere thanks to all involved in conducting this study, and extend our best wishes and fullest support to the officials and staff, both government and private sector, who implement the seed program and must carry out improvements in seed supply to farmers

I. EXECUTIVE SUMMARY

AGRICULTURE

1 1 Egyptian agriculture produces about 35% of the domestic requirements for food, and much of the fiber requirements It generates hard currency through export of cotton fiber, fruit, and vegetables, it provides a livelihood and anchors the rural population in the countryside, and supplies revenue to the national treasury It is expected to provide its products and services at the lowest possible production cost and minimum profit, passing on the benefit of low food prices to the increasing urban population

1 2 High productivity and efficiency are demanded of farmers to achieve these objectives In their favor are good soils, adequate irrigation water, stable climate and credit for production inputs

SEED NEEDS

1 3 Higher-yielding seed are essential in the scheme to increase food and fiber production Considerable attention has been given to develop high-yielding varieties especially wheat, rice, maize, faba beans, lentils, and cotton Active government programs have been instituted to organize and operate a system to give farmers a constant, sufficient supply of high-quality seed of high-yielding varieties However, these have not reached all farmers in adequate quality and purity

1 4 Government considers a high use level of Certified seed (i e , high-quality seed of new and/or high-yielding varieties) as the primary means of distributing and producing improved higher-yielding varieties Because of Egypt's rapidly-growing need for food and high food imports, government seeks to plant the maximum area with higher-yielding variety seed produced under Certification (as the best means of maintaining genetic purity for the beneift of farmers) by private firms or contract growers Desired seed replacement ratio for wheat, rice, broad bean and lentils is 50% Annual seed replacement is considered essential not so much for germination and purity (planting rates are excessively high) as for genetic purity and variety replacement A steady flow of improved varieties has been released and is planned for the future Although genetic purity has been generally low under the previous "Certification" system, it is better than farmer seed Planned improvements (roguing, field inspection, improved Foundation and Registered seed, improved conditioning plants etc) should significantly improve genetic/variety quality of seed produced under "Certification" While in some

countries such as the USA a high rate of annual seed replacement is not considered essential, some countries under intensive cultivation achieve 80-100% seed replacement Egypt's food deficit, growing population and intensive land use require a high replacement rate of seed of the highest possible yield potential, in this case, it is as much variety replacement as seed replacement The intensive cropping system has apparently not prevented high incidence of weeds (e g , wild oats in wheat) which are seedborne, as well as volunteer crop plants which reduce varietal purity and yield However, rather than motivating farmers to seek improved seed, the system requires farmers to use a technology package through credit in kind, apparently evolved through a highly-regulated agricultural policy based on cotton as a required crop rotation Because of special quality requirements of long-staple cotton it has a 100% seed replacement ratio and zoning of varieties to avoid mixtures Cotton affects production and distribution of other crop seed, as they are covered as add-ons under the Seed Law designed for cotton Fixed low prices paid by government to farmers for their crops have developed the thinking that inputs should be provided at a low price to compensate for the hidden tax assessed through low commodity price, which affects potential profitability of seed supply Government has started to modify these policies, and is now blueprinting a path toward privatization

SEED USE

1 5 Present annual seed use is about cotton 75,700 mt, broad bean 21 300 mt berseem clover 70 000 mt maize 30,000 mt, potato 175,000 mt, rice 55,500 mt sorghum 4,100 mt, soybean 4,800 mt, and wheat 89 000 mt Other seed required in important quantities are tomato, onion, watermelon, beans, cabbage, cucumber, lentil, groundnut melons, pepper squash and sugar beet A large number of field and vegetable crops are grown requiring seed in lesser quantities, but often of high value

1 6 Planting rates are excessive, perhaps due to low seed quality, lack of farmer faith in seed quality, farmer cropping habits, poor land levelling, insect damage expectations or inadequate research/ extension work on crop management techniques

Table 2
Total Seed Requirements of Governorates
(not including cottonseed)

(CAS & ARC 1987, 1985 crop year)

GOVERNORATE	TOTAL SEED REQUIREMENTS (mt) *			
	FIELD CROPS	VEGETABLES	TUBERS	TOTAL
LOWER EGYPT				
Alexandria	2 703	56	8 337	11,096
Beheira	37 297	79	2 514	39 890
Gharbia	28 503	11	19,244	47,758
Kafr El Sheikh	25 248	18	461	25,727
Dakahlia	53 335	27	9,463	62,825
Damietta	6 941	16	2 111	9,068
Sharkhia	45 111	91	6 579	51 781
Ismailia	3 721	37	402	4,160
Suez	171	10	--	181
Menoufia	19 916	8	1,054	20 978
Kalyubia	7 168	121	11 360	18 649
Cairo	141	28	32	201
MIDDLE EGYPT				
Giza	4 556	120	29,043	33,719
Beni Suef	16 990	342	2,177	19,509
Fayoum	16 160	180	36	16,376
Minia	27 526	369	12,189	40,084
UPPER EGYPT				
Assiut	22 868	53	606	23,527
Sohag	36 783	51	2,226	39 060
Qena	10 181	168	92	10,441
Aswan	2 049	21	31	2 101
NATIONAL TOTALS	**367,368**	**1,806**	**107,957**	**477,131**

* Field crops include barley broad bean green bean chickpea berseem clover cowpea flaxseed Malta jute lentil lupines, maize, melon & cantaloupe onion dried pea groundnut rice sesame sorghum, soybean sugarbeet watermelon & wheat
Vegetables include cabbage carrot cauliflower cucumber, eggplant, fenugreek lettuce Egyptian mallow Jews mallow onion okra green pea pepper radish, spinach squash tomato & turnip
Tubers, etc, include artichoke colocasia garlic & potato

SEED SUPPLY AND SOURCES

1 7 About 50% of the seed of major crops is provided by a system organized under the Ministry of Agriculture, consisting of several institutions coordinated by the Central Administration for Seed (CAS) The private seed industry has recently produced some hybrid maize and sorghum seed Much seed is farmer-saved, either for personal use or exchange among farmers

1 8 Lack of private-sector investment has placed responsibility for the seed delivery system on Government at all stages planning, seed production conditioning, setting prices, supplying other inputs, credit, and storage/distribution of the crops produced, private-sector participation has only recently begun Government participation in the seed supply system has been considered necessary for several reasons necessity of providing high-yielding seed in the absence of a private sector, lack of profit potential for some essential seed crops, private sector fragmented, small farm size, low level of agricultural education and literacy of farmers, low purchasing power of many farmers, problems of credit for purchasing inputs, regimented nature of agriculture requiring a high degree of organization, careful planning, and execution management, etc

1 9 The seed supply system is based in the Ministry of Agriculture, which is responsible for policy, planning, overall coordination, and monitoring MOA agencies involved include

1 9 1 Agricultural Research Center (ARC) develops, tests, releases and approves crop varieties, produces Breeder, Foundation, and some Registered seed

1 9 2 Central Administration for Seed (CAS) administers Ministerial Seed Programs, conducts both seed industry and control activities, contracts seed production, manages the flow of seed through the system, and conducts Certification and quality control operations

1 9 3 Egyptian Agricultural Organization (EAO) an enterprise under the Ministry of Agriculture imports inputs including vegetable seed, conditions seed assigned to it by CAS

1 9 4 Principal Bank for Agricultural Development & Credit (PBDAC) an independent government agency, plays an essential role in seed, it finances seed production, transportation, and conditioning by buying seed from contract growers and paying

conditioning/transport costs, stores and distributes seed from its own storages, as an in-kind part of crop production credit

1 10 Private-sector seed supply includes 6 registered field-crop seed companies, 12 vegetable seed importers, some with local production, and some 600-700 licensed retail seed merchants

SEED LEGISLATION

1 11 Legal seed framework is based on Law No 53 of 1966, a general Agricultural Law It has some seed law elements, primarily based on cotton, and has allowed a National Seed System to function through Ministerial Decrees However, it does not provide an adequate conceptual political, promotional, administrative, and operational base Decrees do not provide the stability that legally-firm long-range policy (formulated in law, a permanent legal instrument) assures to encourage private-sector participation The public sector also requires major policy, administrative and operational re-organization to meet changing situations and adapt to changing needs

FOREIGN ASSISTANCE

1 12 Bi-lateral and multi-lateral technical assistance has been received from France German Federal Republic, USA, and World Bank Except for the commodity support credit program of USAID, all assistance has been to the public sector

VARIETY DEVELOPMENT AND MAINTENANCE

1 13 Research on variety development and introduction is in the public sector, mainly ARC Output appears to be high-quality, and the pace of introducing new varieties seems adequate Private-sector seed firms are now establishing research in variety development, primarily maize and sorghum hybrids New guidelines are required to support private-sector variety introduction, development, testing, and release Variety testing and registration procedures should be systematized to encourage the private sector Variety protection needs appropriate consideration to attract varieties and participation from foreign seed firms in the future after business incentives are adequate

1 14 ARC Breeder and Foundation seed is not all of the quality required to sustain seed Certification Certification should be by an agency independent of production Constraints on seed quality and risks of seed loss are due to inadequate seed storage at ARC and State Seed Farms

SEED PRODUCTION AND SUPPLY

1 15 CAS, which implements Ministry seed policy, organizes, contracts and supervises Certified seed production through contracts with farmers CAS performs these services for the account of PBDAC, which finances and owns the seed, strictly speaking, CAS is not a seed-producing agency Registered seed is produced normally by State Farms, when additional seed is required, CAS arranges and supervises production by contracted farmers, again for the account of PBDAC Field inspection, initiated about two years ago, is now applied to only part of the seed production, primarily wheat, this is important in ensuring higher genetic purity, and should be extended to all fields of all seed crops as soon as possible Inspections should follow international procedures to ensure high seed quality Rejection of nearly 20% cast doubts on seed genetic purity, as a substantial proportion of seed comes from mixing small farmer-grower sub-lots into larger lots, thus mixtures in handling/conditioning would go undetected

1 16. The private sector produces hybrid maize seed, without competition from the public sector Seed of ARC-developed hybrids is produced by four companies, conditioned in their plants or is custom conditioned by CAS, EAO or Nuba Seed, as the private firms do not have adequate conditioning capacity All seed is distributed by PBDAC Misr Pioneer, a joint government/private sector enterprise, produces seed of its own hybrids, and distributes them through PBDAC and Land Reform, with some recently going through an evolving network of dealers PBDAC reduces distribution costs for the private sector, but freezes their relative market share, as PBDAC and CAS could exercise judgement on where and how much seed of each firm is distributed Three firms indicate they are starting to establish distribution systems, although most of their production still goes through PBDAC

1 17 Farm-saved and farmer-to-farmer seed exchange undoubtedly account for much of seed that is not produced under CAS supervision, this may be up to 50% in some crops Berseem, the crop with the largest area, accounts for most non-quality-controlled, non-conditioned seed As in other countries seed regulations allow farmers to trade seed without being subject to quality control

SEED TESTING

1 18 A large number of tests are made at 3 Seed Testing Stations (service-type seed testing laboratories), many tests are actually part of the reception control for receiving seed from, and payment to,

farmer-contract growers This is normally done by internal quality control labs in conditioning plants, rather than official seed testing labs Final analysis of cleaned seed is done by the official labs for all seed classes, these labs also test seed for Seed Law implementation There is no distinction between internal quality control and official seed testing These should be separated, and the number of labs expanded, to improve operating efficiency and allow official labs to perform more reliable tests Proper labelling of seed bags should be initiated, along with truth-in-labelling and in-market sampling inspection, to protect both farmer-seed users and reliable producers of quality seed

1 19 Seed testing stations are insufficient in number, have outmoded equipment, and employ cumbersome procedures which do not permit reliable repeatable test results Existing labs should be re-equipped, and new labs established Streamlined management systems with computerized data handling should be used to reduce delays in reporting test data so seed can be transferred faster from conditioning plants to distribution storages Both official seed testing labs and in-plant quality control labs are needed

CONDITIONING AND STORAGE

1 20 ARC conditions all Foundation, most Registered, and considerable Certified seed CAS and EAO also condition Certified seed

1 21 Technically-proper storages for unconditioned and cleaned seed at conditioning plants and during distribution, do not exist Certified seed undoubtedly loses germination and vigor in PBDAC Shona Bank storages, when stacked in the open air on the ground rather than on pallets or poles However this is of lesser priority in this initial phase, as seed is not now carried-over and the dry desert climate helps maintain viability although summer temperatures are high Technically-proper storages ultimately must be constructed, but at the present time most short-term storage needs can be handled temporarily by keeping seed off the ground on pallets, and under roof cover to avoid direct sunlight, rain and ground moisture Storage insect and pest control is urgently needed Breeder seed lacks appropriate cold-dry long term storage facilities, adequate ambient storage to hold Foundation seed safely for 2-3 years should be constructed in later phases

MARKETING AND DISTRIBUTION

1 22 Distribution of field crop and cotton seed produced by farmer-contract growers under the government program and by private-

sector seed firms, is through PBDAC and the Land Reform Department PBDAC sells seed in-kind to farmers in a credit package, through village banks Land Reform supplies seed to farmers in Land Reform areas Seed prices are fixed each year by Government PBDAC marks-up seed 7% on C&F prices, to cover distribution costs and interest

1 23 Vegetable seed is distributed by 600-700 retail merchants throughout the country, who are licensed to sell seed Prices of imported seed are controlled, said to allow margins that barely pay distribution costs Locally-produced vegetable seed is priced freely, some retail seed merchants produce vegetable seed, and market it at the farm and in their stores

FINANCING

1 24 Cash flow in the government-supervised contract seed production system and distribution system is by PBDAC PBDAC pays the farmer-seed grower, receives raw seed at their holding yards (Shona banks), pays for transportation and handling Initial payment for seed to the contract grower is only grain price, with the premium paid after conditioning on only the farmer's proportionate amount of clean seed PBDAC pays conditioning cost (to EAO, CAS, ARC), and receives payment under the production credit provided to farmers who use the seed The balance left after deducting PBDAC's commission and interest is transferred to CAS CAS and EAO pay their costs and loans, and return the balance to the public treasury

IMPORT AND EXPORT

1 25 Imports account for most vegetable seed except some watermelon sweet melon, squash, tomato and onion seed All potato seed is imported from Holland, Germany and the UK Some berseem seed and vegetable seed is exported

TRAINING AND PERSONNEL DEVELOPMENT

1 26 There is an urgent need to establish in-depth seed training and extension, fed by good technology information, with feedback on farmer's perceived needs and reactions to new technology packages Upgrading of technical capabilities in seed technology and general seed knowhow, for both public and private sectors, is an identified need

RECOMMENDATIONS

Recommendations for improvements are shown in Section XII

II. INTRODUCTION

2 1. Egypt has a population of 53 million, growing approximately 3 2% per year Agriculture accounted for about 20% of the GDP in 1988, and employed approximately 35% of the labor force National literacy rate was 53% among men, and 60% among women Some 53 5% of all farms are less than 5 feddans (1 feddan = 0 42 ha) in size (1984) The high population growth rate has required Egypt to import large quantities of food and agricultural inputs In 1988, Egypt imported almost two-thirds of its wheat requirements Food imports in 1986/87 amounted to some US$4 billion The high cost of imports, coupled with the growing shortage of foreign exchange, has made it essential to obtain the maximum production possible from each hectare of cropland

2 2 All arable land is under irrigation (approximately 2 5 million hectares) New lands are being opened up, but old lands are lost to urbanization at about the same rate consequently, the only major means of increasing food production are greater intensity of land use and increasing crop yields Because of climate and the ability to irrigate all cultivated lands Egypt already has a high level of land use, averaging 1 85 crops per year and high crop yields Wheat yields increased 1 85% annually for more than 3 decades, rice averaged 1 34% anual yield increase during this period Even with these yield increases, MOA authorities are confident that output can be increased further through improvements in quality and varietal purity of seed provided to farmers

2 3 Because of Egypt's critical food production and import situation, it is not possible either to delay supply of high-quality seed while improved technology "percolates down" to farmers and is adulterated in the process, or to contemplate supplying only a fraction of seed requirements The shortage of crop land, high imports of food, the growing population, and the need to create employment make it essential that all farmers be supplied high-quality seed each year, in order to maximize total national production as well as farm family income The urgent need to increase food production has generated a number of recent studies toward ways the seed production and delivery system can be improved, to provide farmers adequate amounts of seed of the latest high-yielding varieties (HYV), at fair and affordable prices This report updates some information in those studies, and considers current developments within the concerned organizations and institutions

III. BACKGROUND

3 1 Section 5 15 of the National Agricultural Research Project (NARP) Grant Covenant, Amendment 3, requires that a study of the Egyptian seed industry, in addition to the several other studies which have been made recently, be completed as follows

> The Grantee (e g , NARP's participating agencies) will commission a study, for completion within one year of the date of the Third amendment to the Grant Agreement, to review current laws and regulations governing the seed industry The study will provide recommendations for modification of the policy environment regarding seed production conditioning and distribution, to strengthen private sector participation in the seed industry Based on these recommendations, the Grantee agrees to submit a plan to USAID for implementing changes which appear appropriate The status of these changes will be reviewed and approved by both parties prior to approval of the annual (Implementation and Financial) plan for the NARP Seed Technology Component for fiscal year 1991

3 2 To conduct this study a team of six-seven persons was organized for two separate periods, each of up to four weeks Terms of reference for Phase I and Phase II are shown in the appendix hereto This report was generated through the combined efforts of the members of this team

IV. AGRICULTURAL SECTOR

4.1. Seed: an Overview

4 1 1. Seed Use and Requirements

4.1 1 1 Egypt uses large quantities of seed of several crops and varieties A CAS report estimated that approximately 364,000 mt of field crop seed, 8,000 mt of vegetable seed, and 207,000 mt of tubers for seed were required in 1987 Six crops--wheat, rice, maize, broad beans, cotton, and clover--accounted for about 94%

Wheat	89,000	mt
Cotton	75,700	"
Clover	70,000	"
Rice	55,500	"
Maize	30,000	"
Beans	21,300	"
Total	341,500	"

4 1 2 Seed Use Patterns

4 1 2 1 Farmers must have an adequate field stand of plants to produce a profitable crop They cannot afford the loss of time involved if a poor stand requires replanting some of their crop, the crop season may be too short to permit replanting, since two crops per year are planted If farmers could count on a high percent of the seed planted germinating and producing strong healthy plants, they could use only enough seed to get a stand However, farmers plant more seed than should be required, due to actual or perceived low seed quality In doing so, they waste resources (labor and seed) that could be better-used elsewhere A CAS study calculated that farmers plant as much as 51 kg of wheat seed per feddan more than required if seed met standards of the Egyptian seed law Rice farmers plant as much as 58 kg/fed in excess of needs to get the ARC-recommended stand With wheat, over-planting was almost 70% more than the rate required to produce the ARC-recommended stand, for rice, the rate was almost double The excess planting rate for cotton is even greater

4 1 3 Seed Prices and Production

4 1 3 1 These, in the form of information received from the study team economist, are included in a separate section with data in the Appendix Such data is not readily available, further, econdomic

data on present operations is not considered useful because the present condition of facilities, training and operations, and obvious necessity to improve technical/operational efficiency in facilities and procedures Existing facilities and operations must be changed technically, then economic studies should be made

4.1 4. Classification of Seed

4 1 4 1 Technically seed is classified as (1) improved, meaning high-quality (physical, physiological, genetic and phytosanitary quality), conditioned, dried and usually treated seed of improved, higher-yielding varieties, or (2) unimproved, meaning seed of unknown genetic composition and quality, produced without quality control, and not conditioned Seed from organized government and private-sector seed programs is usually classified as improved, seed/grain saved or exchanged by farmers is classified as unimproved

4 1 4 2 Seed produced under Certification is internationally recognized as better quality, especially for genetic (variety) quality Certified seed is of 4 classes

4 1 4 2 1 Breeder seed A small amount of seed produced by or under the direct control of the originating plant breeder or breeding institution It is usually kept in long-term storage to protect agains genetic shift or loss of the stock, and is the ultimate source of re-multiplication of the variety

4 1 4 2 2 Foundation seed Multiplied directly from Breeder seed, by or under the control of the breeding institution, usually be special Foundation Seed Programs Production, handling, conditioning, testing and labelling are supervised by the Certification agency and must meet specific standards

4 1 4 2 3 Registered seed Multiplied from Foundation (or sometimes Breeder) seed, Registered seed are a larger quantity of high-quality seed Production, handling, conditioning, testing and labelling are supervised by the Certification agency, and must meet specific standards

4 1 4 2 4 Certified seed Multiplied from Registered (or sometimes Breeder or Foundation) seed, Certified seed are high-quality (especially genetic quality) seed used to plant the crops of farmers who produce commercial non-seed crops Production, handling, conditioning testing and labelling are supervised by the Certification agency, and must meet specific standards

4 1 4 3 Non-Certified or commercial seed is produced outside the Certification quality control system It varies widely in quality, from low-quality farmer-saved seed-grain to very high-quality hybrid seed produced under the brand name of a reputable breeding and seed producing firm

4 1.4 4 In terms of national planning, economics, food supply and policy, seed is classified as the basic crop production input which produces the field stand of crop plants All other production inputs go toward creating a more favorable environment under which these plants can grow and produce a crop As it requires no direct change in farmer technology, improved seed is classed as the easiest improved technology to transfer to farmers

V. POLICIES AFFECTING THE SEED INDUSTRY

5.1. Market Orientation Policy

5 1 1 The concept of market orientation of the farm economy has not taken full hold in Egypt's agricultural planning Farmgate prices of some crops are fixed by Government, not as floor prices for farm marketing support, but as *bona fide* purchase prices This applies to rice and cotton, and to a large extent to wheat and maize due to prices that prevail because of lower-priced grain imports Agricultural pricing policy should reflect a development policy intended to support and consolidate the farm sector, it should not be aimed at providing revenue for government through paying farmers prices lower than world market prices, nor should it be a mechanism to transfer the cost of subsidizing food from urban to rural areas

5 1 2 General lack of free markets for agricultural products restricts the drive of favorable market prices, which is a strong incentive for farmers to use high levels of inputs Lower income due to low market prices for crops such as rice and cotton limits prices farmers can pay for inputs, including seed This has created Government's rationale for subsidizing agricultural inputs

5 1 3 Government agricultural marketing policy should be modified to establish crop price incentives adequate to provide incentives for the farm economy This would reverse present low pricing, and provide incentives by alternatively reducing input prices, offset farmer economic-opportunity losses through low crop prices, which will achieve higher yields

5 1 4 Generally, agricultural policies of low input cost and crop prices cause several phenomena related to seed supply and use

5 1 4 1 Excessively-high seeding rates result from low seed prices, cause seed waste, increase social costs, and increase need for seed production resources

5 1 4 2 Low seed prices discourage private-sector production of all but high-cost hybrid and vegetable seed This leaves a vacuum which is occupied by Government, which is costly to operate, low in efficiency, and uses national budgets which could be used in other areas thus increasing the social cost of supplying high-quality seed

