

685-0269
PP Annex
PD-ABC-748
741

PROJECT PAPER

AGRICULTURAL PRODUCTION SUPPORT

(685 - 0269)

Amount: \$20,000,000

Submitted to AID/W:
November 21, 1986.

ANNEXES

ANNEX A

PID APPROVAL CABLE

UNCLASSIFIED

STATE 123754/01

685-269

ACTION: AID-2 INFO: DCM RIC

VZCZCTAA5B7ESC369

PP RUTADS

DE RUEHC #6754/01 1131800

ZNR UUUUU ZZH

P 231755Z APR 86

FM SECSTATE WASHDC

TO AMEMBASSY DAKAR PRIORITY 7443

BT

UNGLAS SECTION 01 OF 02 STATE 123754

LOC: 212
24 APR 86
CN: 03704
CHRG: AID
DIST: AID

459
2803

AIDAC

E.O. 12356: N/A

TAGS:

SUBJECT: SENEGAL AG PRODUCTION SUPPORT, 635-2269

1. ECPR APPROVED THE PID FOR THE SUBJECT PROJECT ON APRIL 14, 1986 AND DIRECTED THAT THE PP BE SUBMITTED TO AID/WASHINGTON FOR FINAL APPROVAL. THE MISSION CAN BE COMMENDED ON THE SIGNIFICANT IMPROVEMENT IN THE PID DOCUMENT OVER THE EARLIER PRESENTATION. ALTHOUGH THERE ARE STILL MANY QUESTIONS CONCERNING THE PRIVATE SECTOR AND THE CREDIT COMPONENTS, THE ECPR STRONGLY SUPPORTS THE BASIC CONCEPT OF THE PROJECT. THE FOLLOWING GUIDANCE WAS DEVELOPED BY THE ECPR AND THE PROJECT COMMITTEE, AS DIRECTED BY THE ECPR, FOR INCLUSION IN THE PP]??O AGRICULTURAL PRODUCTION IN SENEGAL AND THE COMPLEXITY OF DEVELOPING NEW PRIVATE SECTOR CAPABILITIES, THE ECPR RECOMMENDED THAT DETAILED FEASIBILITY ANALYSES BE COMPLETED PRIOR TO OBLIGATION OF FUNDS. THE FOLLOWING ANALYSES SHOULD BE COMPLETED AND SUMMARIZED IN THE PP:

A. ANALYSIS OF THE PRIVATE SECTOR. CONSIDERABLE DISCUSSION REVOLVED AROUND QUESTION OF WHETHER THE MISSION AND SENEGALESE UNDERSTOOD ENOUGH ABOUT THE CONSTRAINTS FACING THE PRIVATE SECTOR IN PROVIDING AGRICULTURAL INPUTS TO CEREALS FARMERS AND WHETHER THE PROJECT WAS STRUCTURED TO DEAL WITH THESE CONSTRAINTS. THE PP SHOULD DESCRIBE THE PRIVATE SECTOR CURRENTLY WORKING IN AGRICULTURE INPUT DISTRIBUTION AND CEREALS MARKETING. IF COMMERCIAL ACTIVITIES OF COOPERATIVES ARE A FACTOR, THIS SHOULD ALSO BE DESCRIBED. THIS DISCUSSION SHOULD COVER VARIOUS OPERATIONS (I.E. AGRICULTURE INPUTS, MARKETING, OTHER CONSUMABLES, ETC.) AND SHOULD INCLUDE FINANCIAL CONDITIONS AND VIABILITY (CAPITALIZATION, PAST PROFITABILITY, YEARS IN OPERATION, ETC.), ORGANIZATIONAL STRUCTURE, AND PRESENT OR PAST ARRANGEMENTS WITH THE COMMERCIAL BANKING SYSTEM IN SENEGAL AND WITH FARMERS. IF NOT ABLE TO DO ACROSS-THE-BOARD, SEVERAL CASE STUDIES OF "TYPICAL" ENTERPRISES WOULD SUFFICE.

THE PP SHOULD DESCRIBE WHAT PROJECT SUPPORT IS NECESSARY FOR THE PRIVATE SECTOR TO TAKE ON ADDITIONAL

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MARKETING AND WHAT WILL BE THE RELATIVE ROLES OF THE PRIVATE SECTOR AND GOVERNMENT (OR RDA'S) IN THESE AREAS BY THE PACD. THE PP SHOULD ALSO INCLUDE A THOROUGH ANALYSIS OF CHANGES NEEDED IN THE SYSTEM TO ASSURE A SUSTAINABLE EFFECTIVE PRIVATE SECTOR APPROACH TO INPUT DISTRIBUTION AND CEREALS MARKETING. THIS INFORMATION SHOULD RESULT IN A BETTER UNDERSTANDING OF THE POTENTIAL PARTICIPANTS IN THE PROJECT AND SHOULD ALSO ASSIST IN ESTABLISHING BASELINE DATA.

B. BANKING SECTOR. THE PP SHOULD INCLUDE ANALYSIS OF THE BANKING SECTOR AS IT RELATES TO THIS PROJECT, STARTING WITH THE CENTRAL BANK, THE PRIVATE COMMERCIAL BANKS, AND OTHER INTERMEDIATE CREDIT INSTITUTIONS, IF ANY, WHICH MIGHT BE PARTICIPATING IN PROGRAM. THE ANALYSIS SHOULD DISCUSS THE RELATIVE CAPABILITIES OF THESE INSTITUTIONS WHICH ARE LIKELY TO PARTICIPATE IN THE CREDIT PROGRAM TOGETHER WITH THE TECHNICAL AND OTHER ASSISTANCE THAT MAY BE NEEDED. WE UNDERSTAND THAT THE MISSION IS CARRYING OUT A STUDY OF THE BANKING SECTOR, AND THIS SHOULD PROVE HIGHLY RELEVANT TO THE DESIGN EFFORT.

C. CREDIT. THE ABT ASSOCIATES REPORT AND OTHER STUDIES IDENTIFIED FINANCIAL CONSTRAINTS AS A KEY IMPEDIMENT TO INPUT DISTRIBUTION. MORE INFORMATION IS NEEDED, HOWEVER, ABOUT THE TYPES OF CREDIT ARRANGEMENTS PRESENTLY AVAILABLE IN SENEGAL. THE PP SHOULD DESCRIBE CURRENT INSTITUTIONAL ARRANGEMENTS, TYPES OF CREDIT NOW PROVIDED, CONDITIONS AND TERMS UNDER WHICH OFFERED, FINANCIAL POSITION OF BANKING SECTOR, ETC. THE PP SHOULD ALSO INCLUDE A DESCRIPTION OF HOW AID CREDIT FUNDS WILL FLOW WITH SOME INDICATION OF HOW WE WILL ASSURE THEIR USAGE. DRAWING UPON INFORMATION IN PARA 2.A. ABOVE, THE PP SHOULD DESCRIBE THE LIKELY LOAN RECIPIENTS, WHETHER INDIVIDUAL OR INSTITUTIONAL, UNDER THE CREDIT PROGRAM AND THE CHARACTERISTICS OF THESE BORROWERS. IT IS SUGGESTED TO THE MISSION THAT THEY MIGHT PURSUE THE IDEA OF ENGAGING A LOCAL CPA FIRM TO PROVIDE THE ANALYSIS OF THE CREDIT PROGRAM MECHANISM. PP SHOULD ALSO INCLUDE ANALYSIS OF EFFECTIVE DEMAND FOR CREDIT.

D. GUARANTEE FUNDS. A STRONG PREFERENCE WAS EXPRESSED BY THE ECPR FOR AID FUNDS TO BE USED FOR CREDIT RATHER THAN AS GUARANTEE FUNDS. THE COMMERCIAL BANKS PARTICIPATING IN THE PROGRAM SHOULD BE EXPECTED TO BEAR ALL THE RISK. THE PP DESIGN TEAM SHOULD ASSESS THE

INCENTIVES NECESSARY TO INDUCE COMMERCIAL BANKS TO PARTICIPATE IN THE PROGRAM, FOR EXAMPLE, THE INTEREST RATE SPREAD. IF A GUARANTEE FUND IS NEEDED, THE MISSION COULD USE LOCAL CURRENCIES FROM OTHER PROGRAMS OR NEGOTIATE SUCH A FUND WITH THE CENTRAL BANK TO BE FINANCED BY INTEREST EARNED ON FUNDS LENT TO COMMERCIAL BANKS. FINAL DECISIONS CONCERNING THE DESIGN OF ANY GUARANTEE MECHANISM SHOULD FOLLOW THE COMPLETION OF THE CREDIT AND BANKING SECTOR ANALYSES.

E. CREDIT MANAGEMENT. THE PID PROPOSED THAT THE TA TEAM BE INVOLVED IN THE DIRECT MANAGEMENT OF THE CREDIT. THE ECPR RECOMMENDED THAT THE ROLE OF THE TA TEAM BE LIMITED TO THAT OF MONITORING THE FLOW OF FUNDS. THE TEAM COULD SUB-CONTRACT WITH A LOCAL CPA FIRM FOR THIS WORK.

F. FARMER DEMAND FOR INPUTS AND NEED FOR CREDIT. WHILE THE OBJECTIVE OF THE CREDIT COMPONENT IN THIS ACTIVITY IS SUPPLIER'S CREDIT, IT IS NOT CLEAR HOW FARMERS PARTICIPATION WILL BE ASSURED. PP SHOULD SPELL OUT ASSUMPTIONS BEING MADE ABOUT FARMERS CREDIT. IF ONE OF THESE ASSUMPTIONS IS THAT SUPPLIERS WILL PROVIDE SOME SHORT-TERM CREDIT TO FARMERS, PP SHOULD DO CAREFUL FINANCIAL ANALYSIS TO DEMONSTRATE FEASIBILITY OF SUCH CREDIT. THIS ANALYSIS WOULD NEED TO INCLUDE A DROUGHT SCENARIO WHEN FARMER REPAYMENTS WOULD BE DIFFICULT. POSSIBLE OPTIONS FOR HANDLING THE DROUGHT RISK DISCUSSED

IN ECPR INCLUDED IDENTIFYING POSSIBLE MEANS OF POOLING RISK ACROSS SEASONS OR UNDER SOME TYPE OF INSURANCE PROGRAM.

3. CONDITIONALITY AND POLICY ENVIRONMENT. DISCUSSION DURING ECPR FOCUSED ON NEED AND EXPECTED TIMING OF COS STATEMENT ON CEREALS POLICY. ECPR CONCLUDED THAT, GIVEN MISSION'S DIRECT INVOLVEMENT WITH COS AND DONORS IN ANALYZING CONTENT OF STATEMENT, IT IS NOT NECESSARY TO DELAY PROJECT DESIGN UNTIL FORMAL CEREALS POLICY IS ISSUED. GIVEN SITUATION WITH RICE PRIVATIZATION, IT IS CRITICAL, HOWEVER, THAT THE COS UNDERSTAND AND FULLY AGREE WITH CONCEPTS AND CONDITIONALITY REQUIRED AS PART OF THIS PROJECT. THIS WOULD REQUIRE AN ANALYSIS OF PROPOSED CONDITIONS HIGHLIGHTING BOTH ECONOMIC AND SOCIAL IMPACTS.

4. THE MISSION SHOULD FEEL UNDER NO TIME PRESSURE TO NEGOTIATE THE PROJECT THIS FISCAL YEAR AND, ABOVE ALL, MUST NOT FEEL BOUND TO SIGN AN AGREEMENT BEFORE ALL ASPECTS ARE FULLY NEGOTIATED. THIS PROJECT IS TOO IMPORTANT TO RUSH THROUGH AGAINST SELF-IMPOSED DEADLINES. IF DETAILED FEASIBILITY ANALYSIS IS NOT COMPLETED OR IF THE COS CANNOT READILY AGREE, THE PROJECT SHOULD BE ALLOWED TO SLIP INTO NEXT FISCAL YEAR. THIS SITUATION WILL BE UNDERSTOOD IN WASHINGTON AND YOUR OYB WILL BE PROTECTED. THEREFORE, AID/W IS REQUESTING STATUS REPORT NO LATER THAN MID-JULY ON DESIGN. IF AN FY86 OBLIGATION APPEARS LIKELY, MISSION

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SHOULD SUBMIT CN AT THAT TIME AND ADVISE WHEN FINAL PP WILL BE SUBMITTED (I.E., BY AUGUST 1 AT LATEST). IF AN FYES OBLIGATION IS NOT POSSIBLE, WE WILL THEN PROCEED WITH NOTIFICATIONS TO OBLIGATE FUNDS AGAINST OUTSTANDING MORTGAGES.

5. ECPR ALSO CONCLUDED THAT THE CED NOTICE AND RFP FOR THIS ACTIVITY SHOULD NOT ONLY ENCOURAGE PARTICIPATION OF GRAY AMENDMENT ORGANIZATIONS AS EITHER PRIME OR SUBCONTRACTORS (PER CIB 85-21), BUT SHOULD ALSO INDICATE THAT (PER FAR SUBPART 19.7) THE SUCCESSFUL OFFEROR WILL BE REQUIRED TO SUBMIT A PLAN FOR SUBCONTRACTING WITH SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS CONCERNS. THESE NOTICES SHOULD ALSO STATE THAT CONTRACTING OFFICERS WILL HAVE DISCRETION TO NEGOTIATE MONETARY INCENTIVES WITH THE CONTRACTOR, PURSUANT TO FAR 52.219-13.

6. THE IEE IS BEING REVIEWED BY THE BUREAU'S ENVIRONMENTAL OFFICER AND MISSION WILL BE INFORMED OF RESULT IN SEPTEL. SHULTZ

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ANNEX B

GOS LETTER OF REQUEST

MINISTRE DU PLAN
ET DE LA COOPERATION

685-269

Dakar, le

19

LE MINISTRE

O B J E T : Projet de Soutien à la
Production Vivrière.

USAID/SENEGAL	
Date received	21 OCT. 1986
Registry Nbr	
Date Action Taken	0 0 1 2 8 9
Action Taken	
Signature	

Madame le Directeur,

J'ai l'honneur de vous informer que le Ministère du Développement Rural a terminé les négociations avec l'équipe de l'USAID, au sujet du projet de soutien à la production vivrière.

Ce projet, d'un montant de 20 millions de dollars U.S sur une période de cinq ans, entre parfaitement dans les directives de la Nouvelle Politique Agricole. Le Ministre du Développement Rural, qui en assurera la maîtrise d'oeuvre, prendra toutes les dispositions nécessaires afin d'en assurer l'exécution correcte.

Compte tenu du rôle très important que ce projet est appelé à jouer dans la mise en oeuvre de la Nouvelle Politique Agricole, il serait souhaitable que le projet puisse démarrer ses activités avant la fin de l'année 1986. Je suis persuadé qu'en ce qui vous concerne, vous ne manquerez pas de prendre les dispositions nécessaires pour la mise en place rapide des crédits nécessaires au démarrage du projet.

Je profite de l'occasion qui m'est ainsi offerte pour vous renouveler les remerciements du Gouvernement, pour l'action efficace que l'USAID apporte au secteur agricole. Le secteur agricole étant une super priorité des objectifs du Gouvernement, la contribution importante de l'USAID dans ce secteur n'en est que plus appréciée.

Veuillez agréer, Madame le Directeur, l'assurance de ma haute considération.

Madame LITTLEFIELD
Directeur de l'USAID
B.P. 49

- D A K A R -

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ANNEX C

STATUTORY CHECKLIST

5C(2) PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A. includes criteria applicable to all projects. Part B. applies to projects funded from specific sources only:
B.1. applies to all projects funded with Development Assistance loans, and
B.3. applies to projects funded from ESF.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT

1. FY 1985 Continuing Resolution Sec. 607 FAA Sec. 634A. Congressional Notification will be sent to Congress.

Describe how authorizing and appropriations committees of Senate and House have been or will be notified concerning the project.
2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$500,000, will there be (a) engineering, financial or other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?
 - a) financial and other plans have been prepared.
 - b) Project Paper includes reasonably firm estimate.
3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

No legislative action required.

4. FAA Sec. 611(b); FY 1985 Continuing Resolution Sec. 501. If for water or water-related land resource construction, has project met the principles, standards, and procedures established pursuant to the Water Resources Planning Act (42 U.S.C. 1962, et seq.)? (See AID Handbook 3 for new guidelines.) N/A.
5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project? N/A.
6. FAA Sec. 209. Is project appropriate to execution as part of regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. NO.
7. FAA Sec. 601(a). Information and conclusions whether projects will encourage efforts of the country to:
a. Yes
b. Yes
c. Yes
d. Yes
e. Yes
f. N/A.
(a) increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

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8. FAA Sec. 601(b). Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).
9. FAA Sec. 612(b), 636(h); FY 1985 Continuing Resolution Sec. 507. Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?
11. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?
12. FY 1985 Continuing Resolution Sec. 522. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?

U.S. long and short term TA will be furnished under project. Project commodities will be from U.S. wherever possible. Some training will also be in the U.S.