5.2. Input Supply Policy

5.2 1 Input supply policy has been based on maximizing use of ARC-recommended packages of improved-technology inputs at relatively low farmer prices, supplied as credit-in-kind in crop production credit from the government's Principal Bank for Agricultural Development and Credit (PBDAC) PBDAC distributes inputs, including seed at district and village Shona banks as credit-in-kind, leaving farmers no option to change quantity, type or brand Credit available is limited to PBDAC funds, which determines the fertilizer and seed available at subsidized prices to farmers Farmers must accept the in-kind credit package to get subsidized inputs, which may not be sufficient (e g , fertilizers), as farmers apply more than the recommended rates on which credit packages are based (Table 1) Farmers must accept PBDAC seed, although they may plant their own seed and consume PBDAC-supplied seed MOA considers this credit-in-kind to be the easiest way to transfer technology to farmers, as Extension is weak

5.3. Seed Use and Agricultural Policy

5 3 1 General farmer use of Certified seed of improved varieties is a cornerstone of the official policy to increase yields and productivity To insure that such seed is used and in the absence of other supply systems, Government supplies improved seed of important field crops and other production inputs in packages developed by ARC, through crop production credit supplied by PBDAC Hybrid maize seed is produced, but not distributed, by the private sector Both the public and private sectors produce, import and distribute vegetable seed

5 3 2 High-yielding seed of improved varieties is a driving force in this input supply-side strategy expected to increase crop yields To encourage farmer use of such seed, a two-pronged approach is followed first, lower seed price to farmers through subsidization, second, deliver seed to farmers through input packages linked to credit in-kind

Table 1
Planting Rates

(ARC & CAS 1987)

CROP	PLANTING RATE (kg/feddan)
Artichoke	4,000 (cuttings)
Barley	
Irrigated	60
Dryland	80
Bean, broad (vegetable)	30-50
Bean, broad (for beans)	75
Bean green	75
Bean, green	30-40
Bean, dried	30-40
Cabbage	0 15
Carrot	2-5
Cauliflower	0 40
Chickpea	60
Clover berseem	25
Colocasia	900 (tubers)
Cotton	70
Cowpea, green	40
Cowpea, dried	40
Cucumber	1 0-1 5
Eggplant	0 20-0 30
Fenugreek	25
Flaxseed	60
Garlic	300 (kg bulbs)
Jute Malta	4-6
Lentil	80
Lettuce	0 5
Lupines	75
Maize	15
Mallow, Egyptian	10
Mallow Jews	10
Melon & cantaloupe	1 25

TABLE 3 (continued 2)

CROP	PLANTING RATE (kg/feddan)
Okra	6-8
Onion, summer	
Sole crop	7
Intercrop	7
Onion, winter	
Sole crop	7
Intercrop	7
Onion, winter green	
Sole crop	7
Intercrop	7
Pea, green	40
Pea dried	40
Groundnut	50
Pepper	0 25
Potato	
Nili	1,500
Summer	750
Radish	5-8
Rice	60
Sesame	4
Sorghum	
Forage	15-20
Grain	6-8
Soybean	40
Spinach	8-12
Squash	1-2
Sugarbeet	12
Tomato	0 12-0 36
Turnip	4
Watermelon	1 50
Wheat	75

5.3.3. This input-supply-based policy is not balanced by a demand-side policy, as prices farmers receive have been below international market prices, as well as below CIF cost of imported food commodities This policy is being corrected for maize and wheat, but not for cotton and rice Partial removal of the maize commodity price distortion affected the poultry industry, as other distortions affecting average personal income were not adjusted Low cotton prices to farmers mean that farmers subsidize the spinning industry, urban consumers, and the national treasury in revenues from cotton exports Such hidden taxes may significantly offset the subsidies of input prices Most farmers cannot evade this indirect tax, as rotations including cotton and rice are mandatory in most central and north Delta areas

5.4. The Seed Supply System

5 4 1. The national seed production and delivery system is an aggregate of public institutions, private seed firms, contract farmer-seed growers, private-sector retail seed merchants, exporters and importers, with formal or informal linkages and functional interrelationships, within the framework of the seed component of Agricultural Law No 53 of 1966

5 4 2 A considerable amount of farmer-saved seed-grain is used and exchanged among farmers without quality control, however, this exists in every country, and cannot be considered a part of the mechanism of technology transfer through improved seed Such farmers are generally on the lower end of the economic scale, less receptive to technology improvements, and have never been successfully organized and upgraded into an effective industry to supply high-quality, high-technology in any country

5.5. Seed Policy and Rationale

5 5 1 GOE's policy has long been to improve development, production and distribution of higher-yielding seed, the increasing need for increased food production adds urgency to improving the existing system Until the early 1980's, the seed system consisted mainly of government production of field crop and vegetable seed, and largely private-sector importers, exporters, producers and retailers of vegetable and forage legume seed (mostly berseem clover) At that time, private seed companies were permitted to produce and condition hybrid maize seed

5.5.2. Current MOA seed-use strategy is to maximize domestic food production and minimize imports by planting the maximum area to high-quality seed of the latest high-yielding varieties, with

government and the private sector producing and supplying the required seed of the highest possible quality, available to all farmers, at the lowest realistic price

5.5.3. Policy rationale for using improved seed of new varieties, and maintaining a seed supply infrastructure is

5.5.3.1 Improved seed is the easiest improved technology to introduce to farmers, and transfers improved technology faster and more completely

5 5 3 2 Only high-quality, genetically-pure seed of improved, higher-yielding varieties can give farmers the genetic materials which can improve yields, improve environmental adaptation, resist disease and insect attacks, and improve crop quality to meet consumer needs and improve living standards

5 5.3 3 Improved physical purity of seed permits farmers to plant less,seed, avoid planting weed and other undesirable seed, thus saving seed and resources

5 5 3 4 Properly conditioned, high-germinating seed are required before farm mechanization (planting, cultivation, harvest) can be implemented effectively

5 5.3 5 High-germinating seed can reduce current excessive planting rates, thus saving some seed for grain use and reducing seed requirements and planting costs

5 5 4 The MOA is responsible for ensuring that adequate seed of high-yielding varieties reach farmers MOA seeks to assure highest practicable yields of all crops, especially cotton (the major export crop), wheat, rice, maize, and faba beans (the major staple crops), by planting the highest possible percentage of cropland to high-quality seed of improved varieties MOA replaces 100% of cottonseed each year, seeks 100% for soybeans and 50% for maize For other self-pollinated field crops in the program, seed replacement target has been 50% CAS proposes 100% annual seed replacement for wheat, to help resolve growing food requirements and import costs, but this has not been achieved Certified seed carries higher yield potential than uncertified seed, because of its emphasis on genetic quality As farmers overplant, lower germination has less effect on field stand Seed replacement is tantamount to variety replacement, which is essential in view of the steadily-increasing yield potential of new varieties, and the prevalence of volunteer plants which contaminate farmer-produced seed-grain and reduce its yield potential

5.5.5 Low input costs and commodity prices cause several phenomena

5.5 5.1. Excessively high seeding rates, thus wasting seed, increasing social costs and need for seed production, plants, personnel, budgets, and other resources

5.5.5.2. Low seed prices discourage private-sector entry into production/distribution in all but the high-cost seed of hybrids and vegetables This leaves a vacuum which must be filled by Government institutions, which draw government funds which could be used in other developmental processes

5.6. Private Sector Seed Supply Policy

5 6.1 Major field crops are important in Government's policy of increased food and fiber production Seed to plant large areas of these crops could not be immediately supplied in sufficient quantity and quality by the private sector, which would not be financially interested in seed production and distribution of open-pollinated crops such as wheat, rice, beans, lentils, etc , which offer little profit potential Government programs supply such seed through production contracts with individual farmers, groups of better farmers, and cooperatives Cooperatives, appropriately organized and supported, may be able to help distribute seed of these crops and reduce their economic cost However, the impact of cooperative distribution on development of the private sector should be studied before major programs are implemented

5 6 2 Government has indicated support for private-sector production of such seed, but its low profit potential has not attracted serious participation The private sector probably will not seriously attempt production of such seed until major improvements in facilities and business environment improve or create its profit potential CAS, which implements government seed policy, actively supports the private sector seed industry Although a definitive legal basis has not been established, it is stated government policy to support maximum private-sector seed production and supply, with government handling the essential seed not supplied by the private sector, as the private sector assumes production and supply, government indicates that it will cease production which may cause competition

5 6 3 The MOA took an important step toward establishing private seed companies in 1981, since then, six private and mixed (Government/private) seed companies have been formed to produce

hybrid maize seed Built-in genetic variety protection gives the private sector a profit potential with hybrid seed, so Government leaves hybrid seed to the private sector and produces seed of other, "non-profit" crops Private-sector firms also import 75% of the imported vegetable seed

5.7. Seed Subsidy Policy

5.7 1. PBDAC indicates that direct subsidies did not exceed LE 5 million in 1989 However, indirect subsidies as operating costs of CAS, ARC, EAO, and PBDAC, transportation cost subsidies, and interest on capital investment could probably bring the figure closer to LE 25 - 30 million per year Direct subsidies published by Government are small and insignificant, with wheat seed, the subsidy is 1% of production cost, the direct subsidy on wheat seed could be dropped with little effect on farmers

5 7 2 Direct seed subsidies are reportedly now discontinued

5 7 3. Total seed distributed under subsidy in 1989 was 218,834 mt

5.7.4. Subsidies are used to encourage farmers to use inputs or produce crops that government deems beneficial to the national economy Farmer use of Certified seed is highly desirable and should be encouraged, but are more expensive than farm-run/grain seed Farmers must be convinced that additional returns will exceed the extra seed cost of the seed Subsidies arise when seed are sold to farmers at less than the the cost of production, conditioning, and distribution Explicit subsidies can be identified, such as reduced prices, below the calculated costs Implicit subsidies result from operating costs that are not normally included in the price charged to the farmer, such as the cost of operating CAS losses by EAO or PBDAC, or ARC costs in producing new varieties

Table 2
Costs of Subsidies on Seed

	Wheat	Rice	Other	Total
Seed distributed (mt)	76125	41632	101072	218834
Cost of seed (LE/mt)	481	393		
Cost of processing, transportation, and distribution (LE/mt)	142	157		
	623	550		
Actual price charged farmer	600	550		
Explicit subsidy	23	--		
CAS administration cost, less recovery in sale	48	42		
True cost of amortization of processing plants and other facilities	?	?		
Total subsidy	71	42		
Total cost of subsidy (LE 000,000)	54	1 742	113	
Total cost incl grower bonus	113 mil	66 mil	06 mil	185 mil

(Note Cottonseed has an additional subsidy of LE 06 million, increasing the total seed subsidy to approximately LE 12 million or LE 60/ton distributed) Total additional cost including grower bonus adds LE 72 million, so the real cost of certified wheat seed is 88% higher than the farm grain price

5 7.5. Explicit subsidy on wheat in 1988/89 was LE 23 per ton There was no explicit subsidy on rice Built into the price are charges when seed are purchased by the farmer, LE 20/ton for wheat and LE 26/ton for rice In 1988/89, CAS salary and operating expenses were LE 11 9 million, and capital expenditures LE 3 0 million, or LE 68/ton of seed CAS recovers part of this through built-in charges in the price of seed sold to farmers, leaving an implicit subsidy of LE 48/ton of wheat and LE 42/ton of rice

5.7.6 An implicit subsidy is ARC cost of developing varieties and producing Foundation seed Many employees are engaged in developing new varieties Another implicit subsidy is amortization cost of conditioning and administration The present accounting system probably does not cover full depreciation and interest costs of facilities

5 7 7 Supply-side development programs with low-priced seed inputs could not be sustained against higher costs, low efficiency, and low rates of success Precise data on farmer seed acceptance and use should be surveyed to establish a base for adjusting seed supply and agricultural policies

5.8. Rationale for a New Seed Policy

5.8 1. The concerned administrators have demonstrated competence and ingenuity in designing a working seed delivery system that is serving farmers The present seed system depends on government for direction, management, support, financing, price-fixing, credit for production to farmers Operated in the agricultural sector, responsibilities are divided and not fully coordinated The system is costly and inefficient, and seed quality is sometimes not as high as is needed Privatization of market-oriented activities is a stated Government objective, thus, a clearly formulated seed policy covering this is needed to define roles and objectives precisely and permit efficient reorganization of institutional frameworks and functions as components of a new national seed system

5.8 2. Government's first step in establishing a new seed policy that prioritizes and promotes private sector involvement is to formulate a policy, establish it as a legal framework, and then administer and oversee the implementation of the policy which leaves production and distribution to the private sector which has Government's benevolent support, guidance and participation to ensure a favorable economic, social, and political environment This policy should allow farmers

technological choices, together with strong commodity price incentives, and market security to increase agricultural productivity

5.8.3. Small grain and edible legume seed, not now profit-generating so not of interest to seed companies, as they are supplied in large quantities at low subsidized prices, and may easily be replaced by grain when prices exceed farmers' perceived values Only if future research breakthroughs allow much higher yields, and private seed companies can identify profits will the private sector supply seed of rice, wheat, and bean This is unlikely in the short-term, so Government must continue seed production and distribution for major non-hybrid cereals, edible food legumes, and cotton However, plans should be made to gradually induct the private sector into these crop seed

5 8 4 If CAS re-organizes and streamlines itself, and improves the quality and presentation of its seeds it would be better serve farmers

5 8 5 Government should become a guiding partner and supporter of private seed industry development, in addition to implementing quality regulation CAS is ideally suited to play a major role in this

5 8 6 Concurrent with modifying seed policy, agricultural commodity marketing should be improved to provide more financial incentives for farmers

VI. ECONOMICS OF SEED USE

6.1. Production

6.1.1. Variety Use

6.1.1.1. Seed are produced of field crop and vegetable varieties recommended by ARC after extensive tests All varieties, public, private, or imported, are tested and approved through the ARC variety trial system before release Seed are supplied through the credit and supply system of PBDAC, so farmers who use crop production credit are limited to seed of these improved varieties, or to seed-grain they save themselves or exchange with other farmers Reportedly, a considerable part of several crops is planted with farmer-saved seed, and a large amount farmer crops are not planted to new varieties, estimates of the proportion planted to new varieties varies with crop

6 1.2. Variety Development & Introduction

6.1 2 1. Research on variety development is largely in ARC Some minor plant breeding research is done at some of the 16 University Faculties of Agriculture, and some is by the private sector ARC has been quite successful in variety introduction and development Vegetable variety introduction has been actively conducted by both ARC and the private sector, although only approved varieties may be imported, many locally-used varieties have been introduced Regulations requiring imported vegetable varieties to be registered may slow variety introduction by the private sector, but prevalence of viruses and other diseases requires effective screening to avoid production disasters

6 1 2 2. ARC conducts introduction and development research to generate improved varieties of field, horticultural, and forage crops through its crop-oriented research institutes, 10 regional research stations, and 31 minor research stations ARC has some 24,000 staff, including some 2,500 Ph D 's and over 1,300 M S graduates Crop-based programs, headed by national leaders, conduct breeding, variety testing, agronomy, pathology, and pest control research EMCIP (Egyptian Major Cereals Improvement Project) gave ARC significant support from USAID to strengthen and upgrade its institutional base, facilities, equipment, staff training, organization and capability to conduct goal-oriented research on major cereal crops EMCIP was superseded by NARP (National Agricultural Research Project), which provides broader institutional support

6.1.2.3. Cotton research is in the ARC Cotton Research Institute Variety development has concentrated on long-staple *G barbadense* for irrigated production, with long growing season and high fiber quality Varieties have been developed for the Delta, Middle Egypt and Upper Egypt, production of different varieties has been restricted to specific areas to minimize admixture Egyptian cotton's long growing period restricts multiple-cropping and reduces berseem clover causing an economic loss for farmers which increases cotton production costs and lowers total annual per feddan net returns Cotton yields have declined over the last 6-7 years, partly because of economic disincentives from government pricing policies, and partly from production problems

6.1 2 4 Wheat breeding strategy, until a few years ago, focused on introducing short-strawed, high fertilizer- and irrigation-responsive varieties from CIMMYT, which gave high grain but low straw yields Government paid farmers prices below international market prices and straw prices were high due to demand for dry forage and bedding, so short-strawed Mexican wheats were not accepted by farmers Thus, local varieties intermediate between Mexican wheats and traditional varieties became necessary New varieties have a straw grain ratio of 3 1 and are as high-yielding as some Mexican wheats Yet, their penetration and acceptance by farmers has been slow, perhaps due to lack of a cost- and quality-efficient seed supply industry By comparison, Pakistan has 95% of its wheat area planted to HYV, while Egypt has not reached 70%, Pakistan's average annual yield increase was 3 5% over the last 25 years, in Egypt over the last 30 years, annual yield increase was 1 85% This indicates a significant fundamental difference between Egypt and other countries with similar climatic and production conditions, this must be reflected in any program aimed at increasing production in Egypt Egypt's strategy has been to use a number of varieties, to ensure a broader genetic base as protection against epidemics in case of sudden appearance of a new disease strain

6.1 2.5 Wider farmer use of new wheat varieties are the basic strategy to increase average national wheat yield Farmer acceptance of new varieties is reported to be positive, and yields may be 20% higher than older varieties If such yield increases can be made in farmer fields, it would justify heavy government support to increase seed multiplication and distribution ARC strategy is to introduce new varieties in a constant stream, as higher yield can be incorporated The problem will be to organize production of seed of new varieties and deliver seed to enough

farmers to influence national production Market demand--i e , farmer selection of and demand for specific varieties--has not generally developed Once the conditions which generate farmer demand for specific varieties are created, the seed system must have a mechanism for sensitive, quick feed-back on farmer response, so research can respond to marketing demand

6.1.2.6. Farmer acceptance of new wheat varieties depends on price, high grain yield, and suitable grain straw ratios Demonstration or extension promotion of new varieties has been inadequate to create farmer knowledge of and demand for new varieties, seed is delivered to farmers as a required in-kind component of crop production credit without educational promotion Farmers who do not use crop production credit (i e , at both the lower and upper ends of the economic scale) obtain seed through various means, including purchase from PBDAC

6 1 2.7 Rice breeding has produced varieties with relatively good milling and cooking quality and high yields The Rice Research and Training Center at Sakha is a first-class facility installed by EMCIP, and cooperates with IRRI With abundant Nile irrigation water in the Delta, rice could help supply basic food needs in the North Delta, due to its high yield potential High-tillering IRRI varieties as base breeding material could significantly reduce seed use, if levelling paddy fields is encouraged and transplanting (used in about half of the area) is expanded Rice yields are high and productivity has moved up, but erratically National average yields were

1960--5 30 mt/ha
1970--5 28
1982--5 66
1983--5 76
1984--5 21

During this period, yields increased much faster in other parts of the world An exhaustive analysis of breeding strategies and production and pricing policies seems to be needed

6.1 2 8 ARC maize breeding focused on composites of single-variety and multi-variety open-pollinated progenies, but turned to hybrids in recent years These are rather tall, high-yielding white dent or semi-dent hybrids, adapted to human consumption and stover supply Yields of hybrids are relatively high, average yields of maize varieties and hybrids grown under supervision of the Agrarian Reform and Land Reclamation Institute are shown in Table 3

Table 3
Maize Yield in Areas Supervised by the Agrarian Reform and Land Reclamation Institute

Variety (V) or Hybrid (H)	Area planted (feddans)	Average yield (ardebs/fed)
Hybrid 310 (H, ARC)	267	25 00
Pioneer 514 (H)	81,639	21 15
Karnak (H, Pioneer)	28,955	20 99
Hybrid 215 (H, ARC)	1,455	20 47
Giza 2 (V, ARC)	55,402	19 29
Hybrid 202 (H, ARC)	1,937	16 00
Local varieties (V)	43,685	12 79
Total	**213,340**	
Average		**18 89**

6.1.2.9. Pioneer Overseas Corp (POC), a wholly-owned Egyptian branch of the US company, has conducted maize breeding research in Egypt for several years Its produces inbred lines and doublecrosses, and sells them under a license agreement to Misr Pioneer, which then produces hybrid seed for sale to farmers Misr Pioneer is a joint government/private-sector Egyptian seed production and marketing company, in which Pioneer owns part stock National Seed Co and Egyptian Seed Co indicated that they are beginning private maize breeding programs

6 1.2.10. Yellow maize is produced only in small restricted, newly-irrigated areas, it is prohibited in traditional maize-growing areas Yellow hybrids imported from comparable latitudes reportedly yield less than local varieties, and are susceptible to a local late wilt disease caused by the fungus *Cephalosporium maydis*, which occurs only in India and Egypt

6.1 2 11 Variety development is also conducted on barley, sorghum (grain and forage), onion, tomato, watermelon, green beans, faba beans, and berseem clover, the most important crops

6 1 3. Variety Testing and Registration

6 1 3 1. Before varieties are approved for seed production and marketing, they must be tested and prove to be improved, in standardized ARC trials during 3-years at "B and C levels" The B level is at research stations across Egypt, while the C level is at additional locations, including farm trials After the third year, the variety is approved or rejected on the basis of its comparative performance, if approved, release is permitted The 3-year period of ARC testing may delay approval of a variety, especially in modifying a hybrid by switching one or more inbred lines for reasons other than yield However, this policy is consistent with that of many other countries, which consider it necessary to ensure that premature release of a inadequately-tested variety does not cause economic disaster to farmers, such as recent losses caused by disease susceptibility of a new rice variety and an imported tomato variety

6 1.4 Breeder, Foundation, and Registered Seed

6.1.4.1. Breeder seed to maintain the variety, is produced for ARC-developed varieties by careful small-scale multiplication under supervision and direct control of specified ARC breeders

6.1.4 2 To maintain trueness-to-type in Breeder seed, other countries produce seed for several years in one season and hold it in long-term conditioned storage Small amounts are taken from storage and multiplied each year to provide the following year's Foundation seed, the next seed class in multiplying varietally-pure seed into quantities adequate for farmer use Breeder seed maintenance requires adequate long-term storages, which ARC does not have Required is a relatively small storage with continuous temperature of -5 to -10 (minus 5 to minus 10) degrees C, and relative humidity of 25% or less The Genetic Resources Section at Bahteem could also preserve Breeder seed, once its facilities are rebuilt to proper specifications

6.1 4 3. Foundation seed, multiplied from Breeder seed, is used to multiply Registered seed Production must be carefully supervised to maintain genetic identity and prevent genetic drift Production and supervision has been by ARC breeders in programs in the various crop sections This has not given the required results, because it needs much of the breeder's time, large production areas and volumes which must be supervised, lack of facilities for drying/conditioning/storage, lack of an overall Foundation seed program to conduct and coordinate activities, and lack of special personnel trained in crop science and seed technology As a result, both breeding research and Foundation seed production are less efficient Quality of Foundation seed is said to be sometimes below-standard, which affects quality and cost of both Registered and Certified seed

6 1 4 4 Foundation seed is produced on State Seed Farms under ARC breeder supervision, inspected by CAS, conditioned at ARC EMCIP and Rice seed plants, and held there in nonconditioned storage until used to plant Registered seed production fields There are no technically-suitable storages for Foundation seed, either for unconditioned or conditioned seed All seed is now disposed of in the year following production, leaving no reserve to respond quickly to changing conditions Conditioned (artificially cooled and dehumidified) storages are not required, under Egypt's relatively desert conditions, 2-3 years safe carryover storage could be provided in properly-designed and constructed ambient storages, provided seed are handled properly and insects/pests are properly controlled

6 1.4 5 Registered seed is produced from Foundation seed Registered seed is normally produced by State Farms, when additional seed is required, CAS, in behalf of PBDAC, the financing

agency, contracts and supervises farmer seed-growers to produce the required seed

6.1.4.6. Registered seed is handled and conditioned primarily on ARC EMCIP and Rice plants Conditioning capacity for Foundation and Registered seed is adequate, but these plants do not have the capability to condition much berseem clover seed, also, they would inflict considerable mechanical injury to seed such as faba bean or soybean, and the number of plants (total of 5 plants, one with 2 "lines") may present problems of mechanical admixture during handling, and increase transport costs With adequate maintenance, these plants should be able to handle the required volume of Foundation and Registered seed of the primary cereal crops There is, however, a serious need for improved conditioning for Foundation and Registered cottonseed and some other field crops such as soybean, faba bean and ultimately clover Also, the ideal situation, technically and cost-wise, would be to have smaller plants located at each station/farm which produces adequate quantities of Foundation and/or Registered seed ARC sells Registered seed to CAS, which then supplies it to farmer-growers contracted to produce Certified seed Price of Registered seed is the same as the price of Certified seed If adequate private-sector seed companies existed, CAS could sometimes contract with them for the production of Registered seed

6.1.4 7 Cotton Foundation and Registered seed are produced on State Farms, under ARC supervision, mostly in Lower Egypt Seedcotton has been transported to Sakha for ginning and seed processing, and is then redistributed to various locations which produce the different varieties

6.1 4.8 Foundation single-cross seed of maize is produced by the ARC Maize Section's Seed Unit, and sells them to private-sector seed companies who produce double-cross seed for farmer use This Unit also sells them Foundation seed of the open-pollinated variety Giza 2, which is expected to be phased out The Maize Section has developed 2 new white-grain, high-yielding single-cross hybrids, and is producing and selling to farmers the single-cross seed, because of the higher technology and supervision required As private-sector capability develops, the Maize Section expects to sell inbred lines to the private sector, which will then produce and sell the single-cross hybrid to farmers

6.1 5 Certified Seed Production

6.1.5 1 Registered seed is planted by contract farmer-growers to multiply Certified seed, which is planted by food-producing

farmers Certified seed production is financed by PBDAC, which owns and receives the raw seed, pays EAO and CAS to condition it, and then distributes it to farmers CAS organizes production in behalf of PBDAC, arranges contracts with farmers to produce seed, supervises production, tests samples, and otherwise performs Certification or supervision activities Farmers contracted to produce Certified seed may be independent or in groups Average field size is 4-5 feddans, but it is difficult to find the required number of fields this large among the more than 10,000 growers involved

6.1 5.2. In 1988/89, 114,530 feddans of farmer fields were contracted for wheat seed production, 108,248 mt of raw unconditioned seed were expected, about 50% of total yield at average crop yields Actual amount delivered varies, the expected is based on CAS experience Although production is contracted, if the base (wheat grain) price plus the expected bonus for producing seed is not sufficently higher than local market price, seed deliveries fall Seed deliveries range 57% - 37% of average farmer yields, depending on whether seed grower yield averages are 1 57 or 2 4 mt/feddan Rice seed delivery ranged 58% - 63% of expected crop, under yields of 2 7 - 2 5 mt/feddan in 1988-89 This forces CAS to contract more than double the field area which should be requiredto produce the required seed, thereby increasing CAS operating costs CAS has tried to raise its price and bonus structure to encourage higher deliveries by contracted farmers However, this is said to be as much a cultural response as a market response, as farmers are used to delivering only part of their crop to the government under previous policies Perhaps some of this undelivered seed is later used as seed, but apparently most of it is used as grain An in-depth study should be made of the end use of this undelivered seed, and how farmers can be motivated to deliver more of it to the organized seed program

6 1 5 3 Prior to harvest, contract farmer fields are inspected to determine if the seed crop is of the proper variety and the field meets standards It is reported that 15 - 20% of the contracted fields are rejected However, not all fields are inspected, there have not been field standards for some crops, passing field inspection is not required by Ministerial decree for acceptance of the seed produced, there have not been standard procedures for inspecting fields, inspections have been made by breeders and researchers, and problems have been caused by lack of operating funds and vehicles

6.1.5.4. Farmers deliver raw seed to the assigned PBDAC Shona (village open storage) bank, where it is received and stored CAS samples and tests the seed for purity and germination, this usually requires about 3 weeks, averaging 20 days, for test reports to be received at the PBDAC Shona bank Wheat seed passing this test, usually 98 - 99 % of the total, is transported by PBDAC (with contracted public transport in open trucks) to a conditioning plant of CAS, EAO or ARC, as assigned by CAS, which organizes conditioning to get maximum use from the few available plants On arrival, it is sampled and tested by cAS for moisture and cleanliness, usually 1% or less is rejected It is then conditioned, without specific separation or identification by field or origin as practiced in Certification, divided into lots of specified weight after conditioning, and bagged (100-kg jute bags for wheat, 80-kg jute bags for rice, 15-kg woven plastic bags for maize) CAS samples and tests the cleaned seed, through the CAS Seed Testing and Seed Certification Departments Seed lots are Certified after being conditioned and passing the final test for purity and germination of the cleaned seed Clean seed is stored at the plant until favorable test results are received (usually 2-3 weeks), when PBDAC transports it to the desired Shona bank for delivery to farmers as credit-in-kind

6 1 5 5 Total rice, faba bean, lentil, soybean and cottonseed delivered to PBDAC Shona banks for conditioning and/or Certification in 1988/89 was

Crop	Seed Delivered
Wheat	109,950 mt
Rice	66,877 "
Faba bean	9,766 "
Lentil	939 "
Soybean	6,055 "
Cottonseed	99,399 "

6 1.6 Seed Certification and Quality Control

6 1.6 1 CAS's General Administration for Seed Certification conducts Certification Implementation of the Seed Law and seed Certification are now combined into one operation, relatively little regulatory sampling/testing of seed in marketing channels is done, and facilities, staff and budget are not adequate for separated operations

6.1 6.2 Seed Certification is conducted according to standards established in Decrees Nos 85 and 90, with yearly amendments to establish pure live seed standards for cottonseed, and other seed when necessary to insure adequate seed supply Only laboratory tests are legally considered in accepting seed for Certification, field standards have just been established for wheat, and will be applied in the 1990 crop Seed Certification requires high physical purity and germination, but primarily insures genetic purity and identity by roguing fields, inspecting fields, requiring specific stock seed, tracing/identifying all seed as to its origin, and limiting generations of seed multiplication after Breeder seed Certification must include a complete quality control sequence, inspecting fields for detasseling of maize hybrids is not sufficient, as it does not ensure knowledge of parentage from generation-to-generation, which is the basis of Certification

6.1 6 3 The Certification Unit at CAS has been separated from Production This should improve efficiency and independence of seed Certification, as soon as inspectors are adequately trained, varietal descriptions are adequate to permit effective roguing and inspection, operating funds are adequate, field inspection methods are specified and standardized, inspection procedures are formalized, vehicles for inspectors are available, conditioning plants are adequate to make all required separations, in-plant quality control is effective, and testing labs are adequate

6 1 6 4 Field inspection has been implemented only during the last few years, and wheat variety descriptions, field standards and field inspection procedures have just been prepared Before this field inspection, high amounts were rejected at PBDAC Shona banks In 1984/85, 54 5% of wheat seed was rejected, in 198/89, 44 6% of maize seed from private companies was rejected Field inspection is complicated by the large number of contract farmers and small fields which must be inspected

6 1 7 Seed Law Implementation

6 1 7 1 Seed Law implementation is now primarily in marketing vegetable seed, litle-used for field seed Seed may lose quality at any time it suffers deteriorative conditions, so all seed should be subject to Seed Law regulation during marketing and distribution, whether the seed is Certified or non-Certified, produced by government or the private sector If not expressly requested, seed for export need not be Certified, but should meet Seed Law and Plant Quarantine requirements Most vegetable seed in world trade is not Certified, most countries Certify little vegetable seed, and

exporting firms try to ensure high quality of seed bearing their brand names, to ensure market acceptance All seed, however, must meet Seed Law and Plant Quarantine requirements

6.1.8. Seed Testing

6 1.8 1. CAS's General Administration for Seed Testing makes laboratory seed tests at 3 laboratories called Seed Testing Stations, at Tanta, Giza and Minia Three additional laboratories are planned at other locations, Assiut, Mansoura and Zagazig, where buildings for them are ready and awaiting NARP suppy of equipment Most lab work is in testing cottonseed Facilities are obsolete, and equipment and procedures need major improvement to improve speed, repeatibility and efficiency Information and test results are manually processed and sent to CAS-Cairo, where an ICL minicomputer with 4 workstations and limited capacity compiles the data and issues reports Personnel at seed testing stations need in-depth training in improved germination and purity analysis procedures, seed health testing, etc Procedures are said to be within ISTA guidelines, but operating constraints often change actual practices so results may not be reproducible within tolerances Operations are affected by lack of equipment, personnel training, sample handling facilities and procedures, excessive germination tests, and slow record/report handling Reporting procedures can be improved dramatically by computerization with micro-computers under NARP's Seed Technology Component

6.1 8 2. Internationally, in-plant seed quality control (testing received seed to determine acceptability and payments to growers, conditioning requirements, identifying small lots for blending, sampling/testing during conditioning to ensure proper separation, improving operating efficiency, etc) is done at small special in-plant quality control labs Due to lack of facilities and trained personnel, in Egypt this has been done by the service labs, which should be testing only conditioned seed in Certification and Seed Law implementation activities The service seed labs thus spend time and effort on testing normally done by in-plant quality control The service/control labs are already inadequate for needs

6.2. Conditioning and Marketing

6 2.1. Conditioning

6.2.1.1 Infrastructure

6.2.1.1 1. Seed conditioning plants, in all seed industries, play a central role in development of the seed industry and farmer acceptance of improved seed CAS coordinates and implements MOA seed policy by assigning conditioning of various crop varieties to specified plants of CAS, EAO, and ARC Primary criteria are (1) to get seed conditioned as good as possible and have it ready when farmers need it, and (2) minimize the number of varieties at each plant, since present poor facilities make it difficult to prevent mechanical admixture A major part of wheat and rice seed is "conditioned" at commercial rice mills, due to lack of adequate seed conditioning plants CAS Department of Ginning and Processing is responsible for coordinating allocation of seed to the plants, to try to clean seed within the required time periods and minimize mechanical contamination

6 2 1 1 2 Cottonseed is a by-product of operations of 71 commercial gins of Delta, Masr, Arabeya, Sharkheya, and Nil public companies in the Ministry of Economy CAS personnel at the gins supervise seed handling TheFoundation or Registered seed used to plant Certified seed fields comes from the very old Sakha gin of the ARC Cotton Research Institute

6 2 1 1 3 CAS does not have sufficient facilities to condition all seed, in 1987, it conditioned about 14% of the Certified seed CAS conditioning is under the Department of Ginning and Conditioning EAO conditions most "Certified" field crop seed (75% in 1987) PBDAC pays EAO and CAS for conditioning seed, at LE 6 18/ardeb for wheat, LE 6 10/ardeb for rice, and LE 23/mt for soybeans ARC conditions Foundation and Registered seed, and some Certified seed in its EMCIP and Rice plants The number of plants is misleading as to conditioning quality, capability and capacity CAS reports that all seed are not conditioned, relatively clean farmer-run lots of some crop seed are sold without conditioning, seed of much cotton and groundnut are not mechanically conditioned due to lack of special equipment

6.2.1 1 4 Some private firms condition maize and sorghum-sudan hybrid seed, 3 firms have plants, and 2 new plants are

planned Two firms have their maize hybrid seed conditioned at EAO Tanta and Nuba Seed plants Misr Pioneer also conditions berseem clover seed for other companies

6.2 1 2. Needs

6.2.1.2.1. Basic seed conditioning operations are similar, regardless of crop seed However, differences in crop seed physical characteristics and lot size (which depends not only on the total amount of seed, but to limitations applied by Certification quality control and testing, based on statistical procedures) require different equipment and procedures for different seed kinds Egypt needs 3 distinct types of seed conditioning

6.2.1.2 1.1. Field crop seed Most field crop seed is handled in large volumes, with specific conditioning sequences according to crop Egypt has a wide range of field crops requiring high-quality seed to reduce land required and production costs Because of relatively large lot sizes, field crop seed can be cleaned on higher-capacity machines As some "vegetable" seed such as beans and peas are handled by basically similar methods, those handled in large amounts can be classed with field crop seed for conditioning purposes

6.2 1 2.1 2 Cottonseed Cottonseed, especially in Egypt, requires (1) ginning, (2) acid-delinting, and then (3) conditioning Ginning removes seed from lint, acid-delinting removes linters from seed and makes them free-flowing, when they are free-flowing, the seed can be conditioned in a regular field-crop conditioning plant to remove low-quality seed Cottonseed can be included in calculations of total conditioning required, but normally a separate conditioning plant is established for cottonseed (because of scheduling problems, 1-variety requirements, and safety related to acid treatment), which increases total conditioning facilities required

6 2.1.2 1.3. Vegetable seed Except for seed such as peas and beans, vegetable seed is usually handled in small quantities, some seed also require special treatment or handling to make them flow freely Vegetable seed in small lots are conditioned with lower-capacity machines, because seed conditioning requires time to adjust machines properly (normally, seed cleaned during initial adjustment is returned to the machine after it is properly adjusted)

6.2.1 3. Conditioning Season

6.2.1.3.1. The "conditioning season" is the period from delivery of seed to the conditioning plant until seed must be delivered to the distribution system Under Egyptian conditions of inadequate plants and accumulation of seed in Shona banks, conditioning does not begin until all seed of a variety is harvested and in the Shona bank When an adequate number of conditioning plants are operating and seed can be delivered directly from growers to the plants, this may be changed Days available for conditioning are not the number of days in the year/season/trimester, but the number of days between the time seed conditioning can begin, and the time seed must be delivered to the distribution system

6 2.1.3.2. Conditioning time requirements are presently reduced by not properly conditioning seed, cleaning at grain methods For example, EMCIP plants use primarily the pre-cleaner and the air-screen cleaner, often bypassing the cylinder separators, precision graders, fractionating aspirators, and gravity separators, sometimes, the treater is also bypassed The total calendar days required can be reduced by operating more shifts per day (which would require improved incentive or salary payments to staff), or by good management with permanent staff who could increase the daily number of full-capacity operating hours This, however, depends on improving the staffing pattern, training staff, permanent workers, improved receiving systems, improved records, etc

6 2 1 4 Manageable Size

6 2 1 4 1 Capacity of present facilities is inadequate for needs Capacity of conditioning is extremely difficult to estimate in general or practical terms Capacity of machines is usually given for "grain cleaning", which is rough cleaning, "fine seed cleaning", as required for Certified seed of higher quality and yield potential, is less, usually 50-60% of "grain cleaning" capacity, but varies with seed lots and with what and how much must be removed Measuring seed conditioning as "capacity per hour", either for specific units or as a national total, has no relevance to practical operations, especially in operating cost-efficiency "Per-hour capacity" is only a general administrative measure, if used, minimum calculated needs are often multiplied by 400% to obtain reasonable practical requirements for actual operations This is due to several factors (1) The seed program uses

conditioning plants only as a tool for one aspect of overall requirements, other operating needs determine the amount of seed which can be handled by a plant without constraining other operations or seed delivery/quality, (2) Conditioning plants must be located in producing areas to minimize transport costs, save time in receiving/delivering seed, and help integrate overall operations, (3) The overall program management and genetic-identity maintenance capability determines the total amount of seed which can be handled by a plant, not its capacity at so many hours per day over the year, for example, in Thailand and other countries, plants are intended to handle 2,500 mt of seed in 2 seasons per year, because the small-farmer-contract-grower system and other program aspects make this about the amount which a plant can handle efficiently while ensuring quality and genetic purity, (4) Seed conditioning is seasonal (as are all other agricultural tasks) and can be done only between harvest/delivery and planting/delivery Seed conditioning capacity should be determined by program needs, which should be organized so economic amounts are produced in a cost-effective radius of the plant, in most countries, a conditioning plant is assigned 2,500 - 5,000 mt of seed during a 2-season crop year Per-hour capacity is extremely variable and difficult to estimate, but general statements for cleaning different crop seed are shown in Table 4, based on a conditioning plant whose "design capacity" is 5-7 5 tons/hour of wheat, involving grain cleaning with machines whose capacity is so specified by manufacturers Each seed plant should have the normal margin of 100% extra capacity (which costs relatively little more to install and operate, as choice of equipment models is limited) so they can provide custom conditioning services to farmers and cooperatives which develop seed programs

Table 4
Estimated Conditioning Output & Time Requirements

NOTE

Based on a plant with "design capacity" of 5-7 5 tons/hour of wheat, assuming that all required cleaning/separating machines are balanced in capacity (in Egypt, presently only the GTZ plant in Sakha is so-balanced)

Assumes that lot sizes (i e , quantity of similar-quality seed) is adequate to permit such conditioning,)

Assumes that proper cleaning is done, rather than simple grain cleaning, days shown will not match present time requirements, because present cleaning is "grain cleaning" and in many cases on inadequate equipment, poor receiving and handling facilities, etc

CROP	TOTAL SEED NEEDS (mt)	ESTIMATED AVE CAPACITY/HR	EST. TIME REQ'D	
			HOURS	DAYS*
Barley				
Irrigated	7,476	3-4	2,136	356
Bean broad	14,275	2	7,138	1,190
Winter veg	(40)		20	4
For beans	(14,235)		7,118	1,187
Bean, grn string	3,298	2	1,649	275
Bean, green	1,140	2	570	95
Nili	(318)		159	27
Summer	(490)		245	41
Winter	(332)		166	28
Bean, dried	449	2	225	38
Nili	(186)		93	16
Summer	(235)		118	20
Winter	(28)		14	3
Chickpea	1,133	3	378	63
Clover,				
berseem	70,174	1 5	46,783	7,798
Full-season	(49 299)		32,866	5,478
Short-season	(20,875)		13,917	2,320
Cotton	75,671	4 (AFTER ACID DELINTING)	18,918	3,153

TABLE 4 ESTIMATED TIME REQUIRED FOR PROPER CONDITIONING (continued 2)

CROP	TOTAL SEED NEEDS (mt)	ESTIMATED AVE CAPACITY/HR	EST. TIME REQ'D	
			HOURS	DAYS*
Cowpea, green	164	2	82	14
Nili	(64)		32	6
Summer	(99)		50	9
Winter	(1)		1	1
Cowpea, dried	302	2	151	26
Nili	(105)		53	9
Summer	(197)		99	17
Fenugreek	792	15	528	88
Flaxseed	1,920	3	640	107
Groundnut	1,408	REQUIRES SPECIAL EQUIPMENT		
Jute, Malta	68	15	46	8
Nili	(29)		20	4
Summer	(38)		26	5
Winter	(2)		2	1
Lentil	1,440	2	720	120
Lupines	750	2	375	63
Maize	29,625	4-5	6,584	1,098
Nili	(7,889)		1,754	293
Summer	(21,736)		4,831	806
Okra	196	2	98	17
Nili	(4)		2	1
Summer	(192)		96	16
Winter	(0 2)		1	1
Pea, dried				
Winter	301	3	101	17
Pea, green	670	3	224	38
Nili	(1)		1	1
Summer	(1)		1	1
Winter	(698)		233	39
Rice	55,438	4-5	12,320	2,054
Nili	(57)		13	3
Summer	(55,381)		12,307	2,052
Sesame	104	2	52	9
Sorghum	4,125	3-4	1,179	197
Nili	(102)		30	5
Summer	(4,023)		1,150	192

TABLE 4 ESTIMATED TIME REQUIRED FOR PROPER CONDITIONING (continued 3)

CROP	TOTAL SEED NEEDS (mt)	ESTIMATED AVE CAPACITY/HR	EST. TIME REQ'D	
			HOURS	DAYS*
Soybean	4,762	4-5	1,059	177
Sugarbeet	487	2-3	195	33
Watermelon	183	1	183	32
Wheat	88,945	4	22,237	3,707
"Good" lots		5		
"Difficult" lots		3		

6.2.1 4 2 In most countries with successful seed programs (e g , Thailand, Brazil, India), a seed conditioning plant--which serves as the hub of seed production/handling/supply--handles 2,500-5,000 mt of seed per year At this level, management personnel can balance all seed program components so operations are efficient and seed quality is high

6.2.1.4.3. Farmer needs, agricultural patterns and locations, and seed industry operations/components in Egypt should limit plant capacity to 2,500-5,000 tons/year Under existing seed crop production systems, size of farms, and other agro-economic factors--without consideration of seed program operations, which should improve significantly over the next few years--no seed conditioning plant should be forced to handle more than 2,500 - 5,000 tons annual output of cleaned seed, based on 2 cleaning seasons and including all crops, in the organized (i e , at this stage, government) seed program In most countries with developing seed programs, this is the amount that can be managed under a typical effective management/control/record/ reporting system

6 2 1.4.4 After farmers learn the benefits of high-quality, properly-conditioned seed, planting rate of most crops can be reduced This will reduce the total seed use, which will reduce the conditioning plants required However, this reduced planting rate does not affect present conditioning requirements, as time will be required to educate/convince farmers to use the new rates By the time most farmers use lower planting rates, some equipment will be ready for replacement Instead of replacing it, the plant can be decommissioned, and remaining equipment and/or parts of machines used as replacements in remaining plants (NOTE this assumes that the logical plan of all plants of similar equipment and layout) The critical objective, at this stage, is to introduce new seed technology so seed quality can be improved and total seed use ultimately reduced The extra cost of a few plants which are later decommissioned is minor in relation to the benefits, and represents a greater degree of economy than is sometimes found in long-term development and major technology transfer This is especially true, since these plants probably will not be decommissioned until after their normal lifespan has been completed

6.2 1 5. Support to Private-Sector Development

6 2.1 5.1 Since much seed is farmer-produced, national production goals are better-achieved if each plant has the

normal margin of 100% extra capacity (which costs relatively little more to install and operate, as conditioning machines are available in relatively limited ranges of models) to provide "custom" conditioning services (charged on a per-kg basis) in the early operating years of farmers, firms, and local cooperatives who develop seed production, they usually cannot afford to build even small-capacity conditioning plants This is an easy means of improving seed quality, building a seed industry, and promoting small-scale private-sector development This service should also be offered to larger, international private seed firms who normally prefer to begin operations without the large investment of a seed plant, thus, they can determine potential market growth more effectively, so plants they construct later are better-suited to actual conditions This form of private-sector support has been practiced in other countries in developing private-sector seed supply, in Egypt, this was done to help establish Misr Pioneer and is still done to support private seed firms such as some supplying clover seed