Project Officer will ensure that GOS contributes to project those items as agreed upon in the Project Agreement.

NO.

YES.

NO.

13. FAA 118(c) and (d). Does the project comply with the environmental procedures set forth in AID Regulation 16. Does the project or program take into consideration the problem of the destruction of tropical forests?
14. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (dollars or local currency generated therefrom)?
15. FY 1985 Continuing Resolution Sec. 536. Is disbursement of the assistance conditioned solely on the basis of the policies of any multilateral institution?
16. ISDCA of 1985 Sec. 310. For development assistance projects, how much of the funds will be available only for activities of economically and socially disadvantaged enterprises, historically black colleges and universities, and private and voluntary organizations which are controlled by individuals who are black Americans, Hispanic Americans, or Native Americans, or who are economically or socially disadvantaged (including women)?

YES.

This is a Sahel Project, but no project funds will be disbursed to GOS.

NO.

No project funds are set aside solely for such organization. Interested organizations can submit proposals in open competition or as joint venture partner.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance
Project Criteria

a. FAA Sec. 102(a), (b), (c), (d), (e), (f), (g), (h), (i), (j), (k), (l), (m), (n), (o), (p), (q), (r), (s), (t), (u), (v), (w), (x), (y), (z), (aa), (ab), (ac), (ad), (ae), (af), (ag), (ah), (ai), (aj), (ak), (al), (am), (an), (ao), (ap), (aq), (ar), (as), (at), (au), (av), (aw), (ax), (ay), (az), (ba), (bb), (bc), (bd), (be), (bf), (bg), (bh), (bi), (bj), (bk), (bl), (bm), (bn), (bo), (bp), (bq), (br), (bs), (bt), (bu), (bv), (bw), (bx), (by), (bz), (ca), (cb), (cc), (cd), (ce), (cf), (cg), (ch), (ci), (cj), (ck), (cl), (cm), (cn), (co), (cp), (cq), (cr), (cs), (ct), (cu), (cv), (cw), (cx), (cy), (cz), (da), (db), (dc), (dd), (de), (df), (dg), (dh), (di), (dj), (dk), (dl), (dm), (dn), (do), (dp), (dq), (dr), (ds), (dt), (du), (dv), (dw), (dx), (dy), (dz), (ea), (eb), (ec), (ed), (ee), (ef), (eg), (eh), (ei), (ej), (ek), (el), (em), (en), (eo), (ep), (eq), (er), (es), (et), (eu), (ev), (ew), (ex), (ey), (ez), (fa), (fb), (fc), (fd), (fe), (ff), (fg), (fh), (fi), (fj), (fk), (fl), (fm), (fn), (fo), (fp), (fq), (fr), (fs), (ft), (fu), (fv), (fw), (fx), (fy), (fz), (ga), (gb), (gc), (gd), (ge), (gf), (gg), (gh), (gi), (gj), (gk), (gl), (gm), (gn), (go), (gp), (gq), (gr), (gs), (gt), (gu), (gv), (gw), (gx), (gy), (gz), (ha), (hb), (hc), (hd), (he), (hf), (hg), (hh), (hi), (hj), (hk), (hl), (hm), (hn), (ho), (hp), (hq), (hr), (hs), (ht), (hu), (hv), (hw), (hx), (hy), (hz), (ia), (ib), (ic), (id), (ie), (if), (ig), (ih), (ii), (ij), (ik), (il), (im), (in), (io), (ip), (iq), (ir), (is), (it), (iu), (iv), (iw), (ix), (iy), (iz), (ja), (jb), (jc), (jd), (je), (jf), (jg), (jh), (ji), (jj), (jk), (jl), (jm), (jn), (jo), (jp), (jq), (jr), (js), (jt), (ju), (jv), (jw), (jx), (jy), (jz), (ka), (kb), (kc), (kd), (ke), (kf), (kg), (kh), (ki), (kj), (kk), (kl), (km), (kn), (ko), (kp), (kq), (kr), (ks), (kt), (ku), (kv), (kw), (kx), (ky), (kz), (la), (lb), (lc), (ld), (le), (lf), (lg), (lh), (li), (lj), (lk), (ll), (lm), (ln), (lo), (lp), (lq), (lr), (ls), (lt), (lu), (lv), (lw), (lx), (ly), (lz), (ma), (mb), (mc), (md), (me), (mf), (mg), (mh), (mi), (mj), (mk), (ml), (mm), (mn), (mo), (mp), (mq), (mr), (ms), (mt), (mu), (mv), (mw), (mx), (my), (mz), (na), (nb), (nc), (nd), (ne), (nf), (ng), (nh), (ni), (nj), (nk), (nl), (nm), (nn), (no), (np), (nq), (nr), (ns), (nt), (nu), (nv), (nw), (nx), (ny), (nz), (oa), (ob), (oc), (od), (oe), (of), (og), (oh), (oi), (oj), (ok), (ol), (om), (on), (oo), (op), (oq), (or), (os), (ot), (ou), (ov), (ow), (ox), (oy), (oz), (pa), (pb), (pc), (pd), (pe), (pf), (pg), (ph), (pi), (pj), (pk), (pl), (pm), (pn), (po), (pp), (pq), (pr), (ps), (pt), (pu), (pv), (pw), (px), (py), (pz), (qa), (qb), (qc), (qd), (qe), (qf), (qg), (qh), (qi), (qj), (qk), (ql), (qm), (qn), (qo), (qp), (qq), (qr), (qs), (qt), (qu), (qv), (qw), (qx), (qy), (qz), (ra), (rb), (rc), (rd), (re), (rf), (rg), (rh), (ri), (rj), (rk), (rl), (rm), (rn), (ro), (rp), (rq), (rr), (rs), (rt), (ru), (rv), (rw), (rx), (ry), (rz), (sa), (sb), (sc), (sd), (se), (sf), (sg), (sh), (si), (sj), (sk), (sl), (sm), (sn), (so), (sp), (sq), (sr), (ss), (st), (su), (sv), (sw), (sx), (sy), (sz), (ta), (tb), (tc), (td), (te), (tf), (tg), (th), (ti), (tj), (tk), (tl), (tm), (tn), (to), (tp), (tq), (tr), (ts), (tt), (tu), (tv), (tw), (tx), (ty), (tz), (ua), (ub), (uc), (ud), (ue), (uf), (ug), (uh), (ui), (uj), (uk), (ul), (um), (un), (uo), (up), (uq), (ur), (us), (ut), (uu), (uv), (uw), (ux), (uy), (uz), (va), (vb), (vc), (vd), (ve), (vf), (vg), (vh), (vi), (vj), (vk), (vl), (vm), (vn), (vo), (vp), (vq), (vr), (vs), (vt), (vu), (vv), (vw), (vx), (vy), (vz), (wa), (wb), (wc), (wd), (we), (wf), (wg), (wh), (wi), (wj), (wk), (wl), (wm), (wn), (wo), (wp), (wq), (wr), (ws), (wt), (wu), (wv), (ww), (wx), (wy), (wz), (xa), (xb), (xc), (xd), (xe), (xf), (xg), (xh), (xi), (xj), (xk), (xl), (xm), (xn), (xo), (xp), (xq), (xr), (xs), (xt), (xu), (xv), (xw), (xx), (xy), (xz), (ya), (yb), (yc), (yd), (ye), (yf), (yg), (yh), (yi), (yj), (yk), (yl), (ym), (yn), (yo), (yp), (yq), (yr), (ys), (yt), (yu), (yv), (yw), (yx), (yy), (yz), (za), (zb), (zc), (zd), (ze), (zf), (zg), (zh), (zi), (zj), (zk), (zl), (zm), (zn), (zo), (zp), (zq), (zr), (zs), (zt), (zu), (zv), (zw), (zx), (zy), (zz), (aa), (ab), (ac), (ad), (ae), (af), (ag), (ah), (ai), (aj), (ak), (al), (am), (an), (ao), (ap), (aq), (ar), (as), (at), (au), (av), (aw), (ax), (ay), (az), (ba), (bb), (bc), (bd), (be), (bf), (bg), (bh), (bi), (bj), (bk), (bl), (bm), (bn), (bo), (bp), (bq), (br), (bs), (bt), (bu), (bv), (bw), (bx), (by), (bz), (ca), (cb), (cc), (cd), (ce), (cf), (cg), (ch), (ci), (cj), (ck), (cl), (cm), (cn), (co), (cp), (cq), (cr), (cs), (ct), (cu), (cv), (cw), (cx), (cy), (cz), (da), (db), (dc), (dd), (de), (df), (dg), (dh), (di), (dj), (dk), (dl), (dm), (dn), (do), (dp), (dq), (dr), (ds), (dt), (du), (dv), (dw), (dx), (dy), (dz), (ea), (eb), (ec), (ed), (ee), (ef), (eg), (eh), (ei), (ej), (ek), (el), (em), (en), (eo), (ep), (eq), (er), (es), (et), (eu), (ev), (ew), (ex), (ey), (ez), (fa), 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women in the national economies of developing countries and the improvement of women's status, (e) utilize and encourage regional cooperation by developing countries?

- b) Farmer groups will benefit from credit program of project thru commercial banks.
- b) N/A.
- c) Credit program will support self-help measures of communities.
- d) Women groups in the rural areas have access to credit.
- e) Some training will be done in developing countries.

- b. FAA Sec. 103, 103A, 104, 105, 106. Does the project fit the criteria for the type of funds (functional account) being used? YES. FAA Section 121.
- c. FAA Sec. 107. Is emphasis on use of appropriate technology (relatively small, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)? YES.
- d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed country)? N/A to FAA Section 121,SDP.
- e. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustaining economic growth? YES.

f. FAA Sec. 128(b). If the activity attempts to increase the institutional capabilities of private organizations or the government of the country, or if it attempts to stimulate scientific and technological research, has it been designed and will it be monitored to ensure that the ultimate beneficiaries are the poor majority?

YES

g. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government.

Project will fund activities aimed at and managed by the Senegalese themselves. Training, technical assistance and credit, supported by a media campaign will further the development of the agricultural private sector initiatives and strengthen the GOS institutions involved in the agricultural sector.

2. Development Assistance Project
Criteria (Loans Only)

- a. FAA Sec. 122(b). Information an conclusion on capacity of the country to repay the loan, at a reasonable rate of interest. N/A.
- b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan? N/A.

3. Economic Support Fund Project
Criteria

- a. FAA Sec. 531(a). Will this assistance promote economic and political stability? To the maximum extent feasible, is this assistance consistent with the policy directions, purposes, and programs of part I of the FAA? N/A.
- b. FAA Sec. 531(c). Will assistance under this chapter be used for military, or paramilitary activities? N/A.
- c. ISDCA of 1985 Sec. 207. Will ESF funds be used to finance the construction of, or the operation or maintenance of, or the supplying of fuel for, a nuclear facility? If so, has the President certified N/A.

that such country is a party to the Treaty on the Non-Proliferation of Nuclear Weapons or the Treaty for the Prohibition of Nuclear Weapons in Latin America (the "Treaty of Tlatelolco"), cooperates fully with the IAEA, and pursues nonproliferation policies consistent with those of the United States?

- d. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made?

N/A.

5C(3) - STANDARD ITEM CHECKLIST

Listed below are the statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by imposing limits on certain uses of funds.

These items are arranged under the general headings of (A) Procurement, (B) Construction, and (C) Other Restrictions.

A. Procurement

1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed? YES.

2. FAA Sec. 604(a). Will all procurement be from the U.S. except as otherwise determined by the President or under delegation from him?? Yes, Procurement from U.S. and Senegal except where waivers have been granted.

3. FAA Sec. 604(d). If the cooperating country discriminates against marine insurance companies authorized to do business in the U.S., will commodities be insured in the United States against marine risk with such a company? YES.

4. FAA Sec. 604(e); ISDCA of 1980 Sec. 705(a). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? (Exception where commodity financed could not reasonably be procured in U.S.) No offshore procurement of agricultural commodities.

- FAA Sec. 604(g). Will construction or engineering services be procured from firms of countries which receive direct economic assistance under the FAA and which are otherwise eligible under Code 941, but which have attained a competitive capability in international markets in one of these areas? Do these countries permit United States firms to compete for construction or engineering services financed from assistance programs of these countries?
- Project does not entail construction or engineering services.
6. FAA Sec. 603. Is the shipping excluded from compliance with requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent such vessels are available at fair and reasonable rates?
- No.
7. FAA Sec. 621. If technical assistance is financed, will such assistance be furnished by private enterprise on a contract basis to the fullest extent practicable? If the facilities of other Federal agencies will be utilized, are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?
- YES.
- Not used.

8. International Air Transportation Fair Competitive Practices Act, 1974. If air transportation of persons or property is financed on grant basis, will U.S. carriers be used to the extent such service is available? YES.

9. FY 1985 Continuing Resolution Sec. 504. If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States? YES.

B. Construction

1. FAA Sec. 601(d). If capital (e.g., construction) project, will U.S. engineering and professional services be used? Capital

2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable? N/A.

3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million (except for productive enterprises in Egypt that were described in the CP)? N/A.

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C. Other Restrictions

1. FAA Sec. 122(b). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter? N/A.

2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights? N/A.

3. FAA Sec. 620(h). Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the Communist-bloc countries? YES.

4. Will arrangements preclude use of financing:
 - a. FAA Sec. 104(f); FY 1985 Continuing Resolution Sec. 527. (1) To pay for performance of abortions as a method of family planning or to motivate or coerce persons to practice abortions; (2) to pay for performance of involuntary sterilization as method of family planning, or to coerce or provide financial incentive to any person to undergo N/A.

sterilization; (3) to pay for any biomedical research which relates, in whole or part, to methods or the performance of abortions or involuntary sterilizations as a means of family planning; (4) to lobby for abortion?

- b. FAA Sec. 488. To reimburse persons, in the form of cash payments, whose illicit drug crops are eradicated? YES.
- c. FAA Sec. 620(g). To compensate owners for expropriated nationalized property? YES.
- d. FAA Sec. 660. To provide training or advice or provide any financial support for police, prisons, or other law enforcement forces, except for narcotics programs? YES.
- e. FAA Sec. 662. For CIA activities? YES.
- f. FAA Sec. 636(i). For purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained? YES.

- g. FY 1985 Continuing Resolution, Sec. 503. YES.
To pay pensions, annuities, retirement pay, or adjusted service compensation for military personnel?
- h. FY 1985 Continuing Resolution, Sec. 505. YES.
To pay U.N. assessments, arrearsages or dues?
- i. FY 1985 Continuing Resolution, Sec. 506. YES.
To carry out provisions of FAA section 209(d) (Transfer of FAA funds to multilateral organizations for lending)?
- j. FY 1985 Continuing Resolution, Sec. 510. YES.
To finance the export of nuclear equipment, fuel, or technology or to train foreign nationals in nuclear fields?
- k. FY 1985 Continuing Resolution, Sec. 511. NO.
Will assistance be provided for the purpose of aiding the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights?
- l. FY 1985 Continuing Resolution, Sec. 516. YES.
To be used for publicity or propaganda purposes within U.S. not authorized by Congress?

ANNEX D

121 (D) CERTIFICATION

ANNEX D

UNITED STATES GOVERNMENT
memorandum

DATE: November 22, 1986

REPLY TO
ATTN OF: George Carner, Acting DirectorSUBJECT: FAA 121 (d) Certification for Agricultural Production Support Project
685-0269

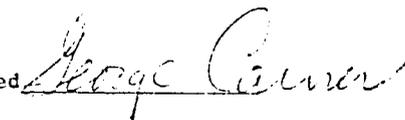
TO: Willie Saulters, AFR/SWA

This project, now in final PP design stage, is a five year, \$20.0 million activity. Its purpose is to facilitate the transition from the GOS to the private sector of the multiplication, distribution and marketing of improved seed varieties, fertilizer, agricultural equipment, crop protection and cereal grain production.

No funds will be transferred directly to the Host Government since the credit component will be managed by the Citibank for the GOS Ministry of Economy and Finance under a host country contract, and the statistics, media and seeds services components will be managed for the Ministry of Rural Development by a U.S. contractor also under a host country contract. Management of funds for procurement of all goods and services will be included under the terms of the contracts.

In view of the above, I, George Carner, hereby certify that no Sahel Development Program Funds will be made available to the government of Senegal under this Agricultural Production Support Project (685-0269).