6 2.1 6. "Dedicated" Plants

6 2 1 6 1 Quality-oriented seed Certification requires high-quality Foundation and Registered seed It is internationally-accepted practice for special conditioning plants to be "dedicated" solely for Foundation or Registered seed Regardless of "overcapacity", these plants are designed to prepare the required amount of seed by the required time In Egypt, adequate numbers, types and locations of conditioning plants are required solely for Foundation or Registered seed, without having to handle Certified or other seed Each Research Station and State Farm which handles reasonable quantities of Foundation and/or Registered seed should have a small but adequate conditioning plant, so that its seed can be conditioned properly within the optimum period, without risk of contamination by mingling different seed classes

6 2 1 7 Plant Location and Seed Transport

6 2 1 7 1 Seed conditioning plants should be sited over the country in a strategic network so no seed is transported more than 25-50 km from growers to the conditioning plant More seed plants need to be located in different areas, to reduce seed transport costs and help develop local seed production Locations of some plants do not match present seed production/use patterns Some areas that could produce seed do not have plants, some plants do not meet local needs For

example, although one EMCIP plant is in Sakha, it cannot condition clover seed, clover seed from this area is transported to Sids for conditioning, and then transported back to Sakha

6.2.1 8. Replacing/Renovating Plants

6 2 1.8 1 Equipment wears out and must be replaced, urbanization takes place, cropping patterns change, labor costs increase, etc All affect seed handling and conditioning Seed plants should be replaced after a reasonable period, under Egyptian conditions estimated at 15 years, some machines require more frequent replacement At the time of replacement, the location should be critically evaluated, and the new plant moved to a different location if this can improve service to farmers and operating efficiency

6 2.1 9. Operation and Management

6 2 1 9 1 Operations need to be better-organized, in terms of cost-efficiency, handling seed safely, reducing time required, improving clean-out between lots, records and reports, operations supervision, quality control, maintenance of equipment, etc

6 2 2 Seed Storage

6 2 2.1 At conditioning plants and throughout seed receiving and distribution, technically-adequate storage is not available Seldom is seed, either conditioned or unconditioned, stored under cover, most is stored in the open under tarpaulins Several reports have commented on the negative effect this has on seed quality Poor storage and the resulting quality loss is probably one reason farmers overplant At the distribution level, there are some 759 Shona banks with 4,253 open-air village stores, and 515 open-air district Shona banks These facilities are valuable because of their dispersed location and availability of land, but are inadequate technically

6.2.2 2 CAS intends to build technically-proper storage at new seed plants constructed under NARP EAO is building bulk silo storage for 6,000 mt at its Tanta plant and is adding 3 feddans to its open storage, but these are not technically proper designs for safe seed storage, they are simply storages

6.2.2.3. For safe storage, seed must be kept dry, cool and protected from pests The one factor which has permitted Egypt to

continue without properly-constructed storage is that it has a desert climate, with low relative humidity, very rare rain, and low moisture conditions Egypt naturally receives the benefit of very dry storage conditions

6 2.2.4. Improved, technically-proper storage is needed at all phases of seed supply, but is of secondary priority until other critically-needed infrastructure is improved To protect seed from the high temperatures, ground moisture, birds, pests, the occasional light rains and direct sun rays, technically-adequate storage should be built as soon as other infrastructural improvements are completed and budgets can be obtained However, it would not be good planning, nor in the interests of support to private sector development, to build improved storages until it is definitively determined what the role of government agencies and the private sector will be, who should operate the storages, locations where storages of specific sizes and for specific purposes are needed, and what type of storages are needed

6 2.3 Seed Distribution

6 2 3 1 Public-Sector System

6 2 3 1 1 The public marketing and distribution system for Certified seed is mostly through PBDAC, including seed produced by both government and private sector PBDAC, in fact, is the government seed producer/supplier, with CAS arranging and supervising production, and CAS/EAO/ARC conditioning seed on a custom fee basis Seed are delivered to PBDAC shouna banks from conditioning plants, and held until delivery to farmers PBDAC supplies fertilizers, pesticides, seed and other inputs as credit in-king crop production credit No promotion or marketing efforts are made by PBDAC, CAS, or EAO The Land Reform program also distributes a considerable amount of seed to farmers in the land reform areas

6.2 3.1 2 PBDAC is interested in getting out of seed distribution In 1989/90, it charged LE 2/ardab to distribute wheat, rice, and faba bean and lentil seed, but raised the commission charges to the private sector from 7% to 15% on consignment sales, to pressure the private sector into developing its own distribution network of dealers PBDAC will implement a US$91 million project for warehouses and expenses, of which US$ 40 million is World Bank-funded US$21 9 million is earmarked for warehouses for feed, grain, and seed, some will

be available in 1991 PBDAC intends to lease facilities to the private sector for seed storage

6 2 3 1.3. PBDAC income from seed has been

	1984	1985	1986	1987
Income from seed (LE 1,000)	2,711	2,329	2,903	3,927
Seed % of total income	2 4	1 9	1 9	2 6

If PBDAC general expenses are charged to the seed account relative to the percent contribution to revenues, the value of these contributions is

	1984	1985	1986	1987
Contribution of PBDAC's General Expenses to the Seed Account (LE 1,000)	4,506	3,811	5,054	8,966
Contribution of PBDAC's General Expenses to Seed Account (LE 1,000)	2,690	1,564	2,048	2,891

6 2.3 1 4. In 1986, PBDAC showed a real itemized seed operations cost of LE 3,693,000, for a net loss of LE 790,000 In 1987 and 1988, on total income of LE 3,927,000 and LE 5,136,000, respectively, PBDAC showed profits on seed of LE 67,000 and LE 284,000, respectively In the last 3 years, bonuses paid to PBDAC employees were LE 1,065,000 in 1986, LE 1,229,000 in 1987, and LE 1,455,000 in 1988, which reduced PBDAC's net profit

6.2 3.1 5. Vegetable seed are sold to farmers by PBDAC, 600-700 dealer-merchants, and importers The importers also sell small (1/2 to 1 0 kg containers) to dealer-merchants, who re-sell to farmers through their shops Nuba Seed Co , a government firm, produces and packages vegetable seed for sale to PBDAC and private dealers, and maintains a small sales force

6.2.3.2. Private-Sector Seed

6.2.3.2.1. Most of the 6 private-sector seed companies, including one joint government/private firm (Misr Pioneer), are operated by former employees of MOA, or have close ties with MOA Three have conditioning plants and condition their maize and sorghum seed, another firm conditions maize seed for others Two firms do not have plants, their seed is custom-conditioned in Government plants None of these firms has a marketing/distribution network, their seed is sold through PBDAC or Land Reform, which buys seed directly, distributes it to farmers, and absorbs the cost of excess seed Misr Pioneer is developing a sales and distribution network for part of its seed, but most of its seed still goes to PBDAC and Land Reform No promotional marketing is conducted by PBDAC, farmers are required to take seed as part of their crop production credit package PBDAC charges 7% of seed cost for distribution, a private distribution system would probably cost much more, as commissions through a private distribution network of dealers, absorbing cost of excess carryover seed not sold, and in market promotion, thus, this is a direct subsidy to private-sector seed firms Credit-in-kind is being de-emphasized as a matter of policy, but still exists It should be changed so that firms who so wish can set up an independent distribution system

6 2 3 2 2 The PBDAC system benefits private firms, as they are immediately paid with no marketing effort However, it makes private seed firms only contract growers who are dependent on PBDAC, and seed is distributed according to PBDAC decisions, so use of seed produced by private firms is restricted Also, PBDAC in-kind credit prevents farmers from buying from other private-sector merchants if they need production credit, so firms are limited in expanding their market share However, government has begun a gradual policy of letting private firms market part of their seed, to gradually build up private-sector marketing without creating a supply vacuum A form of in-kind credit of issuing a "voucher" to be exchanged at any registered seed merchant for a specific quantity of seed would eliminate the problem of credit, enable private firms to build an independent distribution network, and give farmers a choice of seed The PBDAC network reaches 3 5 million farmers with a subsidized infrastructure that could not be matched by the private sector until after it has spent years developing local merchants as retail seed dealers

6 2.3.2.3. All private seed companies produce and supply non-proprietary hybrids and varieties developed by ARC This eliminates varietal distinction of competitive marketing Misr Pioneer (joint government-private sector) now produces its own maize hybrid, 2 private-sector firms indicate they are developing their proprietary maize hybrids

6 2.3.3. Farmer-to-Farmer Seed Exchange

6.2.3.3.1. Farmer-to-farmer seed exchange, or farmers using seed/grain they save themselves, is of unknown dimension but seems very large For example, some 70,000 mt of berseem clover seed is used annually, except for some 8,000 mt, this is handled by local merchants or is supplied without quality control by farmer-to-farmer exchange As in other countries of small-farmer agriculture, farmers commonly keep some grain seed for home consumption, as a cultural matter of eating their own crop The contracted seed crop not delivered to CAS is reportedly little-used for farmer-saved seed

6.2 3.3.2. In every agricultural society, especially of small-medium farm size, farmers are of several levels of financial ability and willingness to accept/spend cash for improved technology inputs There are many sub-divisions and classifications, but a broad, general classification is

6 2 3 3 2 1. The better, more financially able farmers actively seek improved technology and inputs which yield more

6.2.3.3.2.2. The next lower group adopt improved technology and inputs after they see their neighbors (usually the respected better farmers of higher financial means, the local leaders) adopt them and produce more

6 2.3 3 2 3. Another, still lower, group will adopt improved technology and inputs after they see others use it, and they are given intensive promotional/extension education on its benefits

6.2.3 3.2.4. The lowest economic/educational level of small farmers will never adopt, on their own, improved technology and inputs which must be purchased for cash These are the farmers who save their own seed or exchange with neighbors for grain-seed This group can never be raised to organized high-efficiency production, in some countries, they are given

improved seed at no cost, or there are active programs to re-multiply Certified seed and provide this "good, higher-yielding but still not of Certified quality" seed to the low-group farmers in a 1-1 seed-for-grain exchange Considerable study has been conducted on their acceptance of improved technology, and potential for developing them in seed production Despite many experiments, this group of farmers has seldom if ever been improved to the point of becoming leaders and/or users of high technology such as required to produce seed They are simply below the financial/ educational/motivational level required, and seldom are even successful contract seed growers The only apparently successful means of getting these farmers to use higher-yielding seed and inputs is free, closely-supervised supply in poor-farmer development projects Such farmers have never, on any large scale, been improved to the point of organization into volume suppliers of high-quality seed, they are simply users of grain seed An industry to supply high-quality seed cannot be built on such farmers, it must be based on well-organized and financed agri-business, using the better levels of farmers as contract growers

6 2 3 3.3 Considerable but unknown amounts of certain vegetable seed are apparently produced by better farmers, cleaned in some fashion, usually by hand, and sold in locally-available containers Some larger producer/dealers package in paper or polyethylene bags or sealed cans, seed moisture content, critical to maintaining viability in sealed containers, is not known Some of this seed is tested by CAS for purity and germination

6.2.4 Seed Marketing

6.2 4.1 Seed marketing is described in Section VII

6 2 5 Seed Subsidies

6.2 5.1 Direct seed subsidies were LE 4 15 million in 1988, and LE 5 million in 1989, a small sum compared to fertilizer subsidies of LE 237 million for fertilizer or LE 107 6 million for cotton pest control in 1987-88 Seed subsidies could be terminated with little adverse effect on farmers, as seed is a small part of production costs CAS reports that direct seed subsidies were dropped in 1990

6 2.6. Bilateral & Multilateral Technical & Financial Assistance

6.2.6.1. The government seed program has gone for a long period without adequate support, but is or has recently received technical and financial assistance from (1) USAID, United States of America, EMCIP and NARP grant projects providing seed plants, training, and technical assistance, (2) GTZ, Federal Republic of Germany, grants for seed plants, training, and technical assistance in Kafr El Sheikh Governorate, and (3) a French loan for seed plants

6 2.6 2. Technical and financial assistance, except an IFAD-loan to EAO for seed plant, has been channeled through CAS, which coordinates it to fulfil Government's long-range seed development program and policy, which aims to develop infrastructural support services to create an environment in which the private sector can function better

6 2.7. Extension

6.2.7 1 Agricultural Extension is under the Ministry of Agriculture for coordination and overall planning, but extension work is directed from the Governorates There are some 12,000 workers, one officer theoretically covers 500-700 feddans, with one supervisor for each 8 officers and one inspector in each district Each Governorate has 6 Agricultural Extension Departments rural development, animal production, field crops, minor agricultural projects, extension programs, and extension aids These are repeated at the national level Three General Directorates coordinate regional efforts one in the Delta, at Tanta, one in Upper Egypt, at El Minia, and the Central Directorate in Cairo

6 2.7.2. There is no operational budget in MOA for Extension, its funds theoretically come from the Governorates In practice, the only operational funds available are from supervised credit financed by PBDAC in 12 Governorates Total funds for for this fiscal year are LE 760,000 for extension work and LE 1,250,000 for intensified agricultural activities NARP will build on this base to strengthen the technology transfer system Unless a more solid financial base and restructuring of the system is achieved, it is doubtful that it can work efficiently

6.2.7 3. Seed extension to expand farmer use of improved seed does not appear to be an objective of Extension There are no specific projects, no institutional linkages, and transfer of seed information from ARC/CAS to farmers

6.2 7.4. Greater private sector seed supply requires changes in Extension policies The private sector lacks orientation in establishing extension activities, demonstrations, publications, and promotion A major reorganization in Extension promotion of seed use is needed The public and private sectors must cooperate in defining scopes of work, impartially informing farmers, training seed dealers, and creating farmer awareness of the potential of new varieties, market opportunities, and advantages of high-quality seed of improved varieties

6.2.7.5 A critical seed extension need is education of farmers in seed quality and deterioration, farmers need to be educated on high seed quality, and how to value it realistically, in "truth-in-labelling", sources of good seed, and how to procure them, production costs including seed, and their interactions and relation to yields, and market prices

The farmer is an independent entrepreneur who needs appropriate information and inputs to optimize the farm enterprise he manages Seed Extension is essential information and technology transfer, and requires far more attention than it has received

VII. STRUCTURE OF THE SEED INDUSTRY

A brief but comprehensive description of the structure of the seed industry is included under Section VI Economics of Seed Use, as part of the description of why seed costs are as presently structured

7.1. Structure of Markets

7.1.1. Structure of the Seed Industry

7 1 1.1. Public-Sector Seed Industry Components

7 1.1 1.1 Ministry of Agriculture: The MOA (Figure 1), as it relates to seed, has 4 main components concerned with variety development, multiplication, financing, distribution, and quality control (A) the Agricultural Research Center (ARC) develops new varieties and multiplies them through Foundation seed (B) CAS administers government seed policy, advises ARC on required Foundation and Registered seed, plans, supervises and contracts with farmers to multiply estimated Certified seed needs, in behalf of PBDAC, which finances production and owns the seed, coordinates and implements seed Certification, implements seed quality control by sampling seed at conditioning plants and operating testing labs, and coordinates conditioning by assigning different crop/variety seed to various plants so as to minimize mechanical contamination (C) Within the general authorities and production companies or "semi-autonomous agencies", EAO conditions Certified seed according to the plan developed by CAS, and produces/conditions some vegetable seed The Nuba Seed Co (a government enterprise) produces vegetable seed for domestic use (D) PBDAC is the actual owner of the seed which CAS organizes and supervises, and handles financing, storage and distribution

7 1 1 1 2. Agricultural Research Center (ARC) ARC has 17 research institutes and support organizations It develops and/or introduces improved varieties, tests them throughout the country, produces and supplies Breeder and Foundation seed of its varieties, and produces some Registered seed Its 4 EMCIP plants were intended to condition Foundation seed, but due to the shortage of plants they also condition Registered and Certified seed There is close organizational linkage between ARC and CAS, the CAS undersecretary is also an ARC deputy director-general ARC has a network of Regional Research Stations with 31 Secondary Stations Total personnel is near 24,000, reportedly including some 2,500 Ph D 's

7.1.1.1.3. Central Administration for Seed (CAS) CAS is based in Giza , with offices in Governorates (Figure 4) CAS implements MOA's seed policy, after MOA estimates the areas to be planted in various crops in the next season, CAS calculates the seed required at ARC-recommended rates, CAS then contracts with farmers to produce the required "Certified" seed, and supervises its production for PBDAC About 50% of production from contracted farmers is delivered to or accepted by PBDAC Shona banks CAS has recently made a limited number of field inspections on wheat and some other crops to assure that seed meet standards, but passing field inspection has not been an official criterion for acceptance At harvest, farmers deliver seed to the assigned PBDAC Shona bank CAS plants conditioned 16,000 mt MT Later it is sampled by CAS, and sent to the assigned conditioning plant for conditioning CAS samples conditioned seed and tests it at its official, service-type labs When test results are received, seed is moved to the assigned Shona banks for supply to farmers as credit in-kind

7 1.1.1 4 Egyptian Agricultural Organization EAO conditions Certified seed for PBDAC, according to the conditioning schedule developed by CAS PBDAC pays EAO a fee per ton of seed conditioned In 1987, EAO conditioned 48,000 mt of wheat, 52,000 mt of rice and almost 10,000 mt of faba bean seed EAO imports agricultural inputs, fertilizers, pesticides, and seed including some 25% of all vegetable seed imported, and breeds and sells Arabian horses

7 1.1.1.5. Principal Bank for Development & Agricultural Credit (PBDAC) PBDAC owns seed produced by farmer contract growers under CAS supervision PBDAC provides credit for farmer contract seed growers, receives at its Shona banks the raw seed harvested by contract farmers, stores it before conditioning, delivers seed to conditioning plants, receives conditioned/tested Certified seed, transports/delivers it to the assigned Shona banks, stores it until sold to farmers, provides credit to farmers, and issues seed as credit-in-kind to using farmers PBDAC distributes fertilizers, pesticides, animal feeds and new jute bags for Certified seed, seed is a small part of its operations, but it has a major role in seed production and supply

7 1 1 2 Private Sector

7 1.1 2.1 Private-sector seed industry components include

7.1.1.2.1.1. Registered seed companies which produce and condition field crop hybrid seed, and some vegetable and forage seed

7 1.1 2 1.2. Registered seed companies which import/export, and sometimes produce and distribute vegetable and berseem seed

7.1.1.2.1 3. Merchants with permits (licenses) to sell seed at retail, some also produce seed

7.1.1.2.1.4. Farmers who contract to produce seed under the program organized and supervised by CAS

7.1 1.2 2. Six registered seed companies produce hybrid maize, hybrid sorghum-sudangrass forage hybrids, hybrid sunflower, and in some cases vegetable, berseem clover and alfalfa seed

7 1.1.2 3 Four firms have conditioning plants for their seed, and condition seed for other companies El Nil and Danton do not have conditioning plants, their seed is conditioned in Government plants

7.1 1 2 4. Nuba Seed Co is government-owned, and operates under the public agricultural sector Egyptian Seed Co has about 2,000 private shareholders, mainly agricultural college graduates, who own 80% of the shares, public organizations (EAO, commercial credit banks, and the Agricultural Reform (Land Reclamation Institute) hold the other 20% National Seed Co shares are owned by National Bank 50%, Commercial Bank 10%, Egypt (Misr) Bank 20%, Mohandes Bank for Insurance 5%, PBDAC 10%, and 5% are held by private individuals Misr Pioneer Seed Co shares are owned by Pioneer Overseas Corp 70%, Agrarian Reform Organization (a government agency) 24 5%, and private individuals 5 5%

7 1.1 2 5 Fourteen private-sector companies and EAO (public sector) are registered for seed import/export and wholesale marketing They import and distribute seed, some also produce vegetable seed locally EAO imports about 25% of all imported vegetable seed, with 75% imported by the other companies Seed are imported from USA, Holland, UK, France, Denmark, and Japan

7.1 1 2.6 Licensed retail seed merchants number 600-700, according to one importing firm, a directory is being prepared,

but does not count the number of merchants listed Some have small stores and sell both locally-produced vegetable seed from other companies and their own produced vegetable and spice seed, in paper bags Imported seed is sold in original cans or metalized envelopes All seed is labelled to show purity, and often germination and date of analysis Some stores also sell seed by weight from open bags

7.1.1.2 7 Some vegetable seed producers condition seed manually with hand sieves, pack it in paper bags, and sell through their own retail stores, others work through a distribution network, producing seed on their farms, and contracting additional production with other farmers

7.1.1 2 8 The nature of farmer-to-farmer seed supply is unknown as to size and extent The fact that most berseem seed and a large quantity of field crop seed are supplied this way indicates that many farmers save their own seed and probably also supply seed to other farmers, especially higher-value seed such as berseem It is also reported that Government provides a considerable amount of grain for use as planting seed

7 1.1.3. Legal Seed Framework

7.1 1 3 1. Agrarian Law No 53 of 1966 is the legal base of seed legislation It is implemented through MOA Decrees Nos 85, 86, 87, 88, 89, 90, and 91 of June 15, 1967, and No 61 of October 10, 1968 Articles 33 and 98 of Law No 231 of June 28, 1988 pertain to violations registered under Law No 53 Decree No 820 of August 10, 1988 was added Annual cotton rules are issued by MOA to fix production areas for variety, establish levels of pure live seed, and establish other matters

7 1 1 3.2. Law No 53 is a broad agricultural law, with articles pertaining to seed, apparently based on and emphasizing production, conditioning, and distribution of cottonseed This law, with its decrees, has regulated seed activities in a policy of Government intervention at all levels, with heavy Government participation It is inadequate to cope with situations that may arise from participation and coexistence of an active private sector Decrees perfect the Law's details, but do not change its main body An exception is Decree No 820 of 1988 that formalized the existence of the present public sector seed production and delivery system Some private sector activities such as research, property rights on varieties, and extension promotion were covered briefly in Decree No 820 They are not

complemented by other pre-conditions required for a uniform, complete, coherent legal framework on which the private sector can depend and use to guide decision-making Progressive privatization of the seed industry requires precise policies and definitions in the Seed Law itself Decrees may be rapidly changed by Ministerial decision, the Law provides a permanent legal structure and long-range stability in government policy, essential to potential investors

7.1.1.3.3. Present legislation does not provide incentives to the private sector such as registration, special investment and operation credit, and taxation benefits for investment in seed as a priority activity, as are found in some other countries It is basically somewhat similar to older seed laws in many developing and even developed countries, which are essentially consumer protection, protecting farmers from unscrupulous traders at times when no serious private-sector seed supply had been established

7.1 1.3 4 A private-sector seed industry requires precise definition of its and government's roles, and clear and stable rules Government can expedite private-sector development by declaring its support and cooperation and providing firm incentives in legislative form A well-structured Seed Law should be enacted, with the minimum number of articles required to make it structurally functional, so that it expresses policy and long-range direction Operating regulations, which require more flexibility, should be defined in Ministerial Decrees issued under the Law as necessary Operating procedures could be implemented through Departmental Orders and Manuals The Seed Law should formulat the National Seed System envisioned to replace the old system, as both a political philosophy and a practical approach

7 1.2. Seed Sources

7.1 2.1 Farmers obtain seed from

7.1.2.1 1. The public seed delivery system through PBDAC, includes seed produced by both the public sector and private seed companies

7 1.2.1.2 Private dealers, in the case of vegetable seed, recently, some hybrid maize and sorghum seed produced by private firms moves through their beginning system of outlets

7 1.2.1.3. Farmer-to-farmer trade of seed-grain or home-saved seed, and grain supplied by government for seed use

7.1.2.1.4. Seed-grain saved by farmers for their own use

7.1.2.2. The PBDAC seed delivery system is tied to crop production credit and supplies inputs as credit-in-kind, so PBDAC is in fact a wholesale distributor, retail supplier, and a source of credit The policy of linking credit to input supply is being relaxed, but this system still supplies inputs in-kind to most farmers, as alternative sources have not yet developed on a large scale Even private seed companies use the PBDAC seed distribution system, farmers who get credit must take seed as credit-in-kind, PBDAC village banks reach over 4,000 villages, and it is a low-cost distribution system for the private sector, through the indirect subsidy of PBDAC's low 7% charge for seed distribution This charge has recently been increased to 10%, ostensibly to encourage the private sector to develop its own distribution systems However, this will srve only to hamper the private sector production, as it adds to their operating costs without resolving the basic issue, which is that farmers who obtain productin credit need to be able to buy their seed from any of different sources, including private-sector suppliers As soon as this is permitted, the private sector will be able to establish distribution networks and be assured that farmers can buy from them The disadvantage for private-sector seed firms is that PBDAC limits their growth by restricting each company's seed to certain areas and limiting the amount of seed from each company

7 1 2.3. Private merchants licensed to sell seed number about 1,400, one vegetable seed wholesaler stated that he deals with 600-700 retail merchants A directory of the seed industry is being prepared, but does not include a count of licensed seed merchants Recent government policy gradually opens seed marketing so as not to disrupt seed supply to farmers, Misr Pioneer is developing a dealer network, but still moves most of its seed through PBDAC and Land Reform

7 1.2.4. A large amount of seed apparently is grain or farmer-saved seed For example, berseem clover is the largest single crop, an estimated 86% of berseem seed is handled outside the government seed distribution system Total value of grain used for seed is unknown Farmer-saved seed-grain, plus farmer-to-farmer seed-grain exchange may account for nearly 50% of the seed of cereals and food legume crops (Table 5) Studies are needed on seed-grain usage, its quality, and how it can be improved to

increase crop production Value of farmer-source seed of the 5 major crops (wheat, rice, broad beans, and lentils) is estimated at LE 46,000,000, compared to LE 64,000,000 value of these same seed handled through the CAS-supervised system

7.2. Domestic Market

7 2.1. The domestic market is described under Structure of Markets above The extent of seed movement and use is shown in previous sections and in Appendices

7.3. Exports and Imports

7 3.1 Imports

7.3 1 1 About 148,000 fed (62,160 ha) is planted to potato, with an average yield of less than 20 MT/ha This requires some 175,000 mt of seed, mostly imported from Holland, Germany and U K Locally-produced seed give reduced yields because of virus infestations associated with sucking insect vectors All hybrid vegetable seed are imported, as is much non-hybrid vegetable seed 15 companies import vegetable seed, including some F1 hybrid seed Farmers, probably the better market-oriented ones, readily accept this seed, even at prices ranging from 20 times the price of non-hybrid tomato seed to 3 times for cucumber, and 2 times for melon Market farmers are said to prefer imported seed over locally-produced seed

7 3.1 2 Problems mentioned by seed importers are mostly government control and financial, although improved facilities, technology and personnel training should generate significant operational improvements Testing and registering vegetable varieties before seed can be imported may delay introduction of new varieties and reduce options of importers for different sources of varieties However, this is justified to ensure getting disease-resistant varieties, as amply demonstrated by the recent disaster with tomato production Introducing higher-yielding varieties could be speeded-up by streamlining testing/registration The need to use black market dollars to complement dollars available

Table 5
Sources of Seed Used by Farmers

(CAS, 1987)

CROP	SOURCES OF PLANTING SEED USED (%)		
	FARMER-SAVED	EGYPT SEED PROGRAMS	IMPORTED
Artichoke	100	--	--
Barley	85	15	--
Bean, broad	50	50	--
Bean, green	100	--	--
Bean, dried	100	--	--
Beet, garden	7 5	--	92 5
Cabbage	80	--	20
Carrot	74	--	26
Cauliflower	88	--	12
Chickpea	100	--	--
Clover, berseem	100	--	--
Colocasia	100	--	--
Cotton	--	100	--
Cowpea	100	--	--
Cucumber	40	--	60
Eggplant	91	--	9
Fenugreek	100	--	--
Flaxseed	100	--	--
Garlic	70	--	30
Jute, Malta	100	--	--
Lentil	40	60	--
Lettuce	99 97	--	0 03
Lupines	100	--	--
Maize	70	30	--
Mallow, Egyptian	100	--	--
Mallow, Jews	100	--	--
Melon & cantaloupe	59	--	41
Okra	100	--	--
Onion	30	70	--
Pea, green	94 5	--	5 5
Pea, dried	94 5	--	5 5
Groundnut	70	30	--
Pepper	96	--	4
Potato	20	--	80

TABLE 5 SOURCES OF SEED (continued 2)

CROP	SOURCES OF PLANTING SEED USED (%)		
	FARMER-SAVED	EGYPT SEED PROGRAMS	IMPORTED
Radish	100	--	--
Rice	40	60	--
Sesame	85	15	--
Sorghum	90	10	--
Soybean	--	100	--
Spinach	95	--	5
Squash	99 8	--	0 2
Sugarbeet	84	--	16
Tomato	58	--	42
Turnip	100	--	--
Watermelon	97	--	3
Wheat	50	50	--
AVERAGES	**78 81**	**13 11**	**7 86**

from banks to open seed import Letters of Credit increases seed cost Government fixing of prices for imported vegetable seed, but not of locally-produced seed Imported seed are more expensive than local seed, and have a 10% import duty Some importers are representatives of, or deal exclusively with, specific foreign companies With appropriate incentives, they could possibly develop joint ventures with foreign suppliers and produce seed in Egypt for export and local use However, this is contingent on developing local business laws conducive to free-market investment and operations, local seed-industry support services, a local pool of technically competent personnel available to these firms, ready availability of seed equipment and supplies at reasonable cost, ready repatriation of fees and profits, and removal of government price-fixing

7 3 2 Exports

7 3 2 1 The Nuba Seed Co and National Seed Company export some vegetable seed to neighboring Arab countries such as Yemen, Oman Dubai, Sudan Some export berseem clover seed Misr Pioneer exports seed to Gulf countries, and plans to export berseem seed to its sister company in Pakistan Except for small quantities of vegetable seed, and larger amounts of berseem clover seed, it does not appear that Egypt can enter foreign seed markets Vegetable seed export would require producing seed of foreign varieties and hybrids, importing stock seed and formal arrangements with foreign firms Despite excellent growing conditions for vegetable seed, prevalence of virus diseases and marketing would perhaps be limiting Joint-ventures with international seed companies with good marketing organizations would be required for export seed production This would require strong legislative protection of breeder's rights and varieties to encourage these companies to send stock seed to Egypt, investment incentives and elimination of disincentives to encourage investment in seed facilities and operations in Egypt

7.4. Barriers to Seed Policy Implementation

7 4 1 Breeding Research and Variety Development

7 4 1 1 Breeders must spend too much time on mechanics of producing and handling Breeder and Foundation seed, and in field inspections They should be freed of these day-to-day tasks, so they can concentrate on research and improving genetic materials They need support in readily-available operating funds, and high-level guidance in defined national needs and goals so breeding

work most efficiently resolves needs Long-term storage, perhaps combined with the Genetic Resources Unit, is required for Breeder seed Specific Breeder seed production methods, according to crop type, should be developed and followed Detailed variety descriptions are needed to guide field inspection and identification of offtypes

7 4.2 Certification

7.4 2.1. Implementation of Certification has deficiencies Certification is not producing expected genetic purity from the effort invested There is considerable potential to improve quality of seed under Certification through proper field inspection, roguing, origin identification, improved stock seed, improved testing and labelling, and other procedures which are normal parts of the accepted Certification process

7 4 3. Foundation Seed

7 4 3 1 Production and supervision of Foundation seed by ARC breeders in crop section programs has not given the required results, because of demands on the breeder's time, large production areas and volumes which must be supervised, lack of drying/ conditioning/storage, lack of an overall Foundation seed program, and lack of special personnel trained in crop science and seed technology As a result, breeding research and Foundation seed production are less efficient Quality of Foundation seed is sometimes below-standard, which affects quality and cost of Registered and Certified seed Better ambient storage and insect control are needed, to permit safe carryover of Foundation seed for up to 3 years

7 4 3 2 ARC staff complain of insufficient budget for adequate roguing, seed quality may be less than required by Law Field inspection, which has been stepped-up recently, is complicated by lack of field standards and field inspection methods, lack of trained inspectors, lack of vehicles and operating budget, and lack of requirement for proper field inspections

7 4 4. Registered Seed

7 4 4 1 Registered seed has many of the problems common to both Foundation and Certified seed Dedicated conditioning plants of the proper capacity and separation potential, do not exist, and storage is lacking Higher field and seed standards, combined with intensified roguing and field inspection, are needed

7 4.5 Certified Seed

7 4 5.1 Certified seed has the problems common to Certification, Foundation and Registered seed More intensive supervision, better facilities, close roguing and field inspection, origin identification, and labelling are required With bonus payments to seed producers at 40% for wheat and 32% for rice, seed receipts have not increased as expected Mixtures may be introduced by a few farmers, when their seed is pooled into larger lots, this reduces quality of a large amount of seed For 1989, bonus payments were reduced to 20% for wheat and 25% for rice, as the wheat base price went up considerably

7 4 6 Conditioning

7 4 6 1 Plant condition Few existing plants are in good condition, cost-efficient, or suited to Egyptian Certification requirements Many are old, worn, in poor condition, some have operated well beyond the depreciation lifespan of 15 years (some equipment lasts less time, some longer, for example, a treater lasts about 5 years, sometimes a 10-year depreciation life is used)

7 4 6 2 Suitability to Egyptian conditions Some plants are high-capacity, not suitable for Certification under Egyptian conditions Certification maintains origin and identity records of seed, small-grower lots, even combined by local area, cannot be properly separated when conditioned in high-capacity plants

7 4 6 3 Adequacy and cost-efficiency Some new plants are planned, and some are under construction, but the total does not satisfy needs, especially in view of the need to replace several existing plants to improve seed quality There is serious need to replace old and high-capacity plants with new cost-efficient plants more suited to Egypt's small grower system, to focus on seed quality rather than quantity Most plants are not "cleaning seed", but are "cleaning grain" with high losses to achieve desired purity

7 4 6 4 Capability to make required separations Plants report capacity in high figures, but this is usually only "grain cleaning" without using all machines normally used to clean Certified or high-quality seed Except for a few, most plants do not perform complete cleaning, they generally use only the pre-cleaner and/or basic air-screen cleaner, without using other machines to make a complete separation of all undesirable particles at minimum seed loss A complete cleaning sequence may reduce per-hour capacity,

because following machines require precise adjustments and generally operate at lower capacity To maximize capacity, seed quality is forced to be of secondary importance Even the complete "line" of separators in the EMCIP plants is often not used, only the air-screen scalper and basic air-screen cleaner are used, to get high capacity because of the lack of adequate conditioning plants and equipment

7.4.6 5 Equipment/component needs There are shortages of equipment and components (correct screen sizes, screens and screen cleaning systems in good condition, etc) Examples

7.4 6 5 1. Some 70,000 tons of clover seed is used each year, only 3 plants (Sids EMCIP, Sids CAS, and Nuba Seed Co vegetable seed plant) have roll mills to remove dodder seed, even though dodder is a common field and seed contaminant The roll mill at the Sids EMCIP plant is a small "pilot" model, fulfilling government's role to provide pilot facilities to guide the private sector, not providing adequate capacity Plant "design capacity" is 6 tons/hour, but the roll mill conditions clover seed properly and accurately at only about 0 35 ton/hour The Nuba Seed Co reports that it cleans about 1 ton per hour using the roll mill

7 4 6 5.2 Only the new plants have gravity separators in good condition (several have them, but in poor condition so they do not make acceptable separations) Gravity separators are required to remove light foreign material and dead seed from many crop seed

7.4 6.5 3. Few plants make effective length separations needed for small grain (wheat, rice, barley) seed Several plants (e g , EMCIP) have cylinder separators, but they do not make a complete (i e , remove both long and short undesirable particles) length separation, are difficult to adjust, have lower capacity, or are not in operating condition

7 4 6.6 Balanced separating capacity Some plants are not balanced", i e , all required separations cannot be made at a matched or balanced capacity For example, EMCIP plants have pre-cleaners and air-screen cleaners of about 7 tons/hour (at present usage rates, for close separations, capacity would be lower) capacity, but their gravity separators are at most 3 tons/hour, the Sids EMCIP plant roll mill would give about 350 kg/hour if used properly In conditioning, total output cannot be higher than that of the smallest machine

7.4 6.7 "Dedicated" plants No plants are dedicated solely to Foundation or Registered seed Due to lack of facilities, it is necessary to use plants for all classes of seed For example, the Sids EMCIP plant was established for Foundation seed, but handles all classes of seed for government programs and conditions some seed for private companies

7 4 6 8. Optimum plant capacity Due to lack of facilities, CAS considers 10,000 tons/year as desired output for each plant, based not on quality needs or plant management capability, but on the amount that must be put out with limited plants At this rate, 1986 production of 350,000 tons would require 35 plants Actual need is greater, due to technical/managerial/quality-control constraints, and needed seed quality improvement Under local conditions, it is not possible for a plant to handle 10,000 tons and maintain control of seed quality and identity as required by planned Certification to improve seed quality The technical/management system, as in other developing seed industries, cannot operate efficiently and maintain high seed quality when operating capacities are so high, due to

7 4 6 8 1 10,000 tons/year is more than developing seed programs (although this seed program has existed since before 1922, its inability to keep current and maintain/improve its technology, facilities and personnel classifies it as developing) can supervise/handle/manage at one location while maintaining seed quality They cannot maintain quality and implement harvest/delivery/handling cost-efficiently, and safely in terms of seed identity and quality Seed plants should complement overall seed supply, not be an end in themselves

7 4 6 8 2 Seed conditioning is seasonal, and must be completed between seed harvest and marketing/planting 10,000 tons annual output requires hourly capacity or operating periods which exceed management and logistic capability of most staff in developing seed programs to receive, form lots, feed into conditioning, handle out of conditioning, maintain identity, etc

7 4 6 8 3 Seed equipment is made in models whose capacities are practical under local--i e , U S or European--conditions To establish a high-capacity facility requires equipment which is more difficult to operate/maintain A few high-capacity facilities centralize plants and require excessive transport of both unconditioned and cleaned seed, thus increasing seed costs,

reducing seed availability and operating efficiency, and discouraging local seed production

7 4 6.8.4. Operating personnel in developing seed programs seldom can get maximum capacity from a seed plant, they more commonly get 50-75% of seed (not grain) cleaning capacity, if they make proper separations The result is that high-capacity plants often cost more and increase maintenance problems, without equivalent increase in output of high-quality seed

7.4.6.9 Conditioning capacity Plant capacity is reported as design capacity, which has little relationship to actual operating capacity Machines are rated at a "capacity" often based on grain cleaning which is "rough" and less precise, as contrasted to closer precise separation required for seed "Seed cleaning" capacity may be around half the "grain cleaning" capacity Effective capacity is further reduced when unconditioned seed has much waste material or broken seed to be removed Maximum capacity reported in actual operations by some conditioning plants is different from "design" capacity, even though "grain" cleaning as compared to "seed" cleaning is done Capacity is also misleading when reported as "capacity per hour", output is controlled by the number of hours the plant operates at full capacity (not half-capacity) during the time available for conditioning so seed can be ready for farmers at planting time

7 4 6 9 1 There is inadequate reserve capacity to permit expanding pure seed production of new seed crops

7.4 6 10. Operating staff Plants are not operated by permanent operators and workers, the labor contractor and daily-hire system results in poor operations, higher losses, lower seed quality, and increased conditioning costs

7 4 6.11 Full-operation time Because of unavoidable delays in moving/receiving/feeding seed, labor requirements, maintenance, clean-out between varieties, power outage, repairs, administrative activities, operations at reduced capacity, etc , full-capacity operations cannot be achieved for more than an average of 6 hours daily out of a workday of 8 hours, this level is high when considering the season as a whole Table 6 lists some unavoidable reasons why a seed plant cannot operate constantly at peak volume

Table 6
Some Reasons Why Seed Conditioning Plants do Not Operate at Full Capacity for All Hours of Operation

REASONS FOR NOT OPERATING, OR OPERATING AT LESS-THAN-PEAK CAPACITY
BEFORE/AFTER CONDITIONING OF A LOT.
1 Seed must be delivered to the conditioning plant
2 Seed must be analyzed and organized into large lots for conditioning
3 2-3 days are required to clean-up the plant when changing varieties or crops, to avoid mechanical mixtures
4 Equipment may require repairs, parts may be difficult to obtain or substitute
5 Time is required to move seed from storage and feed it into the conditioning system
6 Labor contractor problems may arise, and delay operations for several days or sometimes weeks
7 Adequate labor may not be available
DURING ACTUAL CONDITIONING OF A LOT:
1 Time is required to move seed from the storage and feed it into the conditioning system, this must be done by the same labor force which operates the plants, and often causes shutdown, delay, or reduced capacity
2 Time is required to adjust machines to get proper separation
3 Machines break down and must be repaired

TABLE 6 REASONS FOR NOT OPERATING AT PEAK CAPACITY (continued 2)

	REASONS FOR NOT OPERATING, OR OPERATING AT LESS-THAN-PEAK CAPACITY
4	Machines require lubrication, servicing, etc , this must be done by the limited staff during available working hours, and cannot be done while the machines operate
5	Electric supply failure
6	Temporary shortage of bags
7	Temporary shortage of treating chemicals (however, this usually does not cause delay, as seed are conditioned without treating)
8	Labor shortages, problems, etc , do not permit operation at peak capacity
9	Breakdown or unavailability of trucks, tractors and trailers, to move seed from storages to the conditioning plant
10	Administrative activities require short delays
11	Lack of close planning and management causes delays at the beginning and end of the workday
12	Plants often stop machines for breaks, lunch, etc , this is unavoidable under conditions of old outmoded facilities which require constant labor feeding, and do not permit filling bins and operating continuously with minimum supervision and labor
13	Holidays and religious periods close down plants, or result in reduced operations
14	Labor shortages, etc , cause plants to be operated at less than maximum efficient capacity

7.4.6.12. Organization Conditioning facilities are dispersed among agencies Coordination in planning, integrating and operating conditioning facilities needs to be improved, perhaps in a single administrative agency to maximize efficiency, reduce overhead, improve maintenance, and provide "custom" services to other agencies (production would also probably improve in efficiency if concentrated in one agency which can locate single crop/variety production in specific areas)

7.4 6.13 Fiscal incentives "Public-sector seed conditioning facilities do not operate under incentives which promote efficiency, and payments received by these plants do not promote adequate maintenance or replacement Managerial improvements would improve seed quality and operating efficiency Nevertheless, new facilities will be needed" (Winrock/USAID)

7 4 6 14 Spare parts and maintenance. Some relatively new plants already need spare parts Some plants were not adequately-designed for Egyptian needs, have equipment not used, lack adequate operating space and handling systems, show construction/ installation weaknesses, handle seed excessively and risk mechanical injury, and can--as they were meant to--satisfy only a small part of the needs, primarily of Foundation/Registered seed In general, maintenance is poor due to lack of spare parts, trained personnel and budgets

7 4 6 15 In-plant quality control Except for Pioneer, no seed conditioning plant has adequate internal or in-plant quality control facilities or operations This causes lower seed quality, lost time, increased operating cost, and unnecessary loss of seed

7 4 6 16 Location Several Governorates have no conditioning plants, even though they use large amounts of seed and should produce/condition seed, this prevents them from developing seed production Lack of conditioning also prevents development of the private sector, especially the most desirable kind--small-medium operations by Egyptians to serve local needs for a broad range of crop seed, including low-profit/high-volume crops not attractive to large multi-national seed firms The investment required for realistic dispersal of moderate-capacity plants throughout agricultural Governorates would be small in comparison to its promotional spin-off effect on developing seed production, private-sector participation, reduced seed transport costs, and reduced genetic contamination by separated handling/production

7.4.6.17. Conditioning & seed quality Seed physical purity standards are low in some cases, as compared with other countries, a direct reflection of lack of conditioning capability, with adequate conditioning facilities, seed mechanical purity could be improved and cleaning losses reduced For example, minimum wheat purity is 95%, with 1 0% weed seed allowed, with adequate conditioning, purity standards could be raised to the more common 98% for Certified seed, and weed seed reduced to 0 20% or other more common level Adequate conditioning facilities could improve seed quality, help farmers get better stands with less seed, and reduce weed problems by removing more weed seed from crop seed

7 4 6.18. Seed loss due to inadequate facilities High percentages of seed are lost in conditioning (Table 7), as compared to similar seed programs Excessive cleaning losses are largely due to poor condition and/or lack of proper equipment to make the required separations at the required capacity with minimum seed loss Excessive losses are partly due to poor equipment condition and lack of machines to make required separations Conditioning machines separate undesirable particles by specific dry-solid-particulate physical differences, when normally-used separating machines are not available and incorrect machines are used, good seed loss is higher, when equipment condition is poor, good seed loss is higher, when machines run at high capacities, loss is higher to achieve desired cleaning For example, average conditioning loss in wheat and rice seed should be around 5%, instead of the 14-22% losses here, other crops should show 5% - 10% cleaning loss Excessive conditioning losses are expensive, if the reported 22 2% loss in wheat were reduced to 5%, 17 2% more seed--17,200 tons in 1985--could be obtained "free", without increasing production area or total seed costs, as the seed lost has been produced by contract growers, and paid for

Table 7
Average % Loss During Seed Conditioning

(CAS, 1987)

CROP	AVE WEIGHT LOST (%)	TOTAL WEIGHT LOSS (mt, calculated)
Wheat	22 2	22,200
Rice	14 7	11,760
Soybean	15 5	930
Lentil	11 2	123
Broad bean	10 0	2,000