Signed



George Carner
Acting Director,
USAID/Senegal

Date

11/22/86

ANNEX E

INPUT DISTRIBUTION AND MARKETING ANALYSIS

ANNEX E

INPUT DISTRIBUTION AND MARKETING ANALYSIS

- I. Cereals Seed Production and Distribution
 - A. Structure Proposed for the National Seed Program
 - B. Constraints and Opportunities for Private Sector Entry to Cereals Seed Production and Distribution

- II. Fertilizer Marketing and the Private Sector Distribution System
 - A. The Private Sector Distribution System
 - B. The Cooperative Role in Agricultural Input Distribution
 - C. The Changing Role of the Parastatals in Providing Agricultural Inputs
 - D. Issues and Constraints to Private Sector Entry into National Agricultural Input Markets
 - E. Forecasts of Fertilizer Consumption
 - F. Conclusions and Recommendations

- III. Input Distribution and the APS

- IV. Cereals Marketing in Senegal
 - A. The Role of the Government in Cereals Marketing and Distribution
 - B. Organization of the Private Sector Cereals Market
 - C. The Role of Cooperatives in Cereals Marketing
 - D. Issues and Constraints in Cereals Marketing and Distribution
 - E. Conclusions and Recommendations

- V. Case Studies

ANNEX E

INPUT DISTRIBUTION AND
MARKETING ANALYSIS

Important elements in Senegal's New Agricultural Policy (NAP) are the government's phased withdrawal from financing and supplying agricultural inputs to the farmer, and non-involvement in cereals purchasing and distribution, apart from limited price stabilization interventions. A major role for the Senegalese private sector in filling the gap vacated by the government is envisaged.

This annex provides an overview of the distribution of seed, fertilizer and agricultural implements and cereals marketing. It examines the current situation and future prospects for meeting the agricultural sector's needs under the NAP. Major issues and constraints are identified which could present problems to the private sector in meeting the farm sector's demand for inputs, marketing services and credit. Implications for USAID's Agricultural Production Support Program (APS) are drawn. Finally, case study profiles of Senegalese businessmen at the national, regional and local level are included.

I. CEREALS SEED PRODUCTION AND DISTRIBUTION

Seeds of improved cereal varieties are in short supply and seed markets are characterized by uncertainty and lack of direction. The government traditionally directed its attention and budgets to the foreign exchange earning export peanut sector rather than to food crops. Very few rigorous cereals seeds programs are currently operating.

Private sector involvement in cereals seed production and distribution has been limited to production of seeds under contract to the GOS. The overwhelming role of the government in seed research, development, production, distribution and financing was characterized by an inability to produce foundation seeds, high cost seed multiplication programs, overlapping and confusion of responsibilities, and inefficiencies in the distribution system. Therefore, a major purpose of the APS is to improve the government's capability to produce foundation seed and to promote private sector activity in seed multiplication and distribution. Refer to Annex F for a more detailed review of the cereals seed sector.

The government's long-term seed objectives and policies are summarized in the Statement of Agricultural Policy presented to the donor meeting on agriculture on June 17-18, 1986. This Statement advises that a National Seed Plan is under study and will be published in December 1986. Donor assistance will be requested in carrying out the proposed program which will be based on the following policy guidelines:

- The GOS will withdraw over time from all seed activities except for breeder seed production by ISRA and essential seed quality control

AGRICULTURAL PRODUCTION SUPPORT PP - ANNEX E

programs of the Seed Service, both units of the Ministry of Rural Development.

- Extension services will be upgraded to encourage greater use of improved seed stocks.
- Seed storage capacities will be increased and seed stock management systems improved.
- Seed research will be integrated into the overall mission and activities of the Ministry of Rural Development.
- Private sector entry into production, storage and distribution of seed will be encouraged at all levels.
- Emphasis will be placed on farmer production, storage and maintenance of seed reserves.
- Seed multiplication will be based on a pricing system which will encourage the private sector to enter as producers and distributors.

A. Structure Proposed for the National Seed Program

Table 1, "Structure Proposed for Senegal's National Seed Planning/Financing, Quality Control, Production and Distribution of Certified Seeds," illustrates the objectives and operating structure envisaged by this policy.

- The seed research and seed service activities responsible for development of genetic material and breeder seed and for oversight of national foundation seed and certification are organized under the Ministry of Rural Development (MDR).
- RDA's and agricultural parastatals will work closely with the MDR on an interim basis in organizing and distributing foundation and certified seeds on a non-subsidized basis until such time as the private sector and the cooperatives are able to take over these responsibilities.
- Small farmers will be used on an interim contract basis by the seed service, the parastatals, and the cooperatives in contract growing of foundation and certified seeds.
- Large scale private sector operators will be encouraged to enter the seed production and distribution sector.
- Private sector importers will continue to import and distribute certified seeds to vegetable growers.
- The seed sector will be financed by the newly established National Agricultural Credit Bank (CNCAS), by the informal credit sector, by private sector operators, by donor grants and loans, and eventually by the commercial banking system.

B. Constraints and Opportunities for Private Sector Entry to Cereals Seed Production and Distribution

The private sector's current participation in Senegal's seed business is primarily limited to the import, production and distribution of vegetable seeds and the production, under contract, of cereals seeds. The high return cash flows of vegetable gardeners selling into concentrated and affluent urban markets has supported high demand and cash-and-carry sales of certified vegetable seeds, which has attracted private sector importers and distributors. There is currently, however, little private sector involvement in cereals seed marketing. It is the government's intent to replace the highly inefficient and costly seed multiplication activities of the parastatals with modern, large scale private sector producers though these private sector seed producers cannot profitably operate against existing subsidized seed price structures.

Constraints to the physical distribution of certified seeds, assuming profitable prices and sufficient demand, will pose few problems. Farmers place high priority on cereal seed purchases, quantities purchased are relatively small, and existing transport, storage and wholesaler-retailer outlets can readily support a certified seed product line. Large national firms currently importing and distributing pesticides would also consider certified seed distribution through their local branches and in-place sales forces. Cooperatives could also be expected to play a role in seed distribution.

There are, however, several pre-conditions to private sector entry into breeder and foundation seed production.

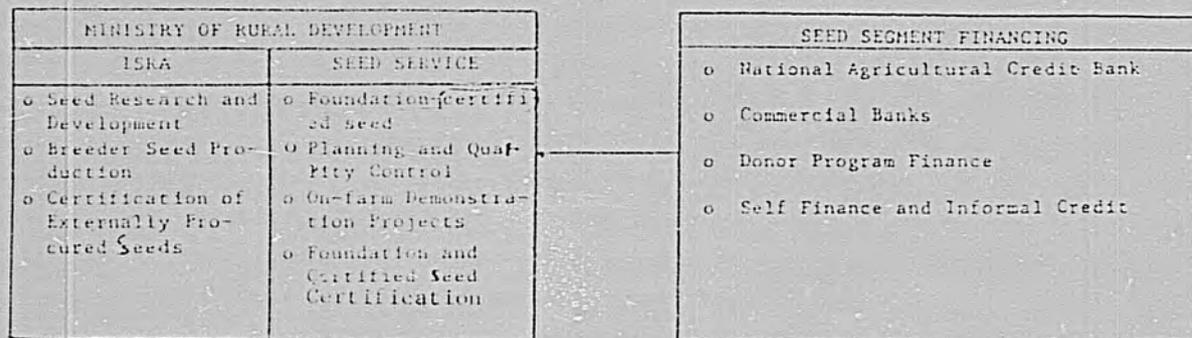
- Seed prices to the farmer must permit a reasonable profit margin for the seed producer. The tentative willingness of small farmers to pay for certified seed has been noted. Price elasticity is not known although seed prices rise at planting time.
- Private sector seed producers must be convinced that a long-term business opportunity exists. Multi-year purchase contracts, initially with the GOS seed service, may be required.
- Breeder seeds must be available in sufficient quantities, in this case supplied by a government entity.
- Effective information and extension programs must be launched to stimulate farmer interest in and demand for certified cereals seeds.

TABLE 1

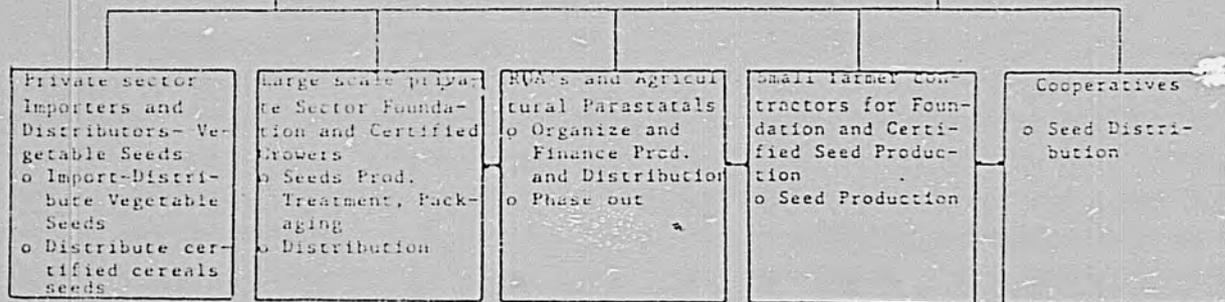
STRUCTURE PROPOSED FOR SENEGAL'S NATIONAL
SEED PLANNING/FINANCING, QUALITY CONTROL
PRODUCTION AND DISTRIBUTION OF CERTIFIED SEEDS

AGRICULTURAL SUPPORT PROJECT - APS II

- o NATIONAL SEED POLICIES, PROGRAMS, BUDGETS
- o NATIONAL BREEDER SEED PROGRAM
- o NATIONAL FOUNDATION AND CERTIFIED SEED QUALITY CONTROL PROGRAM



- o FOUNDATION SEED PRODUCTION
- o CERTIFIED SEED PRODUCTION
- o SEED DISTRIBUTION
- o VEGETABLE SEED IMPORT/DISTRIBUTION



C. Conclusions and Recommendations

The success of the government's national seed program will depend on two forms of donor assistance over a five-to-ten year period: technical assistance and interim financing. Private sector entry into cereals seed production and distribution depends in turn almost entirely on the success of the Ministry of Rural Development's efforts to restructure and revitalize ISRA and the Seed Service (DPCS).

An important element in ensuring successful implementation of the reforms needed to encourage private sector entry into certified cereals seed production and distribution is the program of technical assistance envisaged in this USAID APS project.

It can be seen from Part II, F below that there is "a private sector, including the cooperative management, capable of handling the distribution of agricultural inputs to the farmers..." That assertion is made in the context of the discussion of the fertilizer subsector, but to a lesser extent it applies to the seed subsector as well. The conclusion applying more specifically to the seed subsector may be stated as follows: The private sector is keenly interested in profiting from an expanded role in the multiplication and distribution of improved seed. Farmer demand for improved seed is demonstrable, as discussed in the Economic Analysis section of the main paper and in the Economic Analysis Annex. One difficulty has been GOS delay in taking the necessary steps to withdraw from its dominance of the subsector. It is for this reason that the APS project proposes such heavy emphasis on this seed subsector and on initiating and invigorating private sector involvement.

The technical package for cereals, including seeds, lacks widespread diffusion. Time will be required for the research, pilot and demonstration projects, validation, and farmer education and information programs needed to ensure a steady demand for large quantities of improved cereals seed varieties. Interim donor support, such as that represented by the proposed APS technical assistance and media program in the seed area, will be essential. The fundamental issues of improved seed varieties, market demand, seed pricing, profit margins, and private sector willingness to enter the seed production and distribution business will evolve over a three-to-four year time frame. The APS, therefore, should retain flexibility in its approach and in its financing to accommodate these later developments.

AGRICULTURAL PRODUCTION SUPPORT PP - ANNEX E

II. FERTILIZER MARKETING AND THE PRIVATE SECTOR DISTRIBUTION SYSTEM

The agricultural policies followed by the Senegalese Government during the period 1960-1980 were considered logical and consistent at the time given the government's overall socialist orientation and human welfare concerns against the background of droughts and poor harvests. Fertilizer inputs as part of the total agricultural program were considered a high priority. The government's objectives were to:

- keep fertilizer prices low and affordable to stimulate consumption and achieve high crop yields;
- provide credit mechanisms to the farmer to assist him in the purchase of agricultural inputs;
- ensure reimbursement of farmer loans at harvest time by an enforced levy on crops sold by the farmer through government-controlled outlets;
- foster growth of a strong national cooperative movement to organize individual farmers as production and borrowing units and assist in their education and training;
- provide a range of government research and extension services to develop proven technical packages of seeds, fertilizers and equipment and to train farmers in their use;
- maintain an equilibrium between producer and consumer cereals prices to encourage farmers to undertake intensive cereals production while keeping consumer prices at reasonable levels.

Two primary operating entities were given responsibility for mobilizing the government's efforts and organizing the farmers: ONCAD (Office National de Cooperation et d'Assistance au Developpement) and the cooperative movement. Both entities proved incapable of providing effective leadership and both lost the confidence of farmers and the international donor community. ONCAD, at the time of its abolition in 1980, had incurred debts of 75 billion CFA, which will actually cost the Senegalese treasury 142.2 billion CFA (\$406 million in 1986 dollars) by the time the debts are finally liquidated in 1998. The cooperative movement was viewed by farmers, at least until recently, as an enforcement tool of the government under the control of powerful rural elites.

Fertilizer distribution policies in the wake of ONCAD's abolition in 1980 were essentially improvised on a year-to-year basis.

- Compulsory levy on farmer peanut sales to finance the purchase and distribution of fertilizer in the following years' campaigns - 1981/82, 1982/83 and 1983/84.
- Distribution of subsidized fertilizers through the various Regional Development Agencies - 1984/85.
- Cash sale of subsidized fertilizer through private sector operators, RDA's, and the cooperatives - 1985/86 and 1986/87.

Figure 1, "Fertilizer Consumption - 1974/1985", illustrates the results of years of mismanagement, drought and changing policies. From highs of over 85,000 tons in 1976/77, fertilizer consumption dropped to levels of 26,000 tons in the years 1983 through 1985. Fertilizer consumption for cereals crops, which peaked at 39,000 tons in 1976/77, fell to under 9,000 tons in 1984/85. In 1986/87 fertilizer consumption is estimated at 35,000 tons. Cereals consumption equals 47 percent of overall consumption on average.

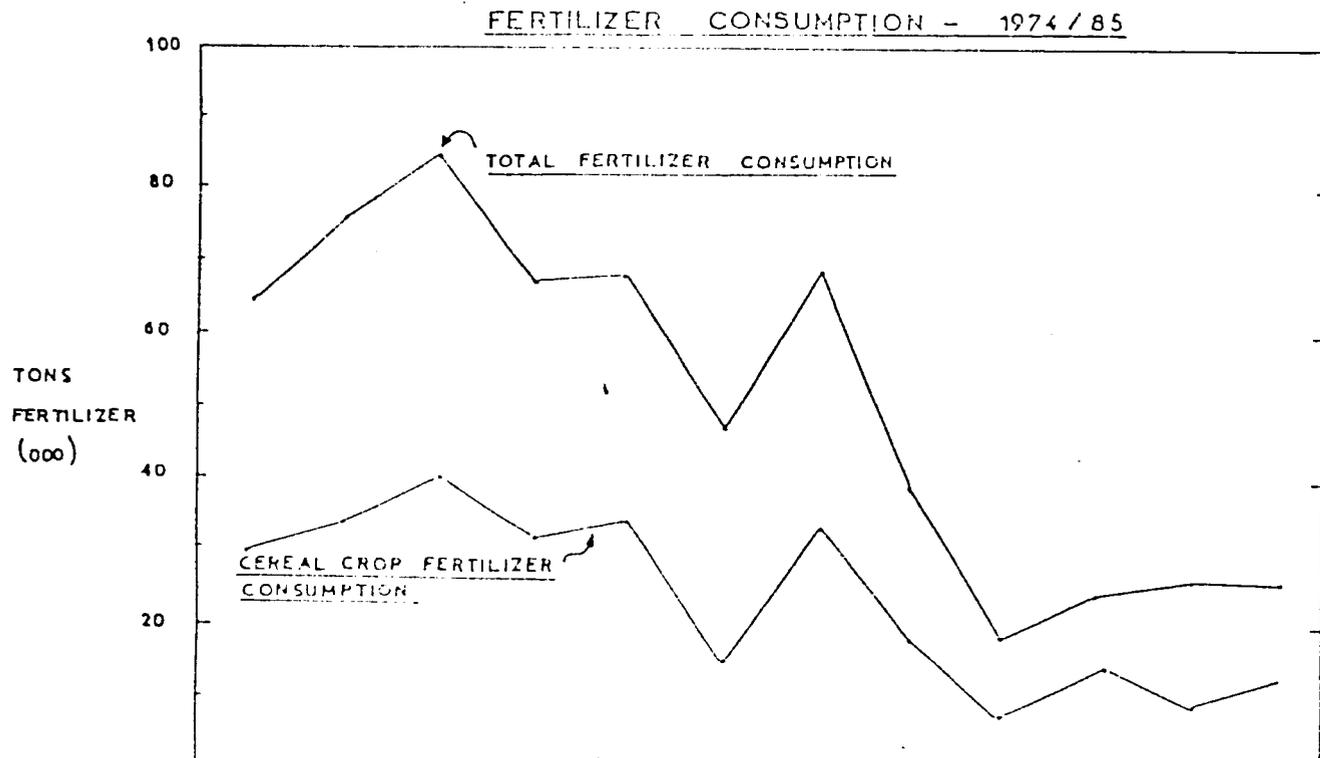
Even following the demise of ONCAD, the government's fertilizer policies continued to concentrate on cash crops over cereals, parastatal responsibility for fertilizer distribution, heavy subsidies, and government-sponsored farmer credit programs.

The obvious failure and growing indebtedness of the government's agricultural apparatus and increasing donor concerns forced a fundamental review and major reshaping of Senegal's agricultural policies and programs. The successful implementation of these new policies will result in a number of fundamental changes in the management of the agricultural sector.

- Withdrawal of the government from all activities which can be assumed by the private sector;
- A gradual reduction in the size and scope of the regional development agencies;
- Creation of an agricultural credit bank (Caisse Nationale du Crédit Agricole du Sénégal - CNCAS);
- Elimination of government subsidies on agricultural inputs apart from those assumed by donors;
- Organization of grass roots farmer organizations able to move gradually into input supply and foodcrop assembly, storage, and distribution.

Under these policies, three major groups will assume new responsibilities for the nation's agricultural segment: the private sector, newly organized farmer cooperatives, and certain parastatals.

FIGURE 1
FERTILIZER CONSUMPTION - 1974/85



YEAR	74/75	75/76	76/77	77/78	78/79	79/80	80/81	81/82	82/83	83/84	84/85	85/86
CONSUMPTION												
TOTAL CONSUMPTION	63,7	76,4	85,2	66,7	67,4	47,2	70,4	38,6	17,9	25	26,4	25
CEREALS CONSUMPTION	29	32	39	31,5	34	18	35	19	8	14,7	8,8	14
% CEREALS TO TOTAL	46	42	46	46	50	38	50	50	45	59	33	54

SOURCE: USAID SENEGAL : MIN OF PLANNING

▲ HISTORICALLY LOW HARVEST YEAR

PRIVATE SECTOR
INPUT DISTRIBUTION SYSTEM

A. Structure of Distribution:

The chart which follows presents in simplified form the structure of Senegal's private sector distribution system:

TABLE 2

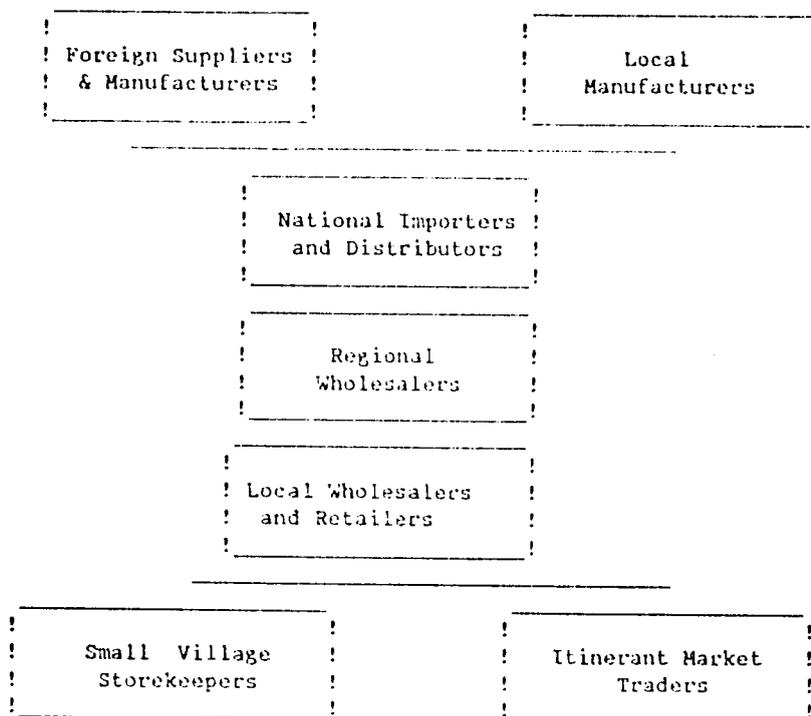


Table 3, "The Structure of The Private Sector Distribution Network", summarizes the operating characteristics of businesses active at each of these levels in Senegal's national distribution system. Case studies at the conclusion of this annex describe each of the business levels.

Table 3

THE STRUCTURE OF THE PRIVATE SECTOR DISTRIBUTION NETWORK

LEVEL	ACTIVITIES
National Importer/ Distributor	<p>Dakar based locally owned company or subsidiary of a foreign company.</p> <p>Does not deal exclusively in agricultural inputs; imports and distributes a broad range of products.</p> <p>Maintains own storage facilities.</p> <p>Works through regular wholesalers or agents outside Dakar.</p> <p>Competes aggressively for government fertilizer import bids and distributes some fertilizer to nearby market gardening farms and to neighboring countries.</p> <p>Consists of 5 to 10 large companies with experience in agricultural inputs; fertilizer, chemicals, equipment.</p> <p>Has sales in the range of 400 million CFA to 5 billion CFA (\$1.2 million to \$15 million).</p> <p>Maintains close relationships with commercial banks.</p> <p>States that financing is not a major problem.</p>
Regional Wholesaler	<p>Operates in all cities in Senegal.</p> <p>Competes aggressively in all the larger cities.</p> <p>Is generally wholly-owned individual proprietorship with very strong family participation in the management of the business.</p> <p>Trades in basic foods, including locally produced cereals, building materials, fabrics, clothing and varied consumer goods.</p> <p>Buys direct from national manufacturers or importers.</p> <p>Supplies local wholesalers and retailers.</p>

Maintains important warehousing capacity -
200-300 tons.

Has turnovers of 250 million CFA to 3 billion
CFA (\$750,000 to \$9 million).

Provides own or contracts transport services.

Has high inventory turnover with sales made
primarily on a cash basis. Preferred customers
may obtain 50% very short-term credit.

Has limited dealings with banks. Tends to
self-finance his operations.

Has little formal training; many speak only
local language.

Local Wholesaler/Retailer

Operates in all villages and small towns.

Manages own store. Supplies small shopkeepers
and weekly market itinerant traders.
Wholesaling activities generally contribute 70%
of sales.

Buys from regional wholesalers and national
producers.

Sells a wide range of products: foods,
appliances, building materials, tools,
automotive parts.

Maintains storage facilities from 10 to 60 tons
capacity.

May extend very short-term credit to established
wholesale consumers: 30%-50% payable on next
reorder.

Supplies from ten to twenty-five small
storekeepers and market traders.

May have maintained a bank account for purposes
of wholesalers license but does not borrow.

Attains sales of between 50 to 250 million CFA
per year (\$150,000-\$800,000).

Has no formal training and speaks only local
languages.

Village Storekeeper

Operates small store which is usually a sideline family-operated business.

Provides limited range of products.

Operates from home and has small storage capacity.

Buys from local wholesaler and obtains limited short-term credit.

Extends limited credit to well known customers.

Does not have bank accounts.

Has annual turnover range between 7-8 million CFA(\$3000 to \$25,000).

Has no formal training. Most are illiterate and speak only local language.

Itinerant Trader

Has no fixed place of business, goes from weekly market to weekly market.

Sells a small assortment of goods.

May have a used pick-up truck.

Buys from regional or local wholesaler.

AGRICULTURAL PRODUCTION SUPPORT PP - ANNEX E

B. The Cooperative Role in Agricultural Input Distribution

The official structure, nomenclature and governmental level of Senegal's cooperative movement are shown in the following chart. Table 4 provides additional information.

! National Cooperative ! ! Union 1 !	National
! Regional Cooperative ! ! Unions 10 !	Region
! Departmental Cooperative ! ! Unions 30 !	Department
! Local Cooperative ! ! Unions 90 !	Arrondissement
! Rural Cooperatives ! ! 340 !	Rural Community
! Village Sections ! ! 4400 !	Village or Quarter
! PRODUCER GROUPS !	

TABLE 4
 FARMER COOPERATIVE STRUCTURE AT THE OPERATIONAL LEVEL

ORGANIZATIONAL UNIT	ACTIVITIES
<u>Rural Cooperative</u> <u>Cooperative Rurale</u>	<ul style="list-style-type: none"> - Smallest administrative cooperative entity. - 340 multi sectoral units. - Legal entity with financial autonomy and rights of ownership. - Provides a range of planning, coordination, follow-up and evaluation activities for associated village sections: <ul style="list-style-type: none"> o obtains credit; o keeps inventory and distributes seeds, fertilizers and agricultural machinery; o Maintains credit and collection operations; o conducts product market research, markets and transports products to urban centers; o identifies and carries out planning for major cooperative projects.
<u>Village Section</u> <u>Section Villageoise</u>	<ul style="list-style-type: none"> - 4400 multi-sectoral units linked to a rural cooperative. - Members pay share of 1000 CFA. - Legal entity with charter providing for financial autonomy and specific responsibilities. Has bank accounts and access to credit directly or through the rural coops. - Elects Board of Directors. - Has formal decision-making structure: General assembly, sectoral committees and special commissions. - Key area-wide organization interfacing with authorities and member units (groupements). - Supposed to provides a broad range of services on behalf of member units: <ul style="list-style-type: none"> o supplies agricultural production inputs and consumer goods; o transports products to gathering/consumption centers; o provides produce processing services; o operates savings and loan and mutual insurance programs; o plans and carries out small cooperative projects; o provides education, training and management services.
<u>Production Groups</u> <u>Groupement de Producteurs</u>	<ul style="list-style-type: none"> - Legal entity with defined charter, responsibilities, financial autonomy and organization structure. - Independent from the cooperative organization. - Legal borrowing entity. - Specific one product or sector focus, e.g.: <ul style="list-style-type: none"> o market gardening, o cereals growing, o stock breeding, o milk production, o fishing, o forestry, o crafts,

42.

The cooperative movement in Senegal was historically a top-down government imposed structure dominated by self-serving regional leaders and never represented a grass roots farmer movement. Cooperatives were used as peanut buying agents and made attempts to provide agricultural inputs.

Since the dismantlement of ONCAD and five years later of SONAR, the role of the cooperative movement has been under question. Under pressure from the donors, and in the context of the creation of a rural credit mechanism (see Credit annex H), new formulas of farmers' organizations have been proposed: village sections (V.S) and producer groups. The objective was to generate bottom up types of organizations. The old cooperative movement strongly opposed this new approach, but without success; now both village sections and producer groups have a legal status (and therefore can borrow from banks) although the V.S. are still associated to the cooperative movement.

In practice, in the last two years, the coop movement has begun to evolve. For this movement it is a question of life or death. For example, they are now willing to participate in the input distribution sector on an equal footing with the private dealers. Some village sections, which had been administratively created in 1984/85, have begun influencing the decision-making process at rural community levels and higher.

The cooperative movement cannot be discarded because of past errors. If reorganized and reoriented, it could be a potentially very useful instrument because it reaches to the farmer level. The project could play a dramatic role in the rebirth of this movement by providing funds and policy guidance.

C. The Changing Role of the Parastatals in Providing Agricultural Inputs

Major reorganization of the agricultural parastatals is underway. The long-term results of these changes are difficult to discern in detail, but the objectives are certainly to eliminate, slim down or reorient state companies whose overall poor performance and large-scale operating deficits made fundamental changes essential.

The government's intent in reducing the role of the agricultural parastatals is reflected in Table 5, "Reorganization of Rural Development Agencies." There are essentially two parastatals which are likely to play a medium to long-term role in assuring the orderly transition of agricultural inputs to the private sector.

SONACOS is the major peanut oil processor in Senegal with 75% of all production. It is a mixed economy company with the GOS holding 60% of the equity. SONACOS is the final buyer and financier of the peanut campaign. It used licensed private sector buying agents (OPS) in 1985 and National Cooperative Union channels on a competitive basis to handle assembly of the peanut crop. SONACOS intends in 1986/87, to disengage completely from the peanut crop collection process in favor of the cooperatives and private traders. When APS implementation begins, SONACOS will have two years of experience with a large number of OPS dealers (80 in 1985, more in 1986), which can serve as a component of an input marketing network.

SONADIS is a mixed economy commercial company with the GOS holding 90% of the equity. Its mission is to distribute basic consumer goods on a national basis. It is the largest distributor in Senegal with sales of 20 billion CFA through wholesale outlets in major cities and 127 retail outlets. SONADIS undertakes minor cereals marketing, and is willing to use its distribution channels for fertilizer sales. Formulas are now being studied to utilize the SONADIS network, in particular on a consignment basis. While a GOS company, it is operated along private sector lines with store managers receiving commissions on sales volume.

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TABLE 5

REORGANIZATION OF RURAL DEVELOPMENT AGENCIES

NAME	REORGANIZATION PLAN
<u>SAED - River Basin</u> Société d'Aménagement et d'Exploitation des Terres du Delta, du Fleuve Sénégal et des Vallées du Fleuve Sénégal et de la Falémé	-Gradual reduction in role and influence which will pass to village sections and production groups. - "Post Dam" regional planning, technical assistance, water project planning, coordination and control. - Design of balanced delta, middle valley and upper valley rural development programs. - Assistance in reorganization of large irrigated areas under management of rural population.
<u>SODEVA - Peanut Basin</u> Société de Développe- ment et de Vulgarisa- tion Agricole	-Reduction of staff by 75% over five years. -Field-based personnel will be retained as "agricultural advisors". -Encourage cropping of maize, cowpeas, cassava; promote cattle fattening; assist in develop- ment of small irrigated areas around wells; improve technical skills for peanut cropping.
<u>SODEFITEX - South Peanut Basin, East Senegal, Kolda,</u> Société de Développe- ment des Fibres Textiles	-Maintain current position as marketing agency monopolizing cotton producers, including credit and input supply. Working through APBs (Assn. de Producteurs de Base). extend its current range of credit and input services to rainfed and irrigated cereals producers.
<u>SODAGRI - Upper Casamance and East Senegal</u> Société de Développe- ment Agricole et Indus- triel du Sénégal	- Reduction and stabilization of personnel. - Evaluate projects and provide services for irrigated and rainfed paddy and other crops. - Has had major seed multiplication program.
<u>SONAR - National Société</u> Nationale D'Approvision- nement du Monde Rural	Abolished.
<u>SOMIVAC - Casamance</u> Société Pour la Mise en Valeur Agricole de la Casamance	-Reorganization and reduction of personnel by 60%. -Evaluate projects and provide services for irrigated and rainfed crops.

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D. Issues and Constraints to Private Sector Entry into National Agricultural Input Markets

One of the basic questions regarding fertilizer distribution in Senegal is: Are farmers willing to buy fertilizer at its true cost as opposed to the past level of subsidy with non-reimbursement of credit? In other words, is there a demand for fertilizer?

The answer to this question is a qualified yes for the following reason: Fertilizer is a good investment in regions of Senegal with rainfall in excess of 450-500 mm. This eliminates portions of the country's rainfed cultivated areas north of the MBour-Kaolack-Tambacounda road. South of this line, when asked whether fertilizer is valuable, farmers reply that it is, especially on cereals. However, even following the successful cereals harvest of 1985/86--one of, if not the largest, since 1970--the Senegalese farmer in much of the rainfed areas is living at little more than subsistence level. Disposable income for essentials is low; most merchants selling basic food products in the area report significant decreases in their turnover of basic food items in recent years. Debt accumulated by farmers in a series of poor harvest years, which in the important Sine-Saloum region stretch back through the seventies, and the resulting disinvestment via sale of cattle or agricultural equipment continue to constrict demand. Field studies at the farmer level confirm the merchants' views that fertilizer purchases come after family food needs are met and social obligations, seed purchases, and debt repayment are made.

When asked why they did not buy fertilizer if they think it valuable, farmers responded that (1) fertilizer was not readily available, (2) prices were too high and (3) they had no cash. Lack of cash was the most common answer. This means that the demand for fertilizer is constrained largely by a liquidity problem.

These are four possibilities to solve that problem. First, the new Caisse Nationale de Credit Agricole is expanding its rural lending activities. Secondly, some traders are willing to extend credit to producers whom they know personally, if they themselves have credit available. This must be one of the key components of the APS: lines of credit available for traders in the fertilizer business. Thirdly, the cooperatives are now beginning to be engaged in input supply and fourthly, traditional money lenders can still be used.

Another issue concerns the willingness of the private sector to fill the gap left by state disengagement. Until now, there has been a limited response by the private sector to this new situation. However, major plans are afoot for the coming agricultural campaign. SENCHIM, the principal fertilizer distributor at the national level, has already organized a distribution system to bring fertilizer in reach of farmers: 30 - 45,000 tons are to be distributed with 60 percent projected use on cereals. The system will include SONADIS, OPS and merchants. SENCHIM's projected sales and formulas are found in Tables 5 and 6.

Apart from the SENCHIM organized system, the typical distributor-wholesaler-merchant prefers to take a small profit with low risk rather than chance earning a larger profit at higher risk. The majority of these small businessmen do not have the financial means necessary to get involved in the fertilizer business, at least the way it was proposed for 1986/87. Merchants were supposed to pay cash or repay credit after 60 days if they were able to obtain an irrevocable letter of credit from their banks (which was difficult for most of them). As indicated, few merchants work with banks on a regular basis. The most appropriate solution, however, is the one proposed by the APS, i.e., lines of credit to selected traders through banks based on more responsive lending terms.