7.4.6.19 Operating hours Most plants work long hours during cleaning seasons, although facilities are inadequate and some seed must be cleaned by rice mills, they still get most seed to farmers on time However, the lack of facilities often prevents complete adequate conditioning, and seed quality is not as high as it could be Two shifts are not commonly used, the same permanent personnel work longer hours, with changes in laborers Personnel are not always paid, or receive incentives, for their extra hours/days of work Improved records will help detail exact operating times and corresponding equipment wear and depreciation Maximum use of the investment must be obtained, but it is poor management and balancing of fixed investment/operating costs if plants constantly work long hours and weeks They will not have flexibility to satisfy farmer needs in a timely manner (e g , shift to a different crop/ variety to meet unexpected demands, etc), new seed crops/ varieties cannot be added, labor costs are higher than capital costs of properly-used facilities, maintenance problems occur, seed quality is lower, seed supply to farmers is disrupted if mechanical/ power problems occur, time for clean-up is a problem, "short cuts" cause mixtures and contamination, and management is less efficient when maximum effort must be given to getting out large amounts

7 4 6 20 Custom conditioning for small-scale private-sector operations The present lack of conditioning facilities and poor/ inadequate equipment prevents adequate private-sector support CAS and ARC provide some custom conditioning, but their capability is limited This could be alleviated, and the private sector encouraged, by a national network of moderate-sized plants in strategic locations to provide conditioning services for farmers and in initial operations of small-medium Egyptian private seed operations This would require a moderate number (small in comparison to many countries) of conditioning plants, at carefully-selected locations

7.4.7. Storage

7 4 7 1 Seed must be kept dry, cool and protected from pests to keep them alive in storage Egypt has a desert climate, with low relative humidity, very rare rain, and low moisture, so it naturally has good dry storage conditions However, protection from soil moisture, direct sunlight, insects and pests is needed

7.4.7.2 Technically-proper storages for unconditioned and cleaned seed at conditioning plants and during distribution do not exist, at conditioning plants or at seed receiving and distribution sites Seldom is conditioned or unconditioned seed stored under

cover, most is stored in the open under tarpaulins Several reports have commented on the negative effect this may have on seed quality Poor storage and quality loss may be one reason farmers overplant, as seed undoubtedly loses germination and vigor in PBDAC Shona Banks, when stacked in the open air on the ground rather than on pallets or poles

7 4.7.3. The distribution system includes some 759 Shona banks with 4,253 open-air village stores, and 515 open-air district Shona banks These facilities are valuable because of their dispersed location and availability of land, but are inadequate technically. To protect seed from high temperatures, ground moisture, birds, pests, occasional light rains and direct sun rays, technically-adequate storage should be built as soon as other infrastructural improvements are completed and budgets can be obtained

7 4 7 4 Improved, technically-proper storage is needed at all phases of seed supply, but is of secondary priority until other critically-needed infrastructure is improved Seed is not now carried-over Technically-proper storages ultimately must be constructed, but at the present time most short-term storage needs can be handled temporarily by keeping seed off the ground on pallets, under roof cover to avoid direct sunlight, rain and ground moisture, and with good insect and pest control

7 4 7 5 It would not be good planning, nor in the interests of support to private sector development, to build improved storages until it is definitively determined what the role of government agencies and the private sector will be, who should operate the storages, locations where storages of specific sizes and for specific purposes are needed, and what type of storages are needed

7.4 7 6 Technically-proper storage will be included at new seed plants constructed under NARP EAO is building bulk silo storage for 6,000 mt at its Tanta plant and is adding 3 feddans to its open storage, but these are not technically proper designs for safe seed storage, they are simply storages

7 4 7 7 Breeder seed lacks appropriate cold-dry long-term storage facilities, adequate ambient storage specifically to hold Foundation seed safely for 2-3 years should be constructed in later phases

7.4.8. Marketing

7.4.8.1. A major constraint to developing a private seed marketing/distribution system is PBDAC's credit and seed distribution practices PBDAC reaches 3 5 million farmers with a credit and in-kind input supply system that could not be matched by the private sector, but competes with private-sector operations, the credit system also does not allow farmers to get credit from PBDAC and buy seed from private dealers

7.5. Product Differentiation

7 5 1. Technically, seed are classified as shown in Section 4 1 3 above

VIII. CONDUCT OF THE SEED INDUSTRY

8.1. Pricing of Seed

8 1 1. Two price-related problems occur in producing and selling seed, first, seed produced by farmers through contracts which must be sufficiently attractive for the farmer and cover additional production costs such as roguing and delivery to the PBDAC Shona bank

8 1.2. The system implemented by CAS gives a bonus above free market price of the product or grain Previously, official government price was used, but the free market price has recently been used, as it is often higher It is often more advantageous for the contract farmer to sell his grain on the open market, so CAS must contract for about twice the area needed, to fulfill its seed target This adds costs in Foundation or Registered seed, field inspection and general administration

8 1 3. In selling side, the cost of Certified seed production must be balanced against the price farmers will pay for the seed As a cost alternative, many farmers use their own or a neighbor's grain as seed Since seed of new, higher-yielding varieties are essential to increas production, as much improved Certified seed as possible must be distributed About 55% of wheat,and 80% of rice seed, are distributed through this system In 1989, PBDAC had an average of 16 0% of the seed remaining after the planting season About 9% of wheat seed(7,600 mt) and 6% of rice seed (3,550 mt) were unsold

8 1 4 Seed are supplied in-kind as part of a subsidized package of inputs including fertilizers, pesticides, and cash Since the main subsidy is fertilizer and cash at favorable interest rates, the farmer usually accepts the seed in order to get the other benefits, although he may not plant the seed

Table 7
Weight and Cost of Bags of Seed

Crop	Bag Weight	Cost (LE)	
		Per kg	Per bag
Jute bags			
Wheat	100 kg/bag, 10 bags/mt	2 10	21 00
Rice	80 kg/bag, 2 5 bags/mt	2 10	26 25
Faba bean	77 5 kg/bag, 12 9 bags/mt	2 10	27 10
Lentil	80 kg/bag, 12 5 bags/mt	2 10	26 25
Soybean	100 kg/bag, 10 bags/mt	2 10	21 00
Cotton	100 kg/bag, 10 bags/mt	3 50	35 00
Maize	30 kg/bag, 33 3 bags/mt	0 68	22 40
	15 kg/bag, 66 6 bags/mt	0 49	32 63
Plastic bags			
Wheat	40 kg/bag, 25 bags/mt	0 88	22 00
Rice	30 kg/bag, 33 3 bags/mt	0 88	29 30

8.2. Cost of Kafr El Sheikh Wheat & Rice Seed

8.2 1. GTZ made a detailed study of Certified wheat and rice seed costs in Kafr El Sheikh (KFS) in 1987/88,, when 9,287 mt of wheat and 8,455 mt of rice were processed

8.2.1.1. Additional costs to farmers who produce seed under contract to CAS A farmer entails 12% additional costs in producing and delivering seed, LE 25/ton for wheat and LE 26/ton for rice The bonus CAS paid to wheat farmers in 1989, including the extra bonus of LE 0 50/ton for each 1% germination above 94%, amounted to LE 81 37/mt, for rice, the amount was LE 50 16/mt The main costs to the farmer are weeding, roguing, and transport to the Shona bank CAS bonus is for these extra costs, plus additional income to encourage farmers to produce seed under contract

8 2 1 2 Transportation Certified seed , as presently handled, go through a series of movements EAO data for 1988/89 show the cost of moving seed from Shouna banks to their processing plants amounted to LE 14 37/mt for wheat and LE 16 66/mt for rice EAO transport costs are about LE 10/mt lower than calculated by GTZ for KFS, but EAO data cover a much larger volume of some 95,000 mt

8 2 1 3 Field inspection, laboratory analysis and Certification Costs are incurred in supervising and inspecting farmer fields by CAS personnel, normally at early flowering and again just before harvest GTZ based its calculations on more frequent inspections, and estimated a cost of LE 2 77/mt of seed delivered to the processing plant CAS estimates the cost at LE 1 0/mt, since the personnel involved have other duties and also perform some extension work during their visits When seed arrives at the receiving shouna, it is sampled and tested at a CAS seed lab Acceptable seed is sent to the conditioning plant ,where another sample is taken and tested after processing GTZ estimated the cost of this testing and certification at LE 2 72/mt, using only salaries and variable costs A post-processing quality control inspection has recently been instituted by CAS, to check seed quality in storage before selling it to farmers GTZ calculated this cost at LE 1 00/mt

8 2.1 4 Conditioning Seed are currently processed in 4 CAS plants, 8 EAO plants, 1 Nuba Seed Co plant, and 5 ARC plants GTZ studied 2 KFS plants and calculated wheat seed conditioning cost at LE 49/mt, and rice at LE 52/mt EAO calculated its costs at LE 31/mt for wheat and LE 38/mt for rice, but this does not include cost of new bags supplied by PBDAC at LE 21/mt for wheat and LE

26/mt for rice This brings sthe total EAO cost to LE 52 for wheat and LE 64/mt for rice

8.2 1 5. Cost of distribution In 1987/88, PBDAC charged LE 1 00/ardab of seed for distribution Not included are the costs for storage, transportation, fumigation, bags and interest This fee has been raised to LE 2 00/ardab for most seed and to LE 20/mt for soybean

8.2.1 6 Cost of CAS' general office CAS governorate offices oversee seed programs in the governorates, the headquarters staff coordinates the program andoversees testing and certification GTZ assigned a cost of LE 8 45/mt of seed for these costs

8 2.1 7 Total cost GTZ's calculations show the total cost of producing, conditioning and distributing Certified wheat and rice seed, in LE rounded to the nearest LE 1 00, as

	Wheat	Rice
Extra cost of contracted seed	25	26
Transport	89	82
Field insp , lab anal , cert	6	6
Processing	52	64
PBDAC distribution	7	8
CAS adminstration	8	8
	187	194

8 2 1.8 These figures show the real additional cost of producing seed, do not show the real cost to CAS of contracting production, or the bonus paid to get seed delivered This is related to extra costs the farmer incurs, but also depends on open market price The real cost of Certified seed as developed in the GTZ study should include the bonus rather than additional cost to the farmer

8 2.1 9. If the private sector takes over seed production, conditioning and distribution, it must perform and pay for

Field inspection and supervision

Transport from field to the conditioning plant

Storage until conditioned

Conditioning and packaging

Storage until distributed to dealers

Transport to dealers, or discounts for seed picked up by dealers

Payments to farmers on delivery

Financing inventory

General administration

Government taxes on profits

Government taxes on imports of equipment and spare parts

Present prices charged farmers for Certified seed would have to rise considerably for the private sector to be succesful would take over the certified seed business However, if government charged the real seed cost, it would be considerably more than present prices, and would help the private sector Seed are a small part of total crop production costs, less than 1% for cotton and 4-5% for wheat and rice The price of wheat seed would have to increase from the present 50% over the farm grain price to 100%, the cost of producing wheat would then increase between 2 and 3%, rice seed would increase from the current 80-90% over farm grain price to about 165% This would increase the cost of production by 4%

8 2 1 10 Potential savings that can be made in conditioning, distribution and transportation, as for example, by moving seed directly from the farm to the conditioning plant and from the plant to dealers
Concentrating seed production on fewer farms with higher delivery rate would reduce production costs to the company Administration costs, now about LE 54/mt, could be reduced Improved conditioning facilities would reduce conditioning costs and loss of seed

8 2 1 11 Subsidies and assistance to the private sector from the public should be considered to reduce the private sector's costs, including

Free seed testing by CAS

Concessional credit at rates

Pricing public-sector seed at full cost

Selling or renting conditioning facilities at concessional cost

Providing PBDAC storage sites and/or facilities, and/or special financing for private dealers to construct storage facilities

Duty-free importation of equipment and spare parts

IX. PERFORMANCE OF THE SEED INDUSTRY

9.1. Government Priority

9.1 1. With rapidly-increasing population and growing dependence on food imports, government gives high priority to developing a delivery system for higher-yielding seed and varieties

9.2. Performance

9 2 1 The seed industry has supplied large quantities of seed of most major crops, although it is inefficient in relative cost and operations, losses are high, seed quality is lower, facilities do not permit close management, quality control is inadequate, and considerable grain-producing areas are reportedly not planted to high-yielding varieties Supplying a higher percent of Certified (e g , varietally-pure high-quality) seed will effectively contribute to higher yields in crops such as wheat, faba beans and rice Technical sources in Egypt cite figures of improve dwheat varieties yielding 20% above present wheat yields, this supports a strategy of higher seed replacement rates

X. ANALYSIS OF FUTURE GOE & PRIVATE SECTOR ROLES

10.1. Future Government Roles

10.1.1. Overall roles of Government should be as defined and described elsewhere in this study

10.1 2. CAS, as the major coordinator and implementer of Government seed policy, has and should continue to have a major role, modified to more nearly fit the perceived model of the seed industry with increased private-sector participation Its present role as seed system administrator should be preserved, and it should continue to execute seed policies of the Minister of Agriculture in for planning, coordinating, promoting, and controlling concerned activities, and in interfacing with the private sector on a day-to-day basis It should simultaneously be a regulatory and promotional agency, and a seed production organizer as needed until private-sector production develops It should not be subsidiary to ARC, but a separate agency within the MOA

10 1 3 CAS should add the functions of intensified training, supply of technical information, and assistance to seed promotion through the MOA Extension Service CAS should also serve as Secretariat of the National Seed Policy-level Advisory body, and handle the seed management information system

10.1 4 CAS shoud implement the Seed Law, operate the seed testing service labs and the national referee lab, and implement Seed Certification, all as separate components It could also handle production and distribution of Foundation Seed

10.2. Future Private Sector Roles

10.2.1 Private seed industry development is already under way Its roles will, ideally, be as described in other sections herein To increase its participation will require

10.2 1 1 Opportunity for profits

10.2 1 2 Reduced risks, with minimum government interference, competition, change of rules, price fixing, and market distortion

10.2 1 3 Long-term assurance of secure investment

10 2 1 4. Legal operations under clearly-defined, stable legislative guidance

10 2.1 5 Fair competition, with no special privileges for any agency

10.2.1.6. Operations focused toward the common goals and needs of agriculture, society, and the country's development

10 2.2 To achieve these conditions, Government should adopt a policy specifying its support for and move toward them, including its declared intention of producing only those required seed not supplied by the private sector, and of phasing out its production as the private sector develops its supply of required seed This could extend to and include decommissioning and/or sale of government facilities and operations

10 2.3 Government should also ensure easy access to credit at concessional rates, and privileged taxation rights Seed supply is seasonal, with a turnover once or twice a year, at planting times, so its cash flow situation generates difficulties which should receive special attention Seed firms needs large amounts of capital, which is tied-up in seed inventories for long periods Such credit is not easily obtained, special sources, perhaps through PBDAC, should be developed, using seedstocks as collateral

10 2 4 Seed prices of seed should be based on the market, and be unregulated Any government subsidy should be paid directly to the supplier, rather than reflected in fixed lower seed prices

10 2.5. Government must positively state its specific support to attract the private sector into seed supply in a free market which does not require government intervention This can be expressed through

10 2 5 1. A government policy statement defining roles of government and the private sector

10 2 5 2 Strong incentives in credit, taxation, free pricing, and elimination of duties on processing plant and seed storage equipment and supplies

10 2.5.3. Updated seed legislation

10.2 5.4 Restructuring of Government agencies and assurance of eliminating potential government competition

10 2 5 5 Government should act single-mindedly once it is committed to a given policy and course of action, hopefully based on a consensus, and compromise, resulting from a National Seed Workshop Government would mean, in this case, not only the Ministry of Agriculture, but joining it the Ministries that would be responsible for Public Finance, Commerce, Industry, Exports-Imports, and Customs in the setting up of policies, and signing the Law It is crucial that government becomes an energetic promoter and actor of the privatization plan Without its support and backstopping the capacity of the private sector to thrive and grow, could easily break down and the objectives of privatization would be lost

10.3. Privatization

10 3 1. Certain parts of the seed supply industry, including production and conditioning of Certified and commercial seed for farmers, can and should be privatized This would save government funds, generate tax income, and create improved rural employment However, the seed conditioning system as it presently exists can never be successfully privatized In addition to the measures described above under the roles of the private sector, aimed at initiating and sustaining private-sector participation, the following considerations can expedite it Government's privatization policy should lead to reduced expenditure, rationalized public administration, greater dependence on market forces, and gradual marketization of agriculture This would lead to restructuring public-sector agencies, with policy and laws favoring the private sector

10 3 2 Privatization can be successful only if there is reasonable certainty that efficient operations and good management will generate a "profit", or return on the investment of money, time and skill This requires

10 3 2.1 Cost-efficient, well-managed operations and facilities which can produce high-quality seed of higher-yielding varieties at minimum cost

10 3 2 2 Seed and varieties for which farmers will pay a reasonable price which includes an adequate profit

10.3.2 3. General farmer acceptance and desire to use improved seed, so that a ready, real market exists

10 3 3. A private seed program revolves around the seed conditioning plant which receives/cleans/stores/handles seed, thus,

major facilities required are for seed conditioning, to support privatization, seed conditioning requires

10 3 3.1 Efficient facilities which can receive and handle seed safely at minimum cost and time

10 3 3.2 Effective separating capability, to ensure high seed quality with minimum loss of good seed

10.3 3 3 Cost-efficient operations, to work effectively and supply seed at minimum cost

10 3 3 4 Good management from harvest to marketing, to ensure supplying the required seed at the required time and maintain identity and purity

10 3 4. Present conditioning facilities are largely not suitable for private-sector operation, many are either

10 3 4 1 Old, worn inadequate, incapable of making required separations or receiving/handling seed movement efficiently, or

10 3 4 2 Too high-capacity to fit Egypt's operational needs and permit profitable private-sector operations

10 3 5 Disposal of old plants and establishment of a network of sutable conditioning plants would create a system which could be effectively privatized This could be best done after the facilities are established operations proven, and farmer demand demonstrated Privatization could be done unit-by-unit or block-by-block, preferably at incentive rates to stimulate development of local seed firms, and involve crops most suited to profitable seed supply This should be accompanied by a government study of means of, and action on, transferring personnel without loss of benefits, supporting services such as Certification, Seed Law implementation, training and seed testing, intensified extension-educational seed promotion to create farmer desire to buy improved seed, improved crop production credit so farmers can get credit and buy seed from any registered seed merchant, low-cost credit for capital outlay and operating costs of the seed industry, and improved laws regarding business management

10 3 6 Strategy Alternatives

10 3 6.1 Privatization of the present public seed industry activities could proceed as follows

10.3 6.1 1. Make special-rate credit available to private firms and merchants for constructing seed storages, provide operating credit using seed inventory as collateral, with the proviso that credit will be issued only so long as seed quality is maintained in the storage The government CAS-implemented seed program could provide specialized storage construction designs, assist and guide construction, provide regular quality control, and issue operating guidelines/ manuals

10 3 6 1 2. CAS should be maintained within the MOA to implement the national seed policy, directly reporting to the Minister of Agriculture It should plan, organize, guide, provide technical assistance, provide services to the private sector, and implement seed testing, seed law, and seed Certification Direct production functions should be transferred to a separate entity, perhaps registered as a company, if such a company could be structured so as to operate cost-efficiently and it could be organzied or transferred so that it would not compete with private sector activities or give preference to any one private-sector firm This agency, however, must provide required seed which is not produced by the private sector, and will probably operate at a loss, so it should receive reasonable and adequate budgetary support in addition to facilities and personnel Provisions should be included for sale or transfer of such company to the private sector, in accordance with appropriate Egyptian law

10 3 6 2 Alternatively, the following approach could be used

10 3 6 2 1 Consolidate all seed production and conditioning into a single government seed supply program, with all assets and personnel of present government seed operations This program would handle all operations of supplying wheat, rice, barley, soybean, faba bean, and food legume seed

10 3 6 2 2 Organize all seed control and regulatory activities into distinctly separate CAS units, separate from production

10.3.6 2 3 Because of its different nature, all activities of cotton seed supply could could be maintained in a separate new agency, or in a separate unit of the overall seed production, conditioning and supply agency

10 3.6 3. In any case, PBDAC's role as a seed distributor would be phased out as soon as possible, with gradual transfer of distribution to the private sector and the new government seed agencies PDAC seed-purchase credit to farmers should be in the forms of coupons for specified value, redeemable at PBDAC and/or at any registered seed dealer If PBDAC continues to supply seed, it must construct technically-proper storages at all sites, to ensure safe seed storage PBDAC may even rent/lease storage space to other seed distributors PBDAC must also provide specially-trained seed specialists to operate the storages safely

XI. FUTURE ROLE & STRUCTURE OF GOE & PRIVATE SECTOR

11.1. Government

11 1.1 Government's role should be that of promoting development of a healthy and vigorous seed industry with all possible commercial activities in the private sector Government should handle planning, consumer protection, education, support, and supply of seed not produced by the private sector The seed industry can be efficient, self-supporting, and serve the national economy and food production by supplying adequate high-quality seed at prices which are fair but still profitable Government strategy should focus on supplying high-yielding seed, this requires developing an efficient technical, administrative and operational infrastructure, establishing working relationships between the public and private sectors, establishing an adequate legislative framework, and improving the general business environment in which the seed industry must operate so privatization can be effective

11 1 2. Government participation for both the short-term and the long-range must include basic variety research, variety development and introduction, crop-related and basic research, seed technology research, providing investment promotional incentives and credit, maintaining Breeder and Foundation seed, Seed Law implementation so as to protect both farmers and seed suppliers, seed Certification implementation, training operating staff and seed specialists, extension seed promotion/education, service seed testing labs, referee standardization lab, plant quarantine, developing ongoing sources of equipment/spare parts/supplies, providing custom conditioning services for farmers and small private-sector seed operations, providing high-quality seed of "non-profit" crop varieties needed to produce the nation's requirements of food/feed/fiber, and providing business laws which can create a suitable economic environment for private firms

11.2. Private Sector

11 2 1 The role of the private sector will obviously be in activities which can, with efficient operation and good service, yield a profit commensurate with the effort expended and the risk taken, so that investment in the high-risk high-technology seed industry can compare favorably with other potential areas of investment Thus, the private sector will be involved primarily in commercial-type market-oriented production/supply/distribution/marketing of seed to

farmers Because of the built-in genetic protection of proprietary developments and its requirement for farmers to replace seed each crop, the primary opportunity for the private sector will be in hybrids This is presently limited to maize and sorghum, there exists adequate potential for hybrid vegetable seed supply, but lack of domestic production infrastructure/technical staff and widespread virus diseases make domestic production unlikely at this time The open-pollinated crops (wheat, rice, etc) presently offer little profit potential, because farmers are not required to replace seed every year, grain can be substituted for seed, seed prices are so low as to preclude adequate profit, and no organized intensive effort is conducted to promote use of improved seed However, once seed firms are established with efficient seed conditioning plants which have excess capacity, they can then gradually begin supply of "o-p" seed with existing facilities, as a means of spreading overhead costs This is not expected to be more than a small percentage of total seed requirements Once farmers are educated in the value of good seed, there should be ample opportunity in supply of properly-conditioned berseem clover seed, as well as for other forage crops and some staple crops

11 2.2. The private sector's role in the foreseeable future should be to handle the major part of the profit-generating, markete-oriented activities producing/conditioning/distributing/marketing hybrid seed and, as seed extension promotion develops the demand, of other crops and o-p varieties, both introduced and developed domestically, in certain crops, breeding proprietary varieties/hybrids will have potential, which should grow as seed extension promotion develops