A third reason for hesitant private involvement in fertilizer marketing is a lingering fear that government will move back into direct involvement in fertilizer supply, distribution and credit, perhaps on a subsidy basis.

E. Forecasts of Fertilizer Consumption

The private sector will be heavily influenced by its assessment of agricultural input demand. Fertilizer consumption used on cereals crops, usually about 50 percent of all fertilizer consumed, peaked in 1976/77 at an estimated 39,000 tons. Consumption, has trended downward since then hitting lows in recent years in the 8,000 to 9,000 ton range. Millet/sorghum production, on the other hand, has achieved tonnage levels which, in some cases, appear to be as high in years of low fertilizer use as in years of high fertilizer use (see Figure 2). Rainfall, of course, is the primary determinant of production, and no simple fertilizer-use/crop yield comparisons are valid without consideration of this variable.

The availability of rainfall and the long-term decline in agriculturally useful rain, rain falling between May 1 and October 31, is dramatically illustrated in Figure 3. Not only have long-term average rainfalls been declining since the 1950's, but year-to-year variability has been within very wide ranges. With such trends and variability it is easy to understand the reluctance of farmers in marginally rainfed areas to invest in fertilizer which is only effective under adequate rainfall conditions.

Forecasting fertilizer consumption in the current, highly disturbed market conditions of Senegalese agriculture is extremely difficult due to the end of government credit programs, erratic rainfall conditions, increased fertilizer costs to the consumer, a New Agricultural Policy, and a dramatic reorientation and reorganization of the government and parastatal agricultural structures. All such forecasts must be considered highly speculative and tentative, particularly in view of data input unreliability on which the forecasts are based. A close watch on 1986/87 fertilizer sales will provide certain useful clues to farmer response under these changing conditions.

TABLE 6

1987 Fertilizer Marketing Plan

The following is the GOS marketing plan to distribute 44,000 metric tons of fertilizer to farmers during the 1987 crop season:

ZONES	Department	6-16-27	6-20-10	14-7-7	19-10-20	TOTAUX
DAKAR	Niayes	-	-	-	1400	1400
CASAMANCE	Oussouye	70	-	-	-	70
	Bignona	900	-	-	-	900
	Ziguinchor	250	-	-	-	250
	Kolda	1740	-	-	-	1740
	Velingara	600	-	-	-	600
	Sedhiou	2450	-	-	-	2450
S/Total		6000				6000
DIORBEL/LOUGA	Louga	-	470	730	-	1200
	Kebemer	-	730	1030	-	1760
	Diourbel	-	910	1350	-	2260
	Bambey	-	1020	1460	-	2480
	Mbacke	-	870	1280	-	2150
S/Total			4000	5850		9850
SINE-SALOUM	Gossas	-	1000	1310	-	2310
	Fatick	-	700	770	-	1470
	Foundiougne	-	750	880	-	1630
	Kaolack	-	750	830	-	1580
	Kaffrine	-	1600	1900	-	3500
	Koungheul	-	1100	1330	-	2430
	Nioro	-	1500	1840	-	3340
S/Total			7400	8880		16280
THIES	Thies	-	780	1750	400	2930
	Tivaoune	-	730	1750	1000	3530
	Mbour	-	1040	2150	700	4090
S/Total			2550	5650	2100	10300
TOTAL		6000	14000	20500	3500	44000

Date: October 24, 1986

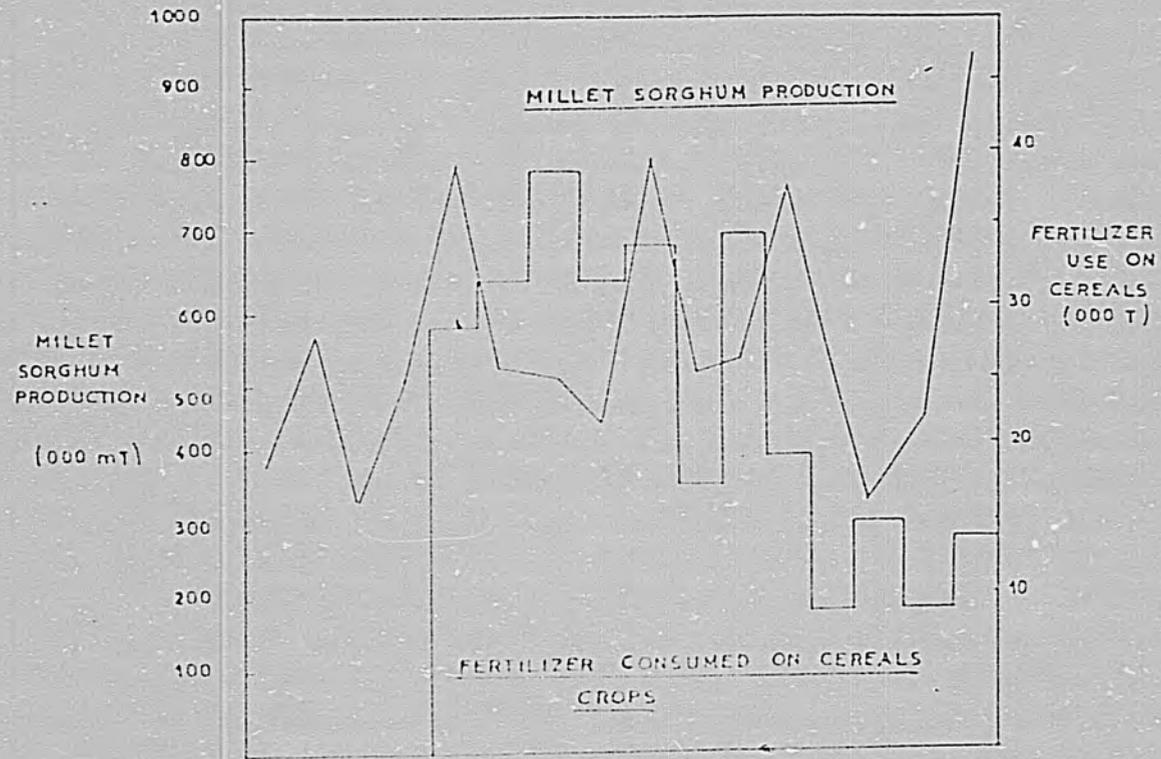
TABLE 7
Fertilizer Pricing Plan

The following is an illustrative cost analysis for the 1987 fertilizer marketing plan organized by the GOS with private and parastatal fertilizer distributors:

Principal Crops and percent estimated	Casamance			Overall
	Peanut (30%) 6-20-10 NPK	Cereals (60%) 14-7-7 NPK	Food Crop(10%) 8-18-27 NPK	Urea 43%N
Senegal's Manufacture	68,000	69,500	72,700	52,225
Price in CFA per MT				
USAID Subsidy	16,000	16,000	16,000	-0-
CFA per Metric Ton				
Price to wholesaler	52,000	53,500	56,700	52,225
CFA per Metric Ton				
Handling charges (4%)	2,100	2,140	2,270	2,175
CFA per Metric Ton				
Price to retailer	54,100	55,640	58,970	54,400
CFA per Metric Ton				
Handling charges (8%)	4,300	4,450	4,720	4,600
Consumer Price:				
CFA Per Metric Ton	58,400	60,090	63,690	59,000
CFA Per 50Kg. Bag	2,920	3,000	3,185	2,950
US\$ Per Metric Ton	177	182	193	179
Transportation Costs:				
Kaolack 5,000 CFA				
CFA per Metric Ton	63,400	65,090	68,690	64,000
CFA Per 50Kg. Bag	3,170	3,255	3,435	3,200
Thies 3,000 CFA				
CFA per Metric Ton	61,400	63,090	66,690	62,000
CFA Per 50Kg. Bag	3,070	3,155	3,335	3,100
Fatick 4,000 CFA				
CFA per Metric Ton	62,400	64,090	67,690	63,000
CFA Per 50Kg. Bag	3,120	3,205	3,385	3,150
Tambacounda 10,000 CFA				
CFA per Metric Ton	68,400	70,090	73,690	69,000
CFA Per 50Kg. Bag	3,420	3,505	3,685	3,450
Louga 5,000 CFA				
CFA per Metric Ton	63,400	65,090	68,690	64,000
CFA Per 50Kg. Bag	3,170	3,255	3,435	3,200
Diourbel 3,000 CFA				
CFA per Metric Ton	61,400	63,090	66,690	62,000
CFA Per 50Kg. Bag	3,070	3,155	3,335	3,100
Kolda 13,000 CFA				
CFA per Metric Ton	71,400	73,090	76,690	72,000
CFA Per 50Kg. Bag	3,570	3,655	3,835	3,600
Ziguinchor 11,000 CFA				
CFA per Metric Ton	69,400	71,090	74,690	70,000
CFA Per 50Kg. Bag	3,470	3,555	3,735	3,500
Saint-Louis				
CFA per Metric Ton	66,400	68,090	71,690	67,000
CFA Per 50Kg. Bag	3,320	3,405	3,585	3,350

* / Exchange Rate: \$1 = 330 CFA

CEREALS FERTILIZER CONSUMPTION AND
MILLET - SORGHUM PRODUCTION



CEREALS FERTILIZER CONSUMPTION AND
MILLET SORGHUM PRODUCTION

FIGURE 2

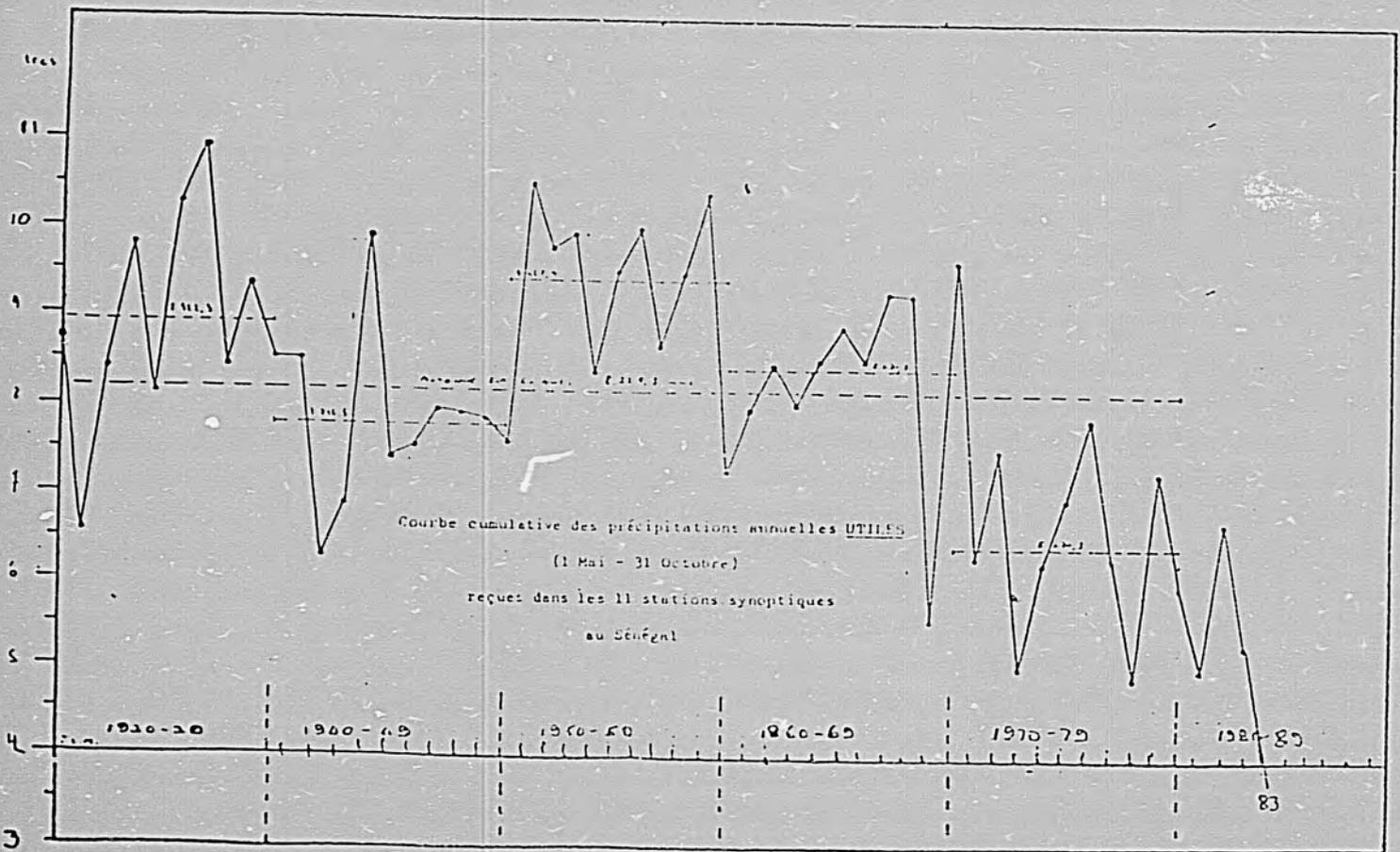
	70/71					75/76											85/86
CEREAL PROD	382	583	322	510	800	516	507	400	502	501	545	785	535	352	471	950	
FERT-CONS.	-	-	-	-	29	32	39	32	34	18	35	19	8	15	9	4	

SOURCE: MINISTRY OF RURAL DEVELOPMENT

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AGRICULTURALLY USEFUL ANNUAL RAINFALL
 FALLING BETWEEN MAY 1 AND OCTOBER 31

FIGURE 3



9/1

Figure 4, "GOS Farm Equipment Distribution Program" illustrates the units of agricultural equipment sold and the amounts paid by farmers for such equipment. The equipment distributed under this government-sponsored and subsidized program included non-mechanized ploughs, seeders, weeders, carts and related farm implements. This program came to a complete halt in 1980 with the end of the government's agricultural subsidy programs.

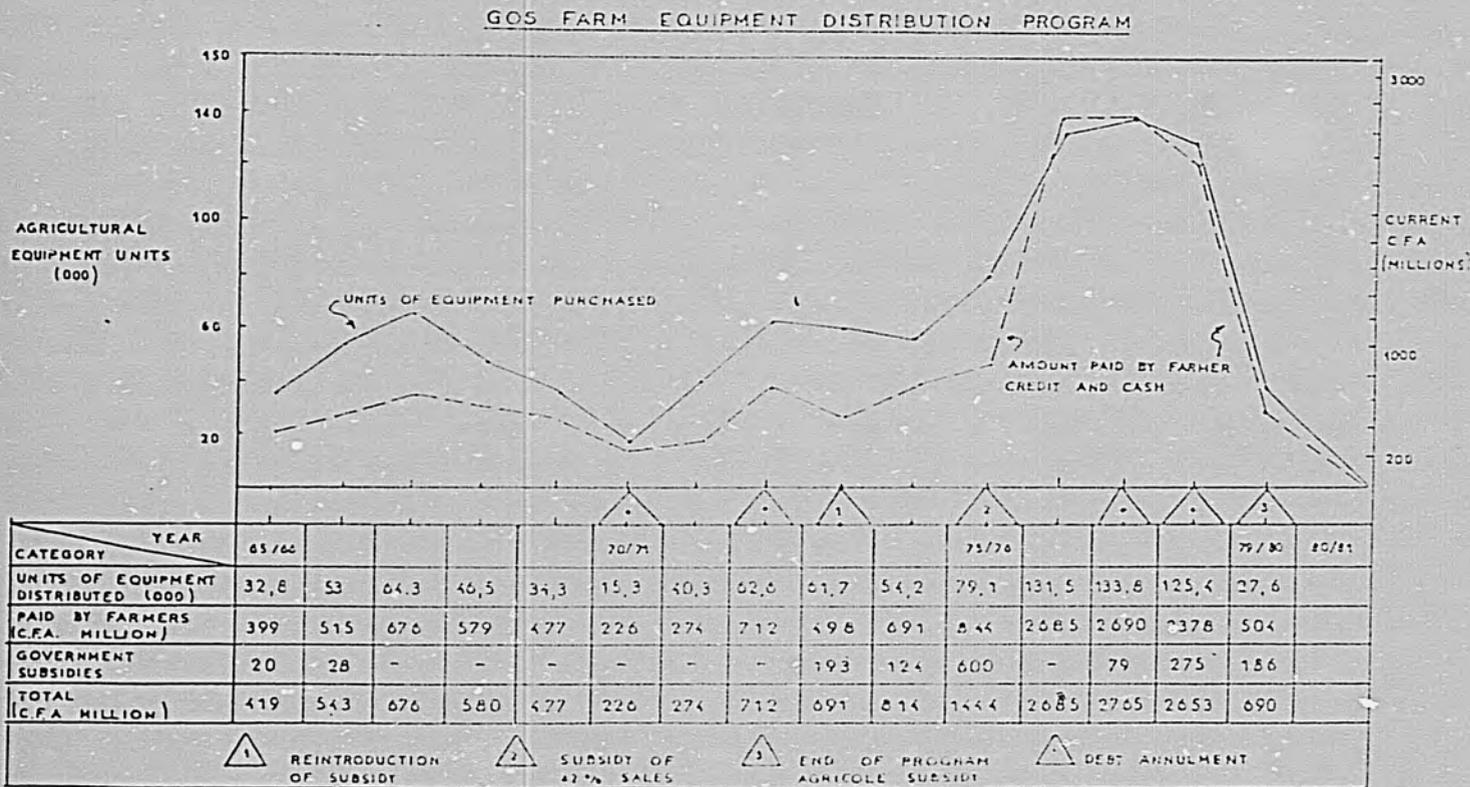
Trading and sales of agricultural equipment continue. There is an active used-equipment market. Tools and implements are locally produced and used equipment is rehabilitated. There are limited imports and production by MATFORCE, a private importer, and SISMAR, an animal traction agricultural equipment manufacturer, recently reopened under private management. In some cases, the high cost of both imports and SISMAR's locally-manufactured products have forced the farmer to buy inferior but relatively inexpensive locally-manufactured equipment. There is also a growing demand for, and increasing private sector supply of, equipment rental and animal traction services.

SISMAR, now operating under private ownership and management, has large and modern manufacturing facilities and is capable of supplying national needs for small, non-mechanized agricultural equipment. It is currently operating at 30-35 percent of capacity. MATFORCE, a UNILEVER company, is a large and well-organized importer, assembler, manufacturer and distributor for a broad range of mechanized equipment and pumps. It has an effective spare parts warehousing system and a national network of distributor-technicians to respond to field maintenance problems. In summary, Senegal possesses in these two private sector companies an outstanding range of capabilities and facilities to meet almost any conceivable farm sector need for agricultural implements and equipment.

There appears to be no doubt that the collapse of the agricultural equipment market in 1980 will increasingly operate to the detriment of increased farm productivity unless credit, cooperative actions and/or private sector rental services are brought to the farmers' aid.

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FIGURE 4
GOS FARM EQUIPMENT DISTRIBUTION PROGRAM



SOURCE USAID SENEGAL FROM VARIOUS GOS SOURCES

F. Conclusions and Recommendations

There is in Senegal a private sector, including the cooperative movement, capable of handling the distribution of agricultural inputs to the farmers, and this private sector is now organizing for this activity. There is a potential demand by the farmers for fertilizer in the southern part of the country and on irrigated lands but this potential demand does not materialize into an effective demand mostly because of financial constraints.

The supply side of the equation should not raise problems if the private sector (including cooperatives) is given adequate financial facilities as planned in the APS project, and if the government remains firm in its disengagement from the sector. As farmers earn more income from higher prices for their production the demand for inputs will increase. Increase in fertilizer and overall input consumption will be gradual, much slower than expected by the GOS. However, it is preferable for Senegal's long-term future to create an effective input demand based on farmers' perception of benefit/cost ratios, rather than create an artificial demand as was done in the 1970s through ONCAD.

III. INPUT DISTRIBUTION AND THE APS

The Senegalese Government pursued a strong interventionist and paternalist agricultural policy for 25 years and program initiatives had the primary objective of increasing agricultural output of both cash and food crops. In almost no other area of agriculture was the government's presence as overwhelming and exclusive, and eventually as unsuccessful, as in the purchase, distribution and financing of agricultural inputs.

Agricultural input planning and direction had heavy top-down orientation, while program execution was characterized by inefficiency and massive losses. The inevitable collapse of this unwieldy structure led to the formulation of the New Agricultural Policy--a revolutionary change in Senegal's approach to national rural agricultural development.

This bold NAP program seeks:

- government withdrawal from all activities which can be assumed by the private sector;
- planned organization or elimination of agricultural parastatals;
- creation of the country's first agricultural bank;
- elimination of all government subsidies on all agricultural inputs;
- grassroots organization of farmer-level cooperatives.

Achievement of these objectives will require the effective and profitable entry of the Senegalese private sector at all levels of the agricultural input distribution business: seeds, fertilizers, and equipment. Any effective program of support to the Senegalese Government's effort to "stay the course" must take into account the problems and constraints to such private sector entry.

Several major conclusions emerge from a scrutiny of the Senegalese private sector.

1. The private sector is large, energetic, internationally well connected, conservative and has access to credit from formal and informal credit channels.
2. The private sector essentially dominates import and domestic trade, distribution, transformation and transport. Private sector importers, wholesalers, merchants, storekeepers, and itinerant salesmen reach all levels of the distribution consumer chain and deal primarily on a cash-and-carry basis. Country towns are accessible over comparatively good roads, local markets are well stocked, and private trucking companies provide effective transport.
3. The private sector has the capability, and has expressed its willingness to enter the agricultural input business but with conditions:
 - demonstration over time that the state will, in fact, stay out of the supply, subsidy and give-away of agricultural inputs;
 - reasonable market evidence that there is a profitable consumer-farmer level demand for agricultural inputs in quantities sufficient to justify distribution;
 - indication that agricultural input demand can be satisfied on an essentially cash-and-carry basis.

The APS must respond to these very real and practical market, credit and business issues and constraints if there is to be, in fact, a transfer of the agricultural input supply business to the private sector, and the resultant reorganization of the still existing agricultural parastatals involved in input supply and credit.

USAID's Agricultural Production Support Program has three major sub-program elements, all directed towards the distribution-financing and effective utilization of a private sector dominated agricultural input system.

1. Specific programs designed to promote understanding of and stimulate demand for new agricultural input packages would:
 - demonstrate credible and proven technical input packages of seeds, fertilizers, equipment, and farm practices;
 - communicate to the farm population the benefits of the new technical input packages. (Information, Communication and Media).
2. Lines of credit made available through the banking network for financing the development of private sector distributor systems. This credit component is complementary to the setting up of an efficient national farm credit program financed by other donors (Finance).

3. Technical assistance to improve the information data base for use in national agricultural planning, measurement and management including agricultural statistics. (Planning, Measurement and Management).

The organization and staffing of the APS project team provides the essential and highly critical fourth element: a high level implementation manager and advisor capable of orchestrating a continuous and coordinated policy dialogue with the GOS, ensuring donor community coordination, and mobilizing private sector interest and involvement. This senior management executive would:

1. Maintain a visible and influential presence in the planning and conduct of a continuing program of policy implementation with senior GOS policy makers, managers and technicians to promote effective new agricultural policies and programs, identify and assist in removal of constraints to attainment of policy objectives, and influence action in the reorganization or elimination of agricultural parastatals.
2. Provide leadership within the international donor community to achieve coordinated and integrated agricultural policies and programs, pool information and resources, and adopt common approaches which will reinforce the government's determination to stay the course.
3. Encourage private sector investments in agricultural input supply by facilitating government-private sector dialogue, dissemination of technical and market research data, sponsoring familiarization travel programs and investment and information seminars and publications.

IV. CEREALS MARKETING IN SENEGAL

Private marketing of locally produced cereals such as millet/sorghum, corn and, in this context, cowpeas, is not a major problem in Senegal for the moment. Estimates place producer's auto-consumption of these foods at levels of 80-95% of production; only 5-20% of the crop enters cash markets. Tonnages, of course, are important. The estimated 1985/86 millet crop was 950,000 tons and total cereals production in that year represented well over 50% of the country's cereal consumption needs. Rice, wheat and sorghum are imported and distributed primarily via private sector channels to fill the gap. But the State plays a role in the sector in different ways: price fixation, import of rice through CPSP, delivery quotas for the marketing of rice, participation of SONADIS (a state owned distribution network) in the distribution of rice and other cereals, role of food aid and the food aid agency (CSA) in cereals markets, plus regulation, control, etc.

The NAP announced in April 1984 contains several fundamental objectives which directly affect cereals marketing and distribution and:

- assure marketing outlets to cereal producers at prices which will encourage substantial increases in local grain production;
- assure year-round cereal supplies to consumers at reasonable prices;
- utilize private sector intermediaries at all stages of the marketing-distribution chain;

- eliminate high cost government interventions and state corporation involvement in cereals marketing and distribution.

The summary which follows reviews the emerging roles of Senegal's public and private sectors in cereals marketing, identifies problem areas, and considers cereals marketing in the context of the APS.

A. The Role of the Government in Cereals Marketing and Distribution

Grain marketing was for many years a state monopoly. The government exercised its monopoly by heavy-handed enforcement of regulatory restrictions on farmer-level grain purchases, transport and storage, and an official system of price regulations and controls. In spite of this onerous regulatory atmosphere the private sector, under a system of government-licensed wholesalers, gradually developed experience and capability in grain assembly at farm, village, regional and national levels. This private sector involvement, however, was not without major problems of official harassment, fines and "arrangements" which gradually became a significant cost of doing business for private sector operators.

The NAP has now fundamentally reversed former policies, programs and practices. The government seeks to remove itself from direct involvement in local cereals marketing, has moved towards substantial deregulation and liberalization, and is encouraging free competition among all private sector operators, including cooperatives. In October 1985, cereals marketing and distribution, except for rice, were declared "free markets."

The government's recently issued Cereals Plan lays out a policy which supports the liberalization efforts, encourages the development of village-level cereals storage capacity, and promotes small and large-scale processing of cereals into products suited for mass consumer and convenience markets.

The government, however, will retain national cereals price stabilization responsibilities to be exercised by the Commission for Food Security (CSA). CSA can intervene, and has intervened, in cereals marketing in years of good harvests in order to sustain a minimum floor price paid to farmers. The Commission stores grain purchased under this price stabilization program for later domestic resale during periods of grain scarcity and rising prices. The government also reserves the right to set consumer sales price for local and imported rice which directly affects market prices for alternative cereals products.

B. Organization of the Private Sector Cereals Market

The government's past regulation of, and interference in, all aspects of cereals marketing did not prevent an active Senegalese private sector from successfully intermediating sales of both local and imported grains. The government's 1985 decision to liberalize cereals marketing with the exception of rice, has, in principle, removed most legal obstacles all licensing requirements to private sector marketing of cereals.

Even before these recent liberalization measures, however, Senegal's private sector grain traders were clearly able to:

- provide market outlets for local grain producers;
- market grain imports effectively;
- organize storage and transport;
- limit the cost of government market interventions.

In spite of past government controls and interferences in grain markets, public sector traders are active and successful in responding to the market needs of both producers and consumers. Over 1400 grain market intermediaries were identified in one survey of forty grain assembly markets. Total quantities moved are difficult to assess. One estimate places grain volumes entering the cash market at between 50,000 to 100,000 tons in "average" years, rainfall, of course, being the most important variable influencing marketable surpluses. The private sector traders represent the overwhelming force in the market.

Senegalese grain market operators are generally small traditional traders; many are illiterate and speak only Wolof. A large number have their origins in the southern Peanut Basin which, favored by rains, usually produces grain in excess of local consumption needs. Trading patterns result in movement of grain to major city centers and grain-deficit areas of the country.

"Assemblers" are the first line operators in direct contact with farmers.

- Small assemblers operate on a capital base of under 10,000 CFA. They buy grain from farmers in 3-15 kilogram lots and assemble grain on a sack-at-a-time basis. Small assemblers sell to a local grain wholesaler and earn an estimated margin of 2.5 - 5 CFA per bag.
- Commission agents are normally financed by a wholesaler. They may be paid a flat day rate or a fee per sack collected.
- Food deficit consumers, who may also be grain producers, buy for their own account and store grain for family consumption.
- Local shopkeepers and itinerant traders are often both assemblers and retailers, depending on the season.

Small assemblers may store limited amounts of grain and may also transport grain. Storage times and distances, however, are very short. Assemblers obtain their financing from persons' savings, or from loans from family members and from other small merchants. Bank credit is almost never used, although some small assemblers may benefit from pass-on loans or advances made by larger wholesalers who use bank credit.

The licensed or unlicensed wholesaler is the next step up the cereals marketing chain. A "licensed wholesaler" was anyone assembling more than 200 kilos. He had to have a bank account with minimum balances, have access to certified storage facilities and keep accounting records. The government, in

the past, awarded and named licensees on an annual basis. Both licensed and unlicensed wholesalers handled varying mixes of locally produced and imported grains. Most licensed wholesalers were awarded quotas for distribution of imported rice, which still remains subject to government control. All distinctions between licensed and unlicensed traders have been abolished enabling previously illegal operations to emerge from the "underground" economy. Private sector wholesalers in the period of September 1984 to March 1985 handled almost ten times the volume of millet which moved through official channels.

Over 80 percent of wholesalers, who buy on a year-around basis turn over their grain purchases within one month, even those with adequate storage facilities. There is some storing five to six months after the harvest when grain is scarce and prices begin to rise. The normal, rapid turnover rate is due to a general lack of liquidity, high cost of "informal" credit, up to 90 percent on an annualized basis, and very limited access to, or reluctance to employ, bank credit. Most wholesalers rely on their own funds. Regulatory policy, which required a licensed wholesaler to show a capital of 3 million CFA had been a major barrier to business entry. The regulatory "rules of the game" had been a major cause of "arrangements" and petty corruption in the past. Payments for such arrangements and fines were widely reported. These regulatory requirements have been abolished.

Wholesaler strategy is heavily influenced by perceptions of alternative returns on investment which are higher than those available in keeping funds tied up in grain inventories. The obvious result is a wholesaler strategy which maximizes turnover.

C. The Role of Cooperatives in Cereals Marketing

Cooperatives, while heavily involved in the past in peanut marketing, were never important players in grain markets. During the 1985/86 cereals campaign, however, cooperatives were used as grain purchasing intermediaries by CSA under its grain stabilization program. CSA directly financed the buying cooperatives, primarily at the regional union or village section levels, in the purchase of about 15,000 tons, equal to two-thirds of domestic cereals purchased by CSA. The coops were paid a commission of three CFA per kilo.

An interesting new "cereals bank" approach, such as the CRS pilot project currently financed by USAID, is emerging. Formal or informal cooperatives purchase surplus grain from farmer-members at harvest which is stored at village granaries. Farmers are paid cash and are given the assurance of repurchase at pre-established price levels during the "hungry" period. The guaranteed repurchase price is normally substantially below the free market price at the time of repurchase. The differential between the purchase and resale price covers the coop's operating expenses plus a small profit. This innovative cooperative approach may prove to be an effective method for financing grain purchase and storage at the local level while stabilizing prices during the between-harvest periods of scarcity at the farm level.

Cooperatives, however, are not expected to become major factors in grain marketing over the medium term. The present organization of the private sector networks will continue to dominate Senegalese cereals marketing and distribution.

D. Issues and Constraints in Cereals Marketing and Distribution

The price uncertainty faced by farmers on cereal crops has, very probably, influenced their decision not to intensify cereals production and increase fertilizer usage. Furthermore, there is a strong tradition which views peanuts as the cash crop and millet as a subsistence crop. As long as this perception lasts, Senegal's progress toward food self-reliance will be slow, since farmers produce barely enough cereals for their own consumption in the good years leaving the growing urban population to feed on imports. The government is now quite aware of this problem and willing to act with donor assistance.

The first step has been to set up a price stabilization mechanism. This is now in place with the CSA playing the role of buyer of last resort to maintain a floor price. This mechanism has worked fairly well with the bumper crop of 1985/86; 21,000 tons of millet have been purchased, which was enough to regulate a market of probably 100,000 to 150,000 tons. The second step has been deregulation of cereals marketing, which was promoted by USAID in the context of the 1985/86 title I program and backed by the donor community. The third step now is to make sure that the system works over a long period of time. It is well known that farmers take a long time before changing their habits. If they are to accept producing cereals as a cash crop, to complement their own cereal needs, they have to be sure that producing millet, corn or cowpeas is as safe as producing peanuts.

The floor price support mechanism must work correctly, but this is not enough. If CSA can buy 20 to 30 percent of total quantities marketed, the rest has to be purchased by the private sector. As indicated above, the private sector, which was able to survive twenty years of state intervention, is available for that job. But their methods of work are archaic and traditional. They avert risks and use as little credit as possible, at least from the banks. Consequently they buy and sell as fast as they can, even with small margins. These small traders do not play the price regulatory role that they could if they stored grains and competed with each other on the market.

E. Conclusions and Recommendations

In addition to small traditional traders, there is need of a more modern type of trader who uses bank services and a real accounting system, who has storage facilities and is willing to store cereals over a longer period of time. The project has a key role to play at that level. There is a small but strategic class of merchants which is willing to modernize. Very often they are the sons or nephews of a successful local trader, who have had a modern education in Dakar, Kaolack or St. Louis. They are willing to take over the father's or uncle's business, but with new methods. They have potential

collateral although at the moment they are reluctant to use it to obtain credit. Banks have been reluctant to lend to that class of customer because of the liquidity shortage and the state involvement in the input supply and marketing process.