11 3. NARP/USAID Assistance to the Seed Component

11 3 1 The overall goal of NARP is to UPGRADE the facilities of ARC and related agencies involved in developing and transferring improved, higher-yielding technology to farmers To achieve this, NARP provides improved facilities for conditioning field crop and cotton seed, equipment for testing labs, a referee lab, seed research, genetic resources maintenance, spare parts for existing plants, technical assistance, vehicles for seed and personnel transport, and training

11 3.2 Toward upgrading seed conditioning capability, the new field crop and cotton seed conditioning facilities and spare parts seem essential They should not only improve seed quality and reduce operating costs, but also generate facilities suitable for privatization when government can create other conditions required, and can be assured that the private sector will provide the "non-profit" seed for which these facilities are intended

11.3.3. The need for expanded testing services through service labs, in-plant quality control labs, and a referee lab is obvious, and should be implemented

11 3.4. Equipment support to seed technology research and germ plasm maintenance is essential

11.3.5. There is clear need for more complete and up-to-date information to support policy, management and operation of the seed supply system The computer system intended to expedite records and reporting is needed It should be kept as simple and uniform as possible in operations and equipment, because (1) most persons who will be involved have little or no experience with either computers or typewriters, and (2) in view of the potential for major changes in the seed supply system as government participation changes and privatization progresses, each unit should have the capability to stand alone, as it is not possible at this time to predict where some of the equipment will be placed before its operating lifespan is ended Recommendations of the AID/Washington data management specialists should be sought and incorporated

11 3 6 Improved transport is clearly required, both to deliver seed more rapidly, and to permit inspectors and supervisory staff to perform the required tasks The vehicles included are needed, and are clearly inadequate for the requirements As soon as possible, additional vehicles of the same types should be procured

11 3 7 Extensive training, both of specialists and operating personnel at all levels, is essential The numbers of trainees included in the NARP Seed Technology Component are inadequate for present needs, and will not generate a pool of trained manpower on which the private sector can draw, however, it is unlikely that enough persons with English language competence can be identified in time to complete training within the NARP project period In-country training should be increased, as should development of Arabic-language technical materials and guidelines As a future source of trained personnel (which, however, will not satisfy present requirements), a Seed Science and Technology Curriculum should be established in one Arabic-speaking country, adequate to provide in-depth intensive training for personnel of all Arabic-speaking countries The recommendations of the Seed Technology Training Specialist, presented in a separate report, should be followed

XII. RECOMMENDATIONS

12.1. Variety Recommendation & Release

12.1.1. Release of new varieties may be speeded up if a part of the 3-year testing period could be satisfied by tests in advanced stages of the variety development process This would require standardizing breeder testing procedures and testing under recognized conditions, with breeders rights protected so promising but not-yet-released proprietary lines could be entered in ARC trials Properly-conducted tests could permit faster release of new varieties, as well as assure reliable performance in farmer fields This would give farmers yield advantages sooner, if the seed supply system could simultaneously multiply seed and supply seed when the new variety is formally released However, except for maize and sorghum, this would apply only to ARC, as only ARC conducts breeding research on most major crops Under Egyptian conditions of small farmers with low financial resources, technical knowledge, ability to select among different varieties, and constraints on seed marketing and choices and acceptance of varieties, provisional or early release of inadequately-tested new varieties could result in serious disasters to farmers and to national food production

12 1 2 Proprietary varieties and lines should be included in ARC tests and trials at no cost, or a minimum cost The objective of such trials is not to earn profit, but to ensure that food-producing farmers receive the best possible genetic materials

12 1 3 A Variety Evaluation and Registration Committee should evaluate, release and register new variety submissions As more varieties are made available to farmers, Agricultural Extension should help farmers make correct choices, and crop production credit should permit farmers to select seed/varieties The Committee should be a specialized technical committee with members representing agricultural research from ARC, universities, and private seed companies, CAS, Agricultural Extension, crop processing/marketing, and other concerned agencies The Committee should be a high-level function in MOA, with its Secretariat in CAS, ARC should organize, conduct and evaluate tests at no charge or only nominal charge

12.2. Certification

12.2 1 Clear legislative separation is needed between seed Certification and Seed Law implementation, however, administratively and operationally, both may be implemented by the same agency

12.2.2. Major improvements are needed in all operational aspects and procedures of Certification, including trained personnel and operating facilities and budgets

12.3. Seed Law

12.3.1. New legislation specifically for seed is required, which is technically and operationally up-to-date and promotionally-oriented as in sectors such as industry and tourism Required is a simple law, properly covering all crops, framed around creating **(A)** a clear policy of goals in seed delivery and means to achieve them, **(B)** an administrative, supporting and operational infrastructure in the public sector, **(C)** incentives to promote development of the private-sector seed industry, **(D)** non-compulsory Certification but universal seed quality control, **(E)** improved and low-cost variety testing and registration, plus protection for foreign or domestically-developed varieties as desired, **(F)** a policy/decision-guiding mechanism which includes all concerned parties from government, private sector, and farmers, **(G)** general administrative provisions on trade, and **(H)** a mechanism for implementing the system by lower-level regulations and procedures

12 3 2 MOA should study the seed legislation and prepare a new draft Seed Law which encourages and promotes the private sector, defines the roles of private and public sectors in a bi-sectorial seed industry, specifies at the policy level and in the long-range, promotional incentives, administrative organization of the public sector, guidelines for conducting business activities, operational interphasing of the public and private sectors to ensure complementation, etc Decrees under the Seed Law should be establish day-to-day operational factors such as allowed germination, which need to be changed more rapidly in response to changing conditions

12.3.3 The Seed Law should include

12 3 3 1. A clear policy on problems of and need for supply of high-quality seed of improved varieties to obtain higher crop yields and quality, as a priority objective of Government and, therefore, granting priority status to the seed industry Acceptance of certain seed industry activities as a private-sector economic activity, and authorization of private-sector seed activities should be stated, as well as the role of Government in supporting and guiding it while protecting consumers

12.3.3 2 Investment incentive components should be compatible with other similar legislation, e g , Investment Law No 230 of 1990

12.3 3.3. It should re-organize and define the roles of CAS, EAO, PBDAC, and other government agencies

12.3.3 4. CAS or a specific government agency should be the administrative entity for the National Seed System, organized as required for efficient operations Either in CAS or in other suitable organizations, units should be provided for (1) Seed Extension and Promotion, (2) Seed Law Implementation, (3) Seed Testing Laboratories, (4) Seed Certification, (5) Seed Training

12 3 3 5 A high-level advisory body on national seed policy, recommendations on Decrees, advising the Minister, etc , should be established by the Law It (named, for example, the National Seed Advisory Council) should include representatives of seed agencies of Government and the private sector, cooperatives, farmers, educational institutions, and agencies which process/market agricultural commodities It should meet regularly, have a permanent Secretariat in CAS or other agency which implements national seed policy, have no line responsibilities, and should serve only to advise and guide the Minister in implementing the seed supply

12 3 3 6 A National Seed Industry Trade Association should be established in the Seed Law, to provide a forum for exchange and consensus among government and private-sector agencies in the seed supply system

12 3 3 7 While hybrids have "built-in" Breeder's Rights and Variety Protection, legal protection should someday be required for breeders of open-pollinated varieties While private-sector breeding of such varieties is not seen as a significant factor in the near future, it should be included in the Seed Law, as the Law will probably be in effect for several decades When implementation is required, it should be through a variety registration office and specialized personnel in CAS or other agency implementing the Seed Law

12 3 3 8 Technical promotion to ensure seed industry development and stability can help ensure rapid flow of genetic innovations to farmers, including (1) Certification for all vareties and hybrids, whether government- or privately-owned, (2) Authorization for private firms to sell non-Certified seed, (3) Impartial testing of varieties and hybrids from both government and private-sector breeders, (4) Testing, approval, andrelease of new varieties as rapidly as is consistent with accurate evaluation,

combined with advance seed production so seed is available when the variety is released, (5) Expedited imports of Breeder and Foundation seed, and seed for research use, within provisions of plant quarantine for disease/pest control

12.3.3.9. Provisions for orderly transfer of assets and personnel of government seed production, conditioning and distribution agencies to private-sector firms and/or government-sector seed companies, when this is realistically possible in light of private-sector operations and assured supply of seed to farmers

12.3.3.10. Operational requirements to implement the Seed Law could be developed as Ministerial Decrees

12.4. Policy Implementation

12 4.1 CAS should implement government seed policy and organize/guide seed supply, with added roles to strengthen its effectiveness It should implement policy in matters such as planning, support, and overall administration of the National Seed System It should also handle Seed Law implementation, seed testing laboratories, national referee laboratory, Certification, promotional support for the private seed industry, variety registration, protection, and testing, and monitoring/regulating the system CAS should be relieved of internal seed production activities, which should be transferred to a public limited company or to private sector firms Seed-related assets of CAS, EAO, and PBDAC should be distributed to such new companies Seed should be distributed through private-sector seed merchants and cooperatives

12.5. Policy Guidance

12 5 1 A National Seed Council or other-named policy-advisory body to the Minister of Agriculture, with representatives from government, the private seed industry, farmers, extension, research, universities, and crop processing/marketing agencies should be established, with appropriate support, functions, and operational system

12 5.2. Seed policy and legislation require a consensus or basic agreements with wide support To develop a consensus, a periodic National Seed Symposium should be sponsored by MOA and organized by CAS, to provide a forum for discussion of objectives and means of developing a coherent seed policy and administrative infrastructure, promote privatization, and develop incentives to private investment A successful workshop requires preparation, management and steering, with a seed experts and specialists, specialists in areas

related to the seed industry, leaders in political, industrial, business, farm and cooperative areas, international technical assistance agencies, and potential seed industry investors Workshop conclusions should be edited and published, as possible with specific recommendations

12.5.3. Two-week travel programs should be organized for public and private sector leaders to visit developing countries such as Sri Lanka and Thailand, which have agricultural holdings similar to those in Egypt and have developed a seed industry Policy and industry implementation leaders should have an opportunity to see and analyze experiences of other countries, to provide in-depth understanding of seed program operations which they can consider in light of the requirements and exigencies of Egypt's specific conditions Technical specialists should be sent to the USA to study new technology and developments

12.6. Privatization

12 6.1 Development of private-sector participation in appropriate activities of the seed industry should be pursued firmly with well-defined objectives Rules and incentives to regulate and promote private investment should be clearly spelled out in policy, and supported by legislation

12.6 2 Divestiture and privatization of public-sector seed industry production and supply as a formal program must be carefully considered There is now a working system, if it is dismantled, it must be immediately replaced by a system which can work at least as efficiently Privatization should reduce operating costs, increase efficiency, create self-sustaining operations, create incentives for higher quality and service, ensure profits as rewards for efficiency, open a true market-oriented system, and give farmers improved seed and higher quality at fair prices

12.6.3 Seed which have "genetic" or "built-in" variety protection or are difficult for farmers to produce (hybrids, vegetables, soybean, forages) are amenable to private sector supply Other seed crops (rice, wheat, edible legumes, some minor crops,) do not lend themselves to large-scale commercial seed industry However, once a strong private sector seed industry is established, existing facilities and infrastructure combined with a constant flow of improved varieties with publicity to attract farmers may ultimately make partial supply of these seed crops useful as additional to the primary profit-making crops Public seed supply and delivery, perhaps modified after the present system, will be required to ensure adequate seed supplies

This, however, should be accompanied by rationalization of the seed distribution system and include private-sector retail seed merchants

12 6.4. Seed companies with shares owned by Government but operated exactly as in the private sector are proposed They would receive the government-program assets and personnel so that they can operate efficiently When such companies have demonstrated their operating efficiency and profitability, they could be privatized by sale of shares by tender, etc , with pre-conditions to avoid monopolies However, most of the seed which such companies would supply will not generate profit for a long time to come, because of the technical and economic nature of the seed crops handled To facilitate efficient transfer, the facilities of the government program should be drastically modernized, personnel trained, and provision for regular budget support made to ensure that they can supply national needs for these seed

12.7. Conditioning

12.7.1. Policy

12 7 1 1. A policy should be followed to establish more medium-sized (small but of cost-efficient size, capable of the required separations and operations) plants over Egypt, to develop seed production in more areas, incorporate safe storage, combine with testing facilities, and serve as centers for demonstration and promotion of farmer use of improved seed At the instigation of the Minister of Agriculture, a study of seed conditioning was conducted The proposed "National Seed Conditioning Strategy" included in this report should be adopted as policy In an agro-economy and climate such as Egypt's where (1) seed can be grown in any location if trained persons and facilities are available, (2) transport is difficult and expensive, (3) conditioning is required to develop seed production and farmer acceptance, and (4) conditioning facilities can be used as major parts of the accumulating/ distributing systems, conditioning plants should be located where they will reduce seed transport costs, ensure seed supply to farmers, and help develop local seed production Most economic--in terms of government expenditure, efficient seed supply to farmers, and supporting development of the private sector--is a national network of conditioning plants which serve specific areas for specific crop seed, and help develop local seed production and the private sector No seed should be transported more than 25-50 km from the grower to the conditioning plant Present cropping patterns and seed use, without including increases in crop

production and seed quality, will require conditioning plants in each Governorate, in order to handle only needs for Field Crop seed

12.7.2. Facilities

12.7.2.1. Plants should be designed for 2,500-5,000 tons/year/plant, however, to satisfy limited budgets while maintaining efficient use of facility investments, provide excess capacity for growth potential and improve seed quality, plants should be targeted at NOT MORE THAN 5,000 mt of high-quality seed per year with normal reserve capacity to support the private sector and handle some crop seed which presently are farmer-saved

12 7 2 2 Within the next 6-8 years, enough modern, complete, efficient-handling seed plants should be constructed to satisfy at least 50% of the needs for field crop seed and 100% of cottonseed needs

12 7 2 3 All 8 plants proposed under NARP should be constructed, without further delay

12 7 2 4 All possible means of financing additional plants--USAID, GTZ, soft loans, etc --should be investigated and used

12 7.2 5 All existing plants which are old or unsuited to Egyptian small-farmer conditions should be closed, decommissioned or replaced

12 7 2 6 Existing seed conditioning plants dedicated solely for Foundation and/or Registered seed are not adequate, a relatively low-capacity, simple conditioning plant (but adequate for identified needs) should be installed at or near each Research Station and State Farm which produce reasonable quantities of Foundation and/or Registered seed, to upgrade quality of these seed These plants cannot be included in Certified seed conditioning requirements

12 7 2 7 Locations and types of new plants should serve total national needs, with special emphasis on developing seed production in most Governorates Sites should be selected on the basis of

12 7 2 7 1 Most efficient fit to current and projected local seed production/use levels

12.7.2.7.2. Best contribution to the total national seed program

12.7 2.7.3. Best usage of facilities, with minimum overlap or duplicated service to specific areas

12 7.2 7 4 Minimum transport cost for seed which will be handled, and to reduce transport of seed to other plants at longer distances

12 7 2 7 5 Development of a seed production/supply system in all areas

12 7 3 Improving Operations, Output & Service

12.7 3.1 The draft National Seed Conditioning Strategy, compiled in a special study initiated by the Minister of Agricuture, should be promulgated as operating policy, and applied to all seed conditioning operations

12 7.4 Organization and Management

12 7 4 1 Organization, coordination and improvement of operations, staff and facilities is essential, so conditioning can be integrated into overall seed supply operations, and can operate with the lowest cost and loss while improving seed quality

12 7.5 Improving Staff Competence

12.7 5 1 All conditioning plants should be completely staffed--officers, workers, etc --with permanently-hired personnel The practice of using labor contractors and daily-hire labor should be stopped immediately

12.7 5 2 All plant personnel should receive upgrading training each year, and be fully trained The manager, equipment operators, mechanic, electrician, and all workers must be well-trained, and re-trained to improve and maintain their efficiency and precision

12 7 5 3 Conditioning plant working conditions should minimize health hazards to staff and damage to the environment

12.7.6. Improving Seed Quality & Plant Efficiency

12.7.6 1. All seed conditioning plants should have a properly-equipped, staffed and implemented in-plant quality control lab and unit

12.8. Seed Training and Extension

12.8.1. Public- and private-sector seed agencies face a deficiency of capability and skills among technical and support staff Training in Seed Technology for staff of public- and private-sector institutions and firms is needed

12 8 2 Management, technical, operational and personal skills of personnel in public-sector agencies need to be improved through training and on-site hands-on operating/learning, with procedures which are most efficient under Egyptian conditions and fit improved facilities and procedures Short courses in developed country programs, and local technical training courses should be conducted cooperatively with ICARDA, CIMMYT, GTZ and other agencies

12 8 3 In-depth training in Seed Technology is essential for staff at all levels, they must be able not only to identify problems but also to identify their causes under local conditions, find workable solutions and develop effective strategies under local conditions of climate, technology, farmer acceptance, economic limitations, and government and other regulations and requirements This requires in-depth operations-oriented training and enough trained persons to work together in securing approval and implementing solutions

12 8 4 Technical resource specialists in seed physiology, storage, conditioning, marketing, industry organization and management, legal support, credit, export, research, and training and extension are needed to develop the national seed industry Training of persons who now manage seed activities must be conducted a few at a time, to avoid disrupting operations Staffing patterns should realistically substitutes for people away from their jobs, not only for training but also for other reasons As many staff and leaders as possible should be sent abroad for M S training in Seed Technology, and a few specialized leaders sent for Ph D specialized training Upon return they would form the core of trainers for local training A university-level Seed Science and Technology curriculum should be established in an Arabiic-speaking country, to serve not only Egypt but also other Arabic-speaking countries

12 8 5 Major training efforts should be directed to the middle-level operational and management echelons, where deficiencies in skills are more acute and influence operations more Training in seed

production, field inspection, analysis and testing, plant operation, storage management, marketing, distribution, extension, promotion, data handling and management, Foundation seed production, commercial seed production, conditioning, Certification, seed handling, etc , are needed by many persons

12.8.6. Internal short-term training courses should be developed by CAS, assisted by ARC, Universities, and foreign technical assistance agencies Both public and private sector staff should be trained In-country short-term training should be intensified It is understood that funds for in-country training for the Seed Technology Component were included in such funds under NARP's Research Component After the trainees have returned from in-depth training abroad, they can conduct in-country training courses

12.8.7 Seed merchants, etc should be trained to improve their skills, understanding of high-quality seed production, conditioning, storage, costs, financing, marketing, etc , to improve their abilities as distributors and diffusers of technical information and high-quality seed, and improved varieties to farmers They should be actively linked to the Extension System

12.9. NARP Seed Component & USAID Assistance

12 9 1 Procurements

12 9 1 1 The NARP Seed Technology Component contributes financial assistance to CAS and ARC to upgrade their operations The project has 5 procurement sub-plans, for (1) two Foundation cottonseed plants, (2) eight conditioning plants for small grains and berseem clover, (3) equipment for 6 seed testing laboratories and a national referee laboratory, (4) equipment for the seed research and genetic resources sections (germplasm bank), spare parts for EMCIP plants, and visual aids, (5) computers and printers and training, and (6) vehicles Analysis and proposals on the Seed Technology Procurement Sub-Plan of NARP

12 9 1 1.1 Procurement No 1 Two cottonseed facilities for Foundation seed are justified by the need for Foundation seed and lack of appropriate existing facilities

12.9 1 1 2. Procurement No 2 Eight field crop seed conditioning plants are justified by the present poor condition and lack of cost-efficient facilities, lack of required separations and operations, inefficient location in relation to production and to permit associated storage and be suitable for privatization

Replacement of old seed conditioning facilities is essential to improve operating cost-efficiency and seed quality, put facilities where they can best serve the seed production program and reduce transport requirements, and make possible privatization However, these facilities may reach the end of their reasonable lifespan before conditions are amenable to privatization of these seed crops, which will not be suited to private-sector profit-oriented seed supply for some time

12 9 1 1 3. Procurement No 3 Ninety PC 386SX type (32 data bit, 16 bit data bus), printers , supplies, and training on operation are needed, the following modifications should be made (1) Technical assistance be added to help organize the management information system involving the computers (2) Some of the computers should be linked in a local network at the CAS Cairo location These computers are the first effort in this direction, and most will be used by persons with no experience with either computers or typewriters, further, seed program organization is entering a stage of major re-organization, so that future structure is not precisely known For these reasons, the computers obtained should be self-supporting, and should be of the same type to minimize training complications and future problems when they are move to different offices and expected to handle different work

12 9 1 1 4 Procurement No 4 Trucks, motorcycles, vans, pick-up trucks for transportation are needed

12 9 1 1 5. Procurement No 5 Equipment for Seed Research, Genetic Resources, and spare parts for EMCIP (including audio visual aids) are justified Construction of the building in which Genetic Resources equipment will be installed does not meet technical requirements, it should be either upgraded or a new facility built Equipment could, however, be acquired, as its use is not contingent on the building

12 9.2 Training

12 9 2.1 Training should follow the recommendations made in a separate report by the Seed Technology Training Consultant

12 9 2 2 Training as included in the NARP Seed Technology Component Training Plan is justified, and should be implemented However, it is doubtful that enough trainees will be available unless English-language training is significantly intensified

12.9.2.3. A comprehensive, in-depth Seed Science and Technology curriculum with adequate coursework, training materials, laboratory facilities and trained lecturers should be established at an Egyptian University, or a University in another Arabic-speaking country This will require a considerable investment and time period, but should be given serious consideration Training should be developed in the Arabic language, and should service the entire Arabic-speaking world This will require several years and several million US dollars to develop, and should be coordinated with other Arabic-speaking countries It thus should be implemented in a separate project

12.9 3. Further Assistance

12 9 3 1. Years of inadequate budgetary support has taken a serious toll on the quality and efficiency of operations of the seed supply system The present NARP Seed Technology Component funding, combined with funds obtained from other sources, are inadequate to bring the overall seed supply system up to modern standards of operating efficiency and seed quality Upon the termination of NARP, or sooner if the implementation mechanism and capability permits, USAID should provide further assistance in (1) continuing to upgrade facilities, (2) providing operating funds and supporting policy changes so that farmer credit is not a constraint, and to ensure that the private-sector seed industry has adequate credit at concessional rates, (3) helping support development of further private sector participation, (4) continuing the training of specialists and operating staff, including a project to develop a university-level seed technology curriculum, (5) establishing and operating an intensive seed extension promotion/education program, and (6) providing for orderly regular maintenance, repair and replacement of facilities

XIII. PROPOSED IMPLEMENTATION PLAN & SCHEDULE

13.1. Implementation and Financial Plan

13 1.1. Modifications for the 1991 FY Implementation and Financial Plan are incorporated into the overall NARP IFP, as this is presented as an entity