The project, through its line of credit, could bridge that gap and allow traders to develop into modern businesses. One of the mechanisms which could be used by the banks participating in the loan program could be financing private sector inventory, a common bank practice in much of the financing of West Africa's export crops. This would ensure that crop inventories being financed are under the surveillance and control of the bank at designated warehouse locations with loans being reimbursed prior to release of the inventory.

A number of common characteristics may be noted in this distribution system.

- Businesses are created and are managed by capable entrepreneurs and are essentially family-owned and operated.
- A broad range of products are distributed down to the level of small weekly markets via an adequate system of wholly owned warehouses and stores and company-owned or contracted transport. Transport infrastructure poses few problems.
- Owners do not normally rely on bank financing with the exception of the largest businesses involved in fertilizer importing.
- Competition exists at every level of the distribution chain.
- Turnover is rapid; inventories are tightly controlled.
- Short-term credit is offered to long established customers.
- Business operators are risk averse, conservative, and secretive, and prefer to maintain liquidity and avoid long-term capital commitments, especially when regulatory and economic conditions are not clear.

V. CASE STUDIES

A. Case Study Number 1: A National Importer/Distributor, Dakar and Saint-Louis

1. General Presentation

The company S. was founded in 1974 by a wealthy Senegalese businessman primarily to diversify his holdings. The company started as an importer and wholesaler of building material (flooring, bathroom equipment, plumbing) but soon diversified into other promising ventures. It now has four separate departments for building materials, agro-chemicals, products (mainly fruits and vegetables), and representation of various foreign producers of miscellaneous equipment.

The company is legally organized in the form of a "Société Anonyme" (S.A.) whose capital of 120 millions CFAF belongs entirely to the founder, Mr. K.

The company S. is managed by one of Mr. K.'s brothers and employs a total of nineteen persons of which five are managers in the four separate departments. The agro-chemical department, which deals regularly in pesticides and agricultural chemicals, and occasionally, when a national or RDA bid is won, in fertilizers, employs five persons.

The company has shares in various other firms including an insurance company, an industrial vegetable production concern and a company which rents heavy agricultural machinery. It also farms 150 hectares of irrigated land through one of its wholly-owned subsidiaries. Through the owner it is associated with a number of other Senegalese companies including an agro-chemical manufacturing plant and a large distribution company of consumer good in the Kaolack region.

2. Activities

The agro-chemical department was organized as a separate entity in 1982 when the company won a major bid for the import of 10,000 tons of urea for the Ministry of Rural Development. This department also imports and distributes small agricultural equipment and tools (pumps, sprayers, generators, etc.), pesticides and crop protection chemicals and fertilizers. The agro-chemical department represents between 40% and 90% of the total sales of the company which fluctuate greatly depending on whether or not the annual national urea import bids from the Ministry of Rural Development or from the RDAs are won.

The company owns a 1200 square meter building in the heart of Dakar's commercial district and a 2500 square meter warehouse nearby plus a building in Saint-Louis which serves as both warehouse and store for this region's market. The offices of the company, as well as a retail store for housing and agricultural material, are housed in the main building in Dakar. In addition, the company operates three 10-ton trucks for its own transport needs and occasionally on a contract basis.

The General Manager has plans to export, and even open a branch in Guinea, in the next two to three years to distribute agro chemicals, agricultural equipment, and building materials.

3. Finance

The data provided by the management of the company on the annual gross sales show important fluctuations due to the impact of the fertilizer import bids.

In 1983 the total sales were given at 1,176 million CFAF of which the agro-chemical department represented 818 million, or 70% of the total. In the same year, the company won a national bid to import 10,000 tons of urea for the Ministry of Rural Development and imported an additional 3,500 tons for reexport to Mali. In 1984 the sales plummeted to 270 million CFAF, the agro-chemical department represented 127 million, or 47% of that amount. That year, no fertilizer was imported by the company and the agro-chemical department sales consisted only of pesticides and crop protection chemical sales. In 1985, the sales rose to 600 million, 535 million or 89% alone for the agro-chemical department after it won a fertilizer import market of 4,000 tons.

The company works with the BIAO bank in Dakar. It used to work with two other national banks but stopped since their certified checks are not universally accepted. The company can draw up to 320 million CFAF through various services such as an overdraft of 30 million, a line of credit for 90 million, etc. When it has officially won a national or RDA bid for import of fertilizer the company has been able to draw up to 300 million CFAF from the bank and, in one instance, a 700 million CFAF short-term loan. The reputation of the Chairman of the Board certainly helps the company in its relations with the bankers. The Chairman usually gives his personal guarantee for the large loans. The normal facilities (overdraft and line of credit) are guaranteed by mortgages worth 120 million CFA, or a coverage of 100%. In 1985, the company paid 30 million CFA to the bank in interest. The company does not take long-term loans for equipment purchases though the company has no problem getting credit from the bank.

4. Interest in the agricultural input market

The company is interested in the fertilizer market and has the capability to organize and finance the import of large quantities of the product. Since 1978, when it imported 10,000 tons of fertilizers from Poland for the now defunct ONGAD, it has constantly been in this market. It imported 13,500 tons from Belgium in 1983 for Mali and Senegal; unloaded, stored and transported 4,000 tons to the regions in 1984; and imported 4,000 tons from Belgium again in 1985. The company has wide experience with the import, storage and shipment of large quantities of fertilizer (urea) but none in actual sales since it has always worked for the Ministry of Rural Development or for Regional Development Agencies, who always organized the distribution of the product to the final consumer.

Under the New Agricultural Policy, the company is still interested in importing fertilizer but is not now equipped to distribute large quantities in the Peanut Basin. However, it would use the organization and resources of an associated company, belonging to the owner of company S., if it were profitable. This will not be the case until credit is available. At present, in the Peanut Basin there is no Rural Bank to provide credit to the individual farmers or cooperatives at the time of year when the cash availability of the population is at the lowest level. The margin of 7,000 CFA per ton offered is enticing but the quantities sold on a cash basis are likely to remain low. The company would consider a marketing effort if the inventory cost could be assumed by another organization. They, in turn would get reimbursed the cost of such a "cash and return" scheme when the fertilizer is actually sold, since the 7,000 CFA per ton margin could be shared.

The primary interest of the company is in the distribution of small farming equipment and chemicals. These products are less bulky to store and transport and they can bring a far higher profit margin than fertilizer. The company is now organizing a sales force for these products and will probably begin marketing them in the Senegal River region through its Saint-Louis base. If it decides to go into fertilizer distribution directly, it will probably concentrate in those areas where farmers have a higher revenue and know that fertilizer is essential for their crops. The company has also just founded a wholly-owned subsidiary to rent heavy equipment and agricultural machinery to farmers and cooperatives in the irrigated regions of the Senegal River Basin. It invested more than 120 million CFAF in this venture and has already won contracts to plough more than 1,800 hectares of land.

5. Conclusion

This case illustrates the activities, results, constraints, opportunities and plans of a company at the national level.

This case shows that there is, among wealthy Senegalese families, an interest in the agricultural sector market especially for high unit value products or services, in regions of proven or future growth.

Financing does not constitute a problem for such firms. They use the banking institutions mainly for treasury purposes and not as source of funds for expansion and growth. Investments are usually financed with company, or its owner's, funds.

It is also important to note that this a company that it relied, until lately, on profits made through one or two large contracts than through the day-to-day commercial activity of an import and wholesale distribution firm. The business strategy is now changing and the company is planning to operate on a more regular basis in a new market and on longer depend entirely on government parastatal contracts for its sales. That this trend is a result of the New Agricultural Policy is difficult to say with certainty but the timing of the change would suggest it.

B. Case Study Number 2: A Cereal National Importer/Wholesaler, Dakar

1. General presentation

Mr. D. is among the most important importers and distributors of food and other consumer goods in Senegal. His office is in downtown Dakar where most of the import and wholesale activity is concentrated. He is the sole owner of his business which he started twenty years ago.

2. Activities and organization

Mr. D. has two major lines of activity: the import of foodstuffs and distribution of rice, oil, sugar, wheat, flour, cement, soap, oil cakes, etc., and transport with a fleet of 20 trucks. Marketing of local agricultural products (mostly millet) is a subsidiary activity.

His annual turnover is approximately 4 billion CFA, of which rice accounts for 25%, with a buying quota of 500 tons per month. In 1985/86, Mr. D. handled 400 tons of millet (and some maize), which he considers to be a small quantity that could be considerably increased if financial constraints were alleviated.

Mr. D. has 30 employees: an administration/accounting staff and 20 truck drivers. He hires daily workers for loading and unloading work. His head office in Dakar includes a storage room and administrative offices. He also owns warehouses in the suburbs of Dakar and two retail outlets in Dakar proper.

His distribution network is nationwide and consists of regional and local wholesalers whose establishment, in a number of cases, he financed himself.

3. Finance

Mr. D. does not publish financial statements and no data are available on the profit generated by his business. Mr. D. has accounts with the major banks in Dakar and can negotiate overdraft facilities with them. These are usually backed by mortgages on personal properties. His current liabilities with the banks do not exceed 100 million FCFA, however. Most of his activities are financed with his own funds and by suppliers' credit, although he probably would have no problems increasing his overdraft ceiling. The investment in trucks is mostly financed through the Senegalese leasing corporation.

4. Involvement in cereals marketing and constraints

Mr. D. declares he is satisfied with the ongoing deregulation of local cereal markets. This has already made his business easier. He sees the lack of an adequate financing system as the main constraint preventing him from being more active in cereals marketing. With the present interest charges on overdraft (18% a year), he has to limit his purchases to the amount which can be sold immediately and cannot store for periods exceeding one or two months.

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He claims to be able to handle 2000 tons and is willing to do so if adequate financial facilities were available. He would set up purchasing points in production areas in addition to his network of local/regional traders who could assemble for him. He apparently does not feel the same constraints on rice marketing, however, and is considering direct import of rice when the CPSP monopoly is abolished. He is also interested in millet export and claims to have potential outlets.

Mr. D. is not very keen in getting into the fertilizer business. He fears that his margin might be absorbed by financial costs related to unsold stocks. He claims that he would be more motivated by a "cash and return" system.

5. Conclusion

Mr. D.'s activities are limited in part by financial constraints. His involvement with local cereals is somewhat limited by his own reluctance to store grains for more than one month at a time. He would probably be motivated to increase purchases and storage of local cereals if more favorable credit conditions were made available to him. Liberalization of exports also constitutes a strong motivation for him, as this would provide him with a regular, profitable outlet.

C. Case Study Number 3: An Importer/Distributor With Experience in the Rural Sector, Dakar

1. General Presentation

The company G.A. is a two-year old Senegalese Import-Export and Trading company whose offices are located in downtown Dakar. Mr. T, the President and General Manager of the company, is also its founder and sole owner. After more than seventeen years work experience as Director of Marketing and Finance of various companies specialized in providing products or services to the agricultural sector, he decided to start his own company. He explained that during these years he was able to accumulate little capital and, far more importantly, a network of relationships with clients and suppliers in Senegal, neighboring countries and Europe who trust him and liked the way he does business. He invested his own savings in the new company and received no help from the banks, although he asked for a loan. Foreign suppliers with whom he has worked in the past trusted him more than the Senegalese commercial banks.

Mr.T. has neither powerful family connections nor personal wealth. The objective of the company is to serve the rural sector, but since the business has been slow to grow, he has to organized a second activity in urban pest control to bring additional income.

2. Activities

The company specializes in importing and wholesaling agricultural inputs. For the time being it consists of some farm implements and chemicals for which the company has exclusive distribution rights, in addition to specialized fertilizers for vegetable gardening. Mr. T. hopes to expand into other products and to organize his own sales force in the future if business picks up as he thinks it will with the disengagement of the government from the agricultural sector.

In addition to this import and trading activity, the company operates a small pest control unit in Dakar. The company employs a total of 14 people and all but Mr. T. and his secretary are working exclusively in pest control.

The company does business with in the rural sector: RDAs, cooperatives, large producers and small farmers. It also exports to neighboring countries: Burkina Faso, Mali, Niger and even Tchad, and to Togo and Benin. His clients in these countries are mainly the cotton companies and parastatals with whom he developed, over the years, excellent business relations.

The sales of the company in volume (excluding the pest control activity) are 70% for fertilizers in Senegal and urea for export, by 20% for chemical products and 10% for equipment and machinery. The profit contribution is almost exactly the reverse.

3. Finance:

The company has no fixed assets and tries to keep its inventory to a minimum. It operates on its own funds since, with no guarantees, the banks will not authorize a loan or an overdraft facility.

The company has succeeded in getting good financial terms from its foreign suppliers. This is because they have been successfully doing business with the owner in the past, when he was an employee. The suppliers usually provide 90 day credit, and in one instance the term goes to 120 days. Since the turnover of the products is high, the company solves its cash flow problem with suppliers' credit but Mr. T. realizes that this is not financially sound management and does not provide a solid basis for growth. He hopes to get a big contract which would "prime the pump" and give enough confidence to the bankers to leverage a long-term loan. Mr. T. is in fact highly critical of Senegalese banks whose management, according to him, mistrusts the private entrepreneurs and will do business only with the parastatals, the foreign companies and the very wealthy or politically important nationals.

The annual gross sales of the company are in the range of 300⁰ to 400 million FCFA (\$850,000 to \$1,200,000).

4. Interest in agricultural input distribution:

The objective of the company is to develop specialized activities in the import and distribution of agricultural inputs. So far, the company is more interested in the irrigated and high rainfall farming areas than in the general farming market. Mr. T. thinks that, in this former market, the private sector can work directly with the farmers because income is higher and more regular all year round, and they know the value of fertilizers, chemicals and equipment. In the general farming market, he has worked with large, almost industrial farms and with the RDAs. He is not prepared to work with the farmers directly since that would mean, in most case, providing credit and he does not have the financial resources or the organization to do so.

Mr. T. thinks that not much can be accomplished by the private sector in the Peanut Basin as long as there is no well-organized and efficient mechanism to solve the farmers cash flow problem. It is not the role of the importers and national distributors, and they could not set up the required financing organization to provide credit to the final consumer.

The irrigated farming region appears a far more interesting market to the company. The growers in these regions are, according to Mr. T., more modern in their approach to agricultural inputs (i.e., they recognize the need to invest to increase their revenue). The disengagement of the RDAs in the irrigated regions opens a new opportunity and his first move will be in this direction.

The management of the company thinks that the liberalization policy of the government is going to be very long and painful to implement and requires a

number of actions on the part of the government. First, the establishment of a rural credit mechanism. The second would be the removal, as in the Ivory Coast, of all import duties on agricultural inputs to reduce the price and make them more affordable to the farmers. A third condition would be the organization of some form of protection for the established companies which are too often undercut by speculators trying to realize short term profits on public bids. This is especially detrimental in the fertilizer and chemical markets where technical assistance, an expensive service, should be systematically provided to the consumer.

5. Conclusion

This case illustrates the situation, constraints and hopes of an entrepreneur struggling to establish a new business on the strength of his personal experience with suppliers and clients and with very limited financial resources.

This entrepreneur is interested in products with a high profit margin and in specialized, moderately affluent markets with a low level of risk (no credit required) where he can compete with better established companies on the basis of the quality of his products or personal service.

If financial resources were more readily available to him this entrepreneur would probably make the most of the new opportunities opened by the planned withdrawal of the parastatals in agricultural input distribution. First of all, though, he wants to be sure that the privatization policy is real and that the government is serious about it. Sometimes he wonders if the government will not try to keep all the profitable activities of the parastatals, and blame the private sector for not serving an insolvent market.

D. Case Study Number 4: A Cereals Wholesaler, Kaolack

1. General Presentation

Kaolack is Senegal's second largest city and the capital of the region with cereal surpluses of millet, sorghum, maize. Among the wholesalers established in Kaolack (around 20 operating on a regional scale), Mr. X. is a medium-sized operator, in business since 1939. He is the sole owner of his business, has a traditional educational background, and speaks only Wolof, although he can apparently also read French.

2. Activities and Organization

Mr. X. specializes in cereals marketing (rice, millet, sorghum, maize) and does not deal with other products. His main activity is rice which he buys in Kaolack from the local CPSP (a state owned corporation with monopoly on rice imports). His buying quota is 90 tons per month. He also deals in millet and maize, with average purchases around 20 tons in the post harvest months in 1985/1986, and substantially less in previous years, as marketable surpluses in the region were very low because of the drought.

Both marketing activities, imported rice and local cereals, seem to reach a balance depending on climatic conditions: when cereal production is low (as in 1984), he sells more rice, especially in rural areas, and has to buy rice from other wholesalers who do not sell their quota. When cereal production is high, as in 1985/1986, he sells less imported rice and is more active in millet.

He considers rice marketing to be easier and more profitable, as margins are fixed, and it requires less financing (he buys monthly on 30 day terms). His annual turnover is in the range of 200 million CFA, 80% from rice and 20% from local cereals.