XIV. SUMMARY AND CONCLUSIONS

14.1. Recent History and Current Status

14 1.1. The Egyptian seed supply industry has gone through a long period in which it has not received adequate budgetary support, and its personnel have not been able to keep up with operating/ management developments and improvements The necessity to provide large amounts of seed with inadequate support has forced it to focus on quantity rather than quality Today, however, the growing need for increased food production is forcing the entire seed supply system to focus on improving all aspects of seed quality, as one of the essential inputs toward increased yields It faces this task with worn, outmoded and inadequate facilities, inefficient operations, lack of up-to-date management information, inadequate budgets and inadequate technical training for staff Its major asset is people who are willing to work hard and selflessly in order to help the country The rapidly-expanding population, lack of additional cropping lands, shortage of inputs, and other constraints create an urgency which does not permit Egypt to evolve improved systems slowly, as some other countries have The current need is to make massive improvements, in technology, facilities, technical skills, and ways of thinking, and apply them in practical operations immediately

14.2. Needs

14 2.1 To enable the seed supply system to give maximum benefit to domestic food production, a major renewal of physical facilities is required, along with massive training and upgrading programs for personnel Increased operating budgets are required, as are modernized operating procedures, reports/records, and systems which permit responsible staff to take more responsibility and act quickly and properly, as is required in the time-sensitive operations of supplying higher-technology seed Re-organization and restructuring of the program should be considered, to focus it more on functions and tasks, to meet the end objective of supplying seed to farmers Increased privatization of market-oriented, profit-generating activities is essential, but will probably be successful only after government creates a supportive long-term operating environment and develops improved facilities/operations which could be amenable to privatization Intensive extension education/promotion of seed value and use should be given to farmers, to create and maintain farmer understanding and demand for higher-yielding seed The entire seed supply infrastructure, from variety development to credit for farmers and the seed industry, need upgrading

14.3. Assistance

14.3.1 To improve the general seed supply, solely for the purpose of increasing national food production, massive assistance, outside of the potential government budget support, will be essential over an extended period The support provided by NARP is a well-balanced start in this direction, for maximum effectiveness, it can be tightened up somewhat, and should be implemented without delay GOE should, on a priority basis, pursue all possible sources of further assistance to develop the supply of higher-yielding seed USAID should consider increased financial support over the long-range, ensuring that investment is concentrated in technologically up-to-date and operationally efficient facilities, that operating and management systems are simultaneously improved, and that personnel development is intensified

XV. ANNOTATED REFERENCES

1 Anon 1989 Agricultural legislation concerning selected seeds of agricultural produce (English translation of Law No 53 of 1966, by GTZ/CAS)

Translation of LAW No 53 of 1966, it covers all aspects of agricultural production Major emphasis is on cottonseed and cotton gins and how seed are handled Includes Decrees which provide for specific implementation of the Law

2 Anon 1989 Report on wheat processing in KFS Governorate 1989 season Impr of Seed Prod Proj , MOA GTZ Cairo Nov 20

GTZ report of operating results of processing plants at Sakha, includes percent rejects and other conditioning information

3 Collande and Niehoff 1988 Improvement of Seed Production and Supply Project Organization and management of seed sector in Egypt with special emphasis on the Governorate of Kafr El Sheikh Cairo Oct

A critical look at organization and management of all aspects of CAS in the seed sector, but does not cover PBDAC, EAO or ARC Points out weaknesses in the system and provides some guidelines for improvement Includes 8 annexes on special subjects

4 Gardner, George R , and J B Parker 1985 Agricultural Statistics of Egypt, 1970-84 ERS/USDA Stat Bul No 732 Washington, D C Aug

Statistical report on major summer and winter field crops, cotton, sugarcane, and vegetable production and yield, 1970-1988 Includes are data on agricultural inputs, fertilizers, animal feeds, agricultural exports and imports, world prices for agricultural products, and supply and distribution of coarse grains, rice and wheat

5 Gomaa, A S , and S A Mohamed 1982 National Seed Program/ Industry in Egypt CAS Cairo 12 pp

Background of the seed industry, present status, data on seed production and constraints Includes a number of recommendations for improving the system

6 Gomaa, Abdel S , *et al* 1987 National Agricultural Research Project, Amendment 2 Nat Agr Res Proj (NARP) Cairo 189 pp

Includes a detailed description the seed industry benefits of improved seed, and the National Agricultural Research Project's role in improving seed technology delivery

7 Gomaa, A S A , *et al* 1988 Maintaining seed quality by safe storage ARC/CAS/NARP/GTZ Cairo April

Outlines the factors of safe seed storage and maintaining seed quality Includes data on seed storage facilities in Kafr El Sheikh, and photographs of KFS seed storage

8 Gomaa, Abdel S 1988 Better seed for maximizing crop production 3rd Annual ARC Conf Cairo Dec 20 pp

Broad overview of the need for better seed, with some current seed industry problems Outlines short- and long-term improvements Some 40 subheadings under "Long term improvements" discuss what is required for needed improvements, tables show crop yields with improved seed, and field crop seed supplied and used in 1986/87

9 Gomaa, A S , Bill Gregg, and M Salah Wanis 1989 Seed supply 1990 accomplishments, current status, needs for the future CAS/ARC Cairo 231 pp

Covers all aspects of the seed industry, from development of basic seed to seed supply systems government policy, seed law, CAS personnel in the CAS and long-term solutions to providing quality seed to farmers 49 tables detail information on the industry and CAS organization

10 Gomaa, A S A , Bill Gregg, and M S Wanis 1989 Egypt the emerging seed market CAS/ARC Cairo

Data on national seed use by crop and governorate

11 Gregg, Bill 1985 Report of inspection of seed facilities EMCIP, N M St Univ Cairo Sept

Detailed report of pre-acceptance inspection of 4 EMCIP seed processing plants, on-site data on status, and recommendations for completion and start-up

12 Gregg, Bill 1988 Infrastructure and organization for an effective national seed program ARC/CAS/NARP Cairo

Overview of infrastructure and organization required for a national seed program A series of diagrams show relationships of various components

13 Gregg, Bill, *et al* 1989 Procedures for inspecting wheat seed fields ARC/CAS/NARP Cairo

Detailed manual of procedures for inspecting wheat seed fields of Breeder, Foundation, Registered, and Certified classes Gives descriptions of some wheat varieties

14 Grobe-Ruschamp, A 1987 Report on the ZOPP Workshop Improvement of the seed production and supply in Egypt GTZ/LUSO Consult GMBH, Hamburg Dec

Outlines steps in systematic analysis of the Egytian seed industry

15 Meyer, G , M Schworer, and J Geddies 1989 Analysis of the seed subsector in Egypt under particular consideration of the seed production of the Governorate of Kafr El Sheikh GTZ Cairo April

Report on CAS operations and cost aspects of producing Certified seed --farm production, conditining, storage, transport, quality control, and distribution by PBDAC) Shows how costs might be reduced through lower replacement rates and improved seed delivery from contractors Includes recommendations on development of seed centers

16 Samii Cyrus, *et al* 1989 Privatization of input supply activities of the Principal Bank for Development and Agricultural Credit Bur for Priv Ent /USAID Prep by Center for Privatization, Washington, D C April

Analyzes PBDAC operations with fertilizers seed, pesticides, agricultural machinery, animal feeds, and jute bags, PBDAC organization and staffing, financial situation, including banking and non-banking operations Gives recommendations and options for privatization Describes PBDAC's role in supplying seed to farmers, private sector participation in field crop and vegetable seed vegetable seed imports costs and returns of PBDAC seed operations

17 USAID 1989 Agricultural Data Base AGR/ACE Cairo Dec

Tables on winter, summer and permanent crops, information on area under cultivation, production, yields, production costs and returns, prices, gross and net farm incomes Data on agricultural inputs, exports and imports, and world prices for agricultural products Supply and distribution tables for coarse grains, rice and wheat

18 USDA 1989 Complete annual food and feed report Am Emb , Cairo April 2

19 USDA 1989 Egypt annual situation report Am Emb , Cairo July 20

20 Winrock Intnl 1986 Improved seed an analysis of the seed industry in Egypt Prep for USAID/MOA/CAS Cairo April

Background information on rationale for a seed industry in the Egyptian context, and evolution of governmental measures to address it Describes and interprets steps from legislation to Foundation seed and multiplication/distribution of Certified seed to farmers Outlines deficiencies and constraints, and proposes solutions for them

APPENDICES

APPENDIX 1
TERMS OF REFERENCE

I. PHASE I

PURPOSE

Section 5 15 of the National Agricultural Research Project (NARP0 Grant Covenant, Amendment 3, requires that a study of the Egyptian seed industry be completed as follows

> The Grantee (e g , NARP's participating agencies) will commission a study, for completion within one year of the date of the Third amendment to the Grant Agreement, to review current (Egyptian) laws and regulations governing the seed industry The study will provide recommendations for modification of the policy environment regarding seed production, processing and distribution, to strengthen private sector participation in the seed industry Based on these recommendations, the Grantee agrees to submit a plan to USAID for implementing changes which appear appropriate The status of these changes will be reviewed and approved by both parties prior to approval of the annual (Implementation and Financial) plan for the NARP Seed Technology Component for fiscal year 1991

IMPLEMENTATION

To fulfill this study requirement, a team of six persons will be organized for up to four weeks during November and December 1989, for Phase I and three weeks for Phase II, to begin in mid-January, 1990 For Phase I, the team compositions is as follows

1 Two U S short-term specialists (one to be team leader)

2. Two Egyptian specialists from ARC/CAS or the private sector

3. The CID/NARP Seed industry Specialist

4. The USAID Project Component Officer

The two U S specialists and at least one Egyptian specialist will devote 100% of their time during the four-week study period The team leader is responsible for finalizing and submitting a written report The other three team members will provide as much of their time as the study needs and/or as directed by the Team Leader The NARP

Policy Component Director has primary responsibility for conducting this study, which full cooperation and support from the NARP Seed Component Director Initial contacts will be made by the USAID project officer in collaboration with the Seed Component Director prior to the two specialists' arrival to coordinate and set up initial meeting times with PBDAC, private-sector firms, and other related government institutions and individuals outside ARC and the Government This will ensure that all principal interest groups are included and initial meetings are scheduled as early as possible to address study issues

APPROACH

The assessment and the development of the implementation plan for the Seed Technology Component will be done in two phases The first phase the study team will assess ans analyze current seed industry needs, use, supply, public and nonpublic infrastructure, govenment seed policy, and all regulatory or legal conditions which affect the seed industry, including a clear description of how it operates The study team will make a comprehensive review of all recent (5 years) studies and special papers relating to the Egyptian seed industry and prepare a brief annotated bibiography of such references The study team will also compile such additional information as deemed necessary to complete their review through meetings with officials of appropriate government agencies, i e , PBDAC, MOA, private and public seed producers, farmer organizations etc , to ensure adequate preparation to recommend improvements and plan for implementing improvements which are realistic and practical for the Egyptian context Special reference should be made to (1) increasing participation by the private sector in seed processing, distribution and marketing, (2) increasing efficiency in least-cost and least-loss seed supply operations, (3) efficiency of using government investment, (4) increased yield potential of seed, and (5) best means to encourage farmer use of higher-yielding seed

The second phase will incorporate GOE and USAID comments into the final assessment study and develop an annual plan for the Seed Technology Component The plan will include the implementation of agreed-upon policy changes, technical assistance needs, identify appropriate staff training, and review commodity requirements The contracting of Phase II could occur under a different contractor than Phase I, and may include an additional person to the present team composition

STATEMENT OF WORK

Under Phase I, the team will

1 Compile secondary data and carry out appropriate analyses to assess (a) Egypt's current seed needs, (b) seed use patterns, (c) seed sources, (d) seed supply system and its problems, (e) present seed industry infrastructure and identify problems or constraints, (f) actual and potential seed quality, (g) domestic seed production vs import Primary emphasis shouod be on (a), (d), (e) and (g)

2. Within the Egyptian context, define appropriate roles for the government and private sector, including a detailed discussion of recommended improvements, necessary policy changes, incentives and/or other assistance needed to move as much Certified seed, synthetics, and other commercial seed production as possible into the private sector

3 Identify policy, legal, economic, and infrastructure constraints under which the seed supply industry operates, and recommend appropriate legal and policy changes needed to create a supportive and vigorous seed industry

4 Review in detail the NARP Seed Component in the context of USAID's private sector commodity import program to understand and then to recommend a coherent approach for a private-sector seed development strategy to be supported by USAID in Egypt

5 Jointly and in collaboration with concerned government agencies and private sector interests, identify principal constraints and offer recommendations to alleviate such constraints in the seed industry Recommend best means to attract increased private-sector participation, and enable the government to establish a policy and legal structure which supports development of a private-sector seed industry to supply and market seed

6. Outline a plan and strategy for improvements which will help the seed supply system work toward higher seed quality, higher operating efficiency, higher technological competence, and continuing long-term improvement in quality and support to agricultural development

7. Review all laws, regulations, and ministerial decrees affecting seed, and recommend specific realistic improvements to increase and improve the role of the private sector The finalization of this to be

referred to an appropriate legal officer of the GOE for written comments

Under Phase II, the team will

The two technical specialists will return to Egypt to assist the Seed Component Director in the development of the plan to implement policy and technical changes agreed-upon between GOE and USAID on private sector participation in the seed industry The technical specialist will be required to complete the following tasks

1. Review the seed technology annual implementation plan and make appropriate amendents to support the policy and technical recommendations approved

2 Review and make appropriate adjustments to the annual implementation plan with respect to staff training for both private and public institutions involved in the seed industry

3 Review and make appropriate adjustments to the annual implementation plan with respect to technical assistance required to achieve planned targets and goals

4 Develop a detailed plan which will include estimated funding and other requirements for improving the seed industry performance, with special emphasis on privatization, seed law and policy, industry infrastructure, applied technology, and self-generated/supported improvement and development This may require the drafting of special legislation or decrees

OUTSIDE SPECIALISTS REQUIRED

To maximize applicability of the study, two (2) outside specialists are needed, whose qualifications and experience will complement those of on-site specilists to provide complete coverage and analysis of all pertinent aspects of the study

1. The team leader should be familiar with overall operating requirements, management aspects, and function-oriented organizational structure of seed programs in both government and private sectors He/she should be familiar with implementation of seed technology and seed industry development programs He/she should have experience with seed legislation in terms of support to development and operation as opposed to restrictive policing He/she should be acquainted with agricultural technology transfer, coordination of agricultural research and extension, agricultural

organization and management, and agricultural and private-sector development He/she must have good writing and communication skills

2. The agricultural policy economist should have previous work experience in assessing government seed policies and private sector technical and economic feasibility in the distributing, marketing, and processing of Certified and non-Certified seed Previous overseas experience is required working on similar assignments mentioned above An M S degree in agricultural economics or related discipline required at minimum The individual must have good analytical capabilities and writing skills

REPORTING REQUIREMENTS

The team will prepare a draft report which will be circulated and discussed with and within the concerned agencies of GOE and USAID prior to the team's departure from Egypt After receiving comments, including those of a GOE legal office, the Team Leader will finalize the report and provide 75 copies to USAID and GOE The following is an illustrative outline of the report to be completed under Phase I

Executive Summary
Not more than 5 pages stating the objectives, major conclusions and recommendations

Introduction

Background
General situation of Egypt's seed industry

Agricultural Sector

Seed. An Overview
Seed use and requirements
Prices and production of seed
Classification of seed in Egypt

Policies Affecting the Seed Industry
Discuss and assess various policies e g , economic, political, administrative, legal, and institutional, who influences and sets policy?

The Economics of Seed Use
Production
Conditioning and marketing

Structure of the Seed Industry
- Structure of markets
- Domestic market
- Exports and imports
- Barriers to implementation of seed policy
- Product differentiation

Conduct of the Seed Industry
- Pricing of seed

Performance of the Industry

Analysis of Future GOE and Private Sector Roles in Egypt's seed Industry
- Future role and structure of the Egyptian government and the Private Sector
- Identify specific legislative changes required to support private sector Assess current Governments plants/facilities and give recommendations on transfer of seed production and supply to private sector

Recommendations

Proposed Plan and Schedule for Implementation.

Summary and Conclusions

References
- Annotated bibliography of previous (5 years past) Seed studies in Egypt

Appendices
Other pertinent documents not necessarily formal studies might also be included

Reporting requirements under Phase II will require the development of a project plan

II. PHASE II

PURPOSE

Section 5 15 of the National Agricultural Research Project (NARP) Grant Covenant, Amendment 3, requires that a study of the Egyptian seed industry be completed as follows

> The Grantee (e g , NARP's participating agencies) will commission a study, for completion within one year of the date of the Third amendment to the Grant Agreement, to review current laws and regulations governing the seed industry The study will provide recommendations for modification of the policy environment regarding seed production, conditioning and distribution, to strengthen private sector participation in the seed industry Based on these recommendations, the Grantee agrees to submit a plan to USAID for implementing changes which appear appropriate The status of these changes will be reviewed and approved by both parties prior to approval of the annual (Implementation and Financial) plan for the NARP Seed Technology Component for fiscal year 1991

IMPLEMENTATION

To conduct this study, a team of six persons will be organized for two separate periods, each of up to four weeks Phase I was implemented in late 1989, Phase II will begin in early March, 1990 Team composition for Phase I was

A Two U S short-term specialists (one to be team leader)

B Two Egyptian specialists, from ARC/CAS or the private sector

C The CID/NARP Seed Industry Specialist

D The USAID Project Component Officer

APPROACH

As a coordinated unit, the team will study the relevant information, status, and other data available, and prepare recommendations These will be assessed and used in developing an implementation plan for the Seed Technology Component, and will be accomplished in two phases All activities, recommendations, public descriptions and discussions, etc , will be conducted as a team and will be developed

only through and after full and complete discussion and agreement with the Seed Technology Component Director

Phase I

In Phase I, the study team assessed and analyzed current seed industry needs, use, supply, public and nonpublic infrastructure, govenment seed policy, and all regulatory or legal conditions which affect the seed industry, including a clear description of how it operates The study team made a comprehensive review of all recent (immediately preceding 5 years) studies and special papers relating to the Egyptian seed industry, and prepared a brief annotated bibliography of such references It compiled such additional information as deemed necessary to complete their review through meetings with officials of appropriate government agencies (PBDAC, MALR, private and public seed producers, farmer organizations etc) to ensure adequate preparation to provide a basis for Phase II A draft report has been received and is under review by the Government and USAID

Phase II

During Phase II, the study team will finalize the report and use materials and data compiled during Phase I to further articulate improvements and a plan for implementation which is realistic and practical in the Egyptian context Special reference should be made to

A Increasing participation by the private sector in seed conditioning, distribution and marketing

B. Increasing efficiency in least-cost and least-loss seed supply operations

C. Efficiency of using government investment

D Increased yield potential of seed, and

E. Best means to encourage farmer use of higher-yielding seed

Phase II will incorporate GOE and USAID comments into the final assessment study and develop an annual implementation plan for the Seed Technology Component The plan will include implementation of agreed-upon policy changes, technical assistance needs, appropriate staff training, and comodity requirements Phase II could be contracted under a different contractor than Phase I, and may include an additional or different person(s) than Phase I

STATEMENT OF WORK FOR PHASE II

All activities, recommendations, public descriptions, etc , will be conducted as a team and after full and complete discussion and agreement with the Seed Technology Component Director Work includes

A. Take all available comments with special relevance to the seed study report, incorporate divergent views, resolve all conflicts, gain a concensus, and finalize the draft seed study within three weeks of arrival

B. In preparing and finalizing the study, the Agricultural Economist will, in consultation with the other team members

1. Conduct additional work on the economics of seed replacement

2 Provide additional analysis of the economic efficiency of public-sector conditioning and distribution activities

3 Make sure earlier work is included in the final report and, if needed, carry out additional analysis of seed subsidies and their impact on private sector entry into the seed industry

4 Estimate net returns to farmers for wheat and rice seed production

5 Identify additional data required for possible Phase II analysis of the above issues, if needed

C. In consultation and agreement with all team members, provide input to the Seed Technology Component implementation plan for FY 1990-91 and amendments to current training plants, review current seed technology annual implementation and training plans, and suggest appropriate amendments to

1. Support approved policy and technical recommendations

2. Staff training for both private and public institutions involved in the seed industry with a special look at recommendations to establish a seed technology instutute at a university

3. Technical assistance and other requirements to achieve planned targets and goals

D Build on the seed study and provide specific realistic and practical improvements to increase and improve the role of the private sector, including

1. A coherent approach for a private sector seed development strategy to be supported by USAID in Egypt

2. Means to increase private sector participation

3. Enable the government to establish an policy and leagal structure which supports development of a private seactor seed supply and marketing industry

E. Review laws, regulations, and ministerial decrees affecting seed, and recommend specific realistic improvements to increase and improve the role of the private sector The finalization of this will be referred to an appropriate legal officer of the GOE for written comments

F. The policy/training specialist will also prepare, in collaboration with the full team, the following

1 Draft of a national seed policy, to be used to initiate discussion toward a long-term national seed policy

2 Evaluation of Egyptian university grading systems, toward improving acceptance for graduate study in U S universities

3. Develop further details toward establishing an In-Egypt University Seed Technology curriculum

PHASE II TEAM COMPOSITION AND OPERATION

To conduct this study, a team of seven persons will be organized for a period of up to six weeks Team composition will be

A. Three U S short-term specialists (one, a Seed Technologist, as team leader, one an economist, one a policy/training specialist)

B Two Egyptian specialists, from ARC/CAS or the private sector

C The CID/NARP Seed Industry Specialist

D. The USAID Project Component Officer

The two U S specialists and at least one Egyptian specialist will devote 100% of their time to this study during the four-week study period All activities will be conducted as a team group, not as individuals, and in full cooperation and collaboration with all team members and in consultation with the NARP Seed Technology Component Director The team leader is responsible for finalizing and submitting a written report The other team members will provide as much of their time as the study needs, and/or as directed by the Team Leader

OUTSIDE SPECIALISTS REQUIRED

To maximize realistic long-term applicability of the study, three (3) outside (U S) specialists are needed for up to six weeks Their qualifications and experience will complement those of on-site specialists to provide complete coverage and analysis of all pertinent aspects of the study

A. The team leader (proposed Dr Alexander Grobman) should be a Seed Technologist with Ph D in Seed Technology, familiar with
   1. overall operating requirements, management aspects, and function-oriented organizational structure of seed programs in both government and the private sector
   2 implementation of seed technology and seed industry development programs
   3 seed legislation in terms of support to development and operation as opposed to restrictive policing
   4 agricultural technology transfer, coordination of agricultural research and extension, agricultural organization and management, and agricultural private-sector development
   5 good writing and communication

B The agricultural economist (proposed Dr Ken Laurant) should have

   1 previous work experience in private sector technical and economic feasibility and working requirements
   2. good analytical capabilities and writing skills

C. The agricultural policy and seed technology training specialist (proposed Dr Ronald Brown) should have
   1 previous work-experience in assessing government seed policies and private sector's technical and economic feasibility in distributing, marketing, and conditioning Certified and non-certified seed
   2. experience in handling international graduate students from the university end, determining requirements for accepting students, and student support during their studies

3. Good analytical capabilities and writing skills

APPENDIX II
SEED PRICING & COST DATA

APPENDIX III
SEED SUPPLY & USE DATA