Mr. X. has a store located on the main commercial street of Kaolack, near the market place. It consists of a bare room used as a store-room and office. The storage capacity is 150 tons in bags. The room is sparsely equipped with a scale, a desk and chairs for visitors. Mr. X. has no truck and has to contract transport. He works with his brother and his two sons. He has no permanent employees but hires day workers for handling.

His supply network for local cereals is made up of itinerant small traders who service the various weekly markets of the region, and local shopkeepers in villages. Permanent links of mutual confidence, allowing the use of credit, have been established between Mr. X. and his suppliers, whom he calls "hommes de confiance" (trustworthy men). Most of the time his suppliers act as agents: they are paid at least partly in advance. They buy from farmers at a price agreed upon with the wholesaler, and are remunerated by a fixed commission.

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Local cereals purchase activities are most significant after harvest when prices are lowest. They continue, however, until the "hunger season" if grain is still available. Mr. X. prefers to follow the demand rather than buy larger quantities after harvest and store for a long period.

Mr. X. sells his rice locally to retailers established in Kaolack's market places or to shopkeepers in smaller towns and villages of the region. Millet is also sold through the same retailers network when prices are favorable. The major part of it, however, is sold to wholesalers in the grain deficit areas in the north of the country, or to Dakar, depending on where prices are higher.

3. Finance

Mr. X. has a bank account and overdraft facilities, the ceiling of which does not seem to be determined and has to be negotiated periodically. He bitterly complains that bank credit is arbitrary and depends on whether or not you have "friends" in the bank.

Mr. X. identifies the shortage of cash as the major constraint hampering marketing of local cereals. Indeed, his credit requirements are much higher for local cereals, since he has to prefinance his supplies and his distribution and inventory turnover is much lower than on rice. If credit was more easily available, and at a lower cost, he indicates that he would be able to purchase and market greater quantities. If Mr. X. had lower financial constraints he would also like to get involved in cement and kola nut marketing.

The profit generated by Mr. X.'s business can be estimated around 10 million FCFA a year and is probably not sufficient to be reinvested as working capital.

4. Conclusion

This case study illustrates the attitude of a medium-sized cereals wholesaler. His borrowing capacity is limited by bank requirements. If additional credit facilities were made available to him, he would expand current activities and develop new ones.

E. Case Study Number 5: A Local Wholesaler/Retailer, Koungheul

1. General presentation and activities

Established in Koungheul for the past 23 years, M. Djibi D. is involved in the wholesale and retail trade of food products (rice, millet, sugar, oil, biscuits, flour, tomato paste, etc.), consumer goods, hardware products, fabric and clothing.

His business, of respectable size, is run by himself, his three brothers and four wives, each of whom, as Mr. D. puts it, is capable of running a separate business. This personnel is completed by a driver, a watchman and a laborer. The company owns a pick-up truck and a service car.

The company also sells two types of cereals: rice (a 60-ton quota each month) and millet bought from producers through middlemen, and sold as soon as a client shows up. With the cereal shortages of two years ago, the company was able to commercialize as much as 30 metric tons of millet every month but given this year's good harvest, millet trading has lost much of its interest, according to Mr. D.

Mr. D. buys his merchandise from a local manufacturers and some Kaolack based wholesalers. He generally pays cash and has his products sent to Koungheul by private carrier. His main clients are retailers established in rural areas. They number about ten and each buys on the average up to 300,000 FCFA worth of goods every two weeks. He extends credit for 25% of the purchased amount, reimbursable the next time they come for supplies.

2. Finance

The maximum turnover is around 2 to 2.5 million FCFA per day in peak periods (corresponding to the harvest period) and about 1 million in low periods.

The company has always been run on his own funds because Mr. D. thinks working with banks has risks. He has a bank account just because his suppliers and former regulations require it but thinks the bank charges are too high. He got a loan proposal from the bank but the conditions were very severe plus the bank administration is often according to his own experience, very corrupt. Officers ask for money to process the loan application and this increases the real interest rate charged on the money obtained.

The family business enjoyed a steady growth until 1981-1982, then stagnated. One of the reasons for this stagnation was the smuggling of products such as sugar, flour, tomato paste and tea from The Gambia. Sugar is generally sold at 225 FCFA/Kg on the black market, but its rate can go as low as 175 FCFA/Kg compared to the official price of 375 FCFA per kilo.

3. Interest in agricultural input distribution

Speaking about NAP, Mr. Djibi D. regrets the way the last peanut commercialization was done. According to him, unskilled outsiders tried to

seize the occasion to make money; they got bank loans after having distributed bribes all over, and finally went bankrupt. He has been told that only one businessman made money during the last campaign of peanut commercialization. That is why Mr. D. preaches caution and patience. He prefers to see a clear situation before pouring his money into that kind of business.

Mr. D. and his brother believe fertilizers and seeds can be a profitable business, and said they would be interested in creating a fertilizer section with their existing personnel, but there is one condition: they want the monopoly for fertilizer trading in Kounghel and the surrounding areas. According to them, they would invest their own funds but do not want later to be challenged by other traders who at the beginning were not willing to take any risk.

Mr. D. thinks fertilizer can be profitable once the farmers are used to saving for it since most of them know its value in increasing their crops and thus their revenue. For the time being, they are used to getting it free or with credit they never reimburse. They think that the government will, once more, provide it to them.

5. Conclusion

This case presents a merchant whose business is already good and profitable enough. He will not strive for additional growth if it means taking risks or making a big marketing effort to achieve it. His position is to reap the benefits from a new opportunity if all chances are guaranteed. Having achieved what he considers to be a successful position in life, he does not appear to be ready to push much further, and will probably keep on managing a very well known business in a traditional way which leaves him a lot of leisure time, does not attract attention or envy in his community, and does not endanger the gains already made.

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F. Case Study Number 6: A Local Merchant, Koussanar

1. General presentation

Mr. N.B. is one of three local storekeepers in the medium-sized village of Koussanar, about 70 km west of Tambacounda, the capital of the region of Senegal Oriental (Eastern Senegal).

The village numbers approximately 5000 inhabitants and is located in a rather heavily forested region by Senegalese standards. The average rains are good, and far more regular and important than further west around Kaolack. This allows for good crops of peanuts, millet, corn, and cotton and for the raising of large herds of cattle, sheep and goats. The average productivity per hectare is high and the country is sparsely populated. Most farmers are also herdsmen and cattle supplement their yearly crop income.

Mr. N.B. is in his fifties, has not been to school, and does not understand French. He was a farmer and herdsman for sixteen years before the capital from his farm allowed him to open a general merchandise store in Koussanar, not far from his land. He is the sole owner of the small business he has been operating for the past fifteen years. The years until 1981 were good years and his business expanded, allowing him to purchase the building that houses his family, store and inventory as well as a second one where he intended to open another shop. Lately business has not been very good and the second store had to be closed. The first one is operated by the owner and two members of his family. There are no employees.

2. Activities

Mr. N.B.'s business is typical of the type of commercial activity existing in the small cities and large villages of Senegal. The store is family-operated and located in the same building as the family house and offers a variety of goods from food products to hardware, textiles and toiletries. The food products in bulk, mainly rice, oil, sugar and tea, and the soap, represent seventy percent of the total sales, followed by fabrics, which account for twenty percent and the rest, such as canned goods, pots and pans, tools and stationery, account for remaining sales. The manufactured goods, according to Mr. N.B. who does not keep records by category of products, account for fifty to sixty percent of the total profits.

Mr. N.B. has a storage capacity of approximately four tons of merchandise, in addition to the goods piled up in his store which looked pretty crowded. The total surface of the store is estimated at 150 square meters. He receives supplies from regional wholesalers in Kaolack. His main suppliers are a Senegalese merchant who is a personal friend and helped him start his business for the food products and the soap, and a Lebanese merchant for the textiles. He does not have any vehicle and contracts the transport of the purchased goods, generally fortnightly.

His clients are the local population around Koussanar and some smaller village storekeepers nearby and itinerant merchants going from market to market.

However these last two sources of sale, which at one time accounted for more than fifty percent of his business, are disappearing either because the rural population has less money or because these retailers supply themselves elsewhere. N.B. does not know.

A very important factor to explain the drop in sales, according to Mr. N.B., is the huge amount of smuggling which is done from The Gambia. The price of the contraband goods, even after transport and other costs, is often half the price the local merchants can offer.

3. Financial Organization

The average sales were given at 30,000 FCFA per day, down from 150,000 FCFA in 1980-1981. This amounts, for this type of business which is operated all year round, to approximately 11 million FCFA a year, or \$32,000. Assuming an average profit margin of between 5 and 10 percent, the revenue generated is obviously very low, in the range of 550,000 FCFA to 1,100,000 FCFA (\$1500 to \$3000 a year). This compares favorably with the average yearly revenue of a Senegalese farmer of approximately 200,000 FCFA, or \$600 a year.

However, in the case of Mr. N.B., as with probably most of these local village traders, commerce is not the only source of income. He has his fields and herd to supplement the family revenue. The additional commercial income makes Mr. N.B., in his village of Koussanar, a relatively wealthy individual, though nothing compared to the merchants at the regional level.

Mr. N.B.'s suppliers usually ask for 75% of the value of his order in cash, the remained to be paid at the next reorder, generally within fifteen days. When he does not have the necessary cash, he usually reduces the value of his order rather than borrow. The bank will not lend to him since he cannot offer much in terms of guarantees and has no previous records of deposits with them, and the informal credit suppliers' rates will consume all his profit. Reducing the amount of the order is not very important since the customers will probably wait, having little opportunity to get the goods elsewhere. He just makes sure he always has enough of the most essential food products.

Mr. N.B. gives terms of payments to his regular individual customers in the village if they need it but is usually paid in cash. He does not give credit, or terms, to the smaller retailers anymore since he got into serious difficulties in the past when some bad debts were not repaid. The borrowers, mainly Mauritians, traditionally fall into debt just before returning to their own country. Mr. N.B. thinks that to recover the lost sales and increase his profit, he should compete with the smaller retailers in the country. He thought of purchasing a small second-hand pick-up truck to sell goods from market to market, but he gave up the idea because he does not have the cash to do it and does not want to borrow for a risky venture. If it fails he could lose 10 years worth of effort.

4. Interest in the distribution of agricultural inputs:

Mr. N.B. has heard of the New Agricultural Policy but is not sure what it means to him. As a long successful farmer, he knows the economic value of fertilizer and is convinced that, in the Koussanar region, most farmers are also aware of it. They are likely to be willing to buy it for cash, if they have no other choice and probably have the savings, in the form of cattle, to do it. But he himself will not try to sell fertilizers this year since nobody else is doing it and the government may provide it once again through the RDAs. He will wait until next year.

The amount of cash he would have to direct towards fertilizer purchases would not allow him to conduct the rest of his business, which is not much, but at least secure. If the crops are good the next two or three years he anticipates that his business is likely to pick up. He does not want to borrow to build up an inventory of fertilizer which might not sell if big fertilizer importers, the RDAs, or cooperatives get into the distribution.

5. Conclusion

This case illustrates the operating conditions, results and attitude of a small storekeeper at the village level. Not really prepared to take financial or commercial risks, he probably relies more on his revenue as a farmer and owner of cattle than on his commercial venture. The products sold, and the operating conditions, are very traditional: essentials for cash. Probably all of the small profits generated are used for family consumption and very little, if any, is reinvested in the business. Their economic role as the last link in the distribution chain is, at present, essential but individually they are too small and financially weak to take any kind of leadership in a new distribution system.

ANNEX F
SEED SECTOR ANALYSIS

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ANNEX F

SEED SECTOR ANALYSIS

I. SEED PROGRAM OBJECTIVES

The seed program will make a marked contribution to the project's goal to increase Senegal's food production and to facilitate the transition of the planning, multiplication, distribution and marketing of improved seed varieties, fertilizer, agricultural equipment, crop protection products and the cereal grain from the GOS public sector to Senegalese private sector. The project will reduce GOS participation in the operation of governmental seed farms and encourage the private sector to invest in seed production and distribution. The seed program will assure that the private sector will have the capacity to deliver timely and dependable access to improved seed varieties critical for generating increased agricultural production and subsequent increased income generation. At the end-of-project, the seed program will have strengthened the seed multiplication program to provide sufficient high quality foundation and certified seed of millet, maize, rice, cowpea and sorghum to plant the 1,350,000 hectares of cropland devoted to cereal production in 1991.

A. Background

The seed program will upgrade Senegal's seed production, certification, distribution and marketing system to meet the rural community's demands for high quality seeds with which to plant their cultivated cropland. Current rainfed cropping areas in Senegal are estimated at 2.4 million hectares (1 hectare = 2.5 acres). About one million hectares are planted to pearl millet and sorghum that produce grain that is both consumed by the farm family and sold in the commercial marketing channels. Approximately 1.1 million hectares are planted to peanuts that are largely oriented toward the export peanut oil market. Approximately 80 thousand hectares are planted to maize that produce approximately 80 thousand metric tons of maize grain that is consumed locally. Approximately 60 thousand hectares are planted to rainfed rice paddy that produces approximately 60 thousand metric tons of rice grain that substitutes for rice that might have had to be imported with scarce foreign exchange. Approximately 80 thousand hectares are planted to cowpeas that produce approximately 80 thousand metric tons of cowpeas that are consumed locally. Cowpeas appear to be a viable cropping alternative for land use in the lower rainfall Louga-Thies-Linguere agricultural zones. Other rainfed crops include approximately 35,000 Ha of cotton, as well as large areas in fruit trees and manioc. In addition, Senegal's irrigated crop production covers a total of 39,000 hectares, including 20,000 ha of irrigated rice paddy, 7,000 ha of sugar cane, 8,700 ha of fruits and vegetables and 3,300 ha under other food crop cultivation. According the GOS Cereal Plan, the target proposed for irrigation is the addition of an average of 5,000 hectares per year up to the year 2000.

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The project's seed program will support the GOS implementation of the NAP goal for the cereals sector to achieve food self-sufficiency. The seed program's variety selection activities will facilitate the strategy to promote the production and commercialization of local cereals to be transformed into processed food and by-products that meet consumer tastes at prices competitive with those of imports. The project will be an integrated part of the GOS NAP implementation, in collaboration with the donor community, as well as the GOS implementation of the Cereal Policy and Cereal Plan, dated May 1986.

Under the Cereal Plan, the target for rainfed cereal crop production looks forward to a net increase of 79,000 ha by the year 2000. The number of hectares planted to millet and sorghum would remain almost constant at one million hectares. By the year 2000, however, the area planted to maize should double from the present 80,000 ha to approximately 150,000 ha. Concurrently, the GOS envisions a 5,000 ha per year increase in area planted to irrigated rice paddy. The seed program will support the expanding GOS efforts to substantially increase crop production by increasing crop yields per hectare rather than expanding the cropland area under crop production.

B. Illustrative Seed Multiplication Program

Table 1 illustrates the magnitude of the project's focus on each major cereal crop to be achieved by the end-of-project, December 1991.

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TABLE 1

	Millet	Maize	Cowpea	Irrigated Rice	Rainfed Rice	Total
Total ha Cropland Under Cultivation	1,030,000	120,000	100,000	40,000	60,000	1,350,000
Total Seed Needs (Metric Tons)	6,180	2,400	2,000	3,200	6,000	19,780
33% Seed Turnover (Metric Tons)	2,060	800	667	1,067	2,000	6,594
Seed Value (000 CFA/MT)	18,540	2,200	10,005	9,603	18,000	63,348
Estimated Usage Certified Seed in %	30	70	60	60	30	
Certified Seed Usage (Metric Tons)	400	560	400	640	600	2,600
Certified Seed Value (000 CFA/MT)	5,562	5,040	6,000	5,760	5,400	25,800
Project Produced Certified/Registered Seed (Metric Tons)	185	168	120	192	180	845
Project Certified Registered Seed Costs (000 CFA/MT)	1,665	1,512	1,800	1,728	1,620	8,315
Ha. under Project Certified/Registered Seed Production	155	84	120	96	180	635
Project Foundation Seed (Kilograms)	927	1,680	2,400	7,682	18,000	30,689
Project Foundation Seed Cost (000 CFA/Kg)	12.05	21.85	48	111.4	26.1	219.4
Project Foundation Seed Hectares	.8	.84	2.4	3.8	18	25.84
Breeder Seed (Kilograms)	4.6	17	48	307	1,800	2,176.6
Project Breeder Seed Cost	598	2,210	9,600	44,515	261	57,184
Project Breeder Seed Ha. Used	.004	.009	.05	0.2	1.8	2.063

ILLUSTRATIVE CROP SEED MULTIPLICATION SCHEME

TABLE 2: MILLET

This illustrates the seed program growth potential during the life-of-project

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
Hectares Cultivated	1,000,000	1,005,000	1,010,000	1,020,000	1,030,000
Overall Seed Required (Metric Tons)	6,000	6,030	6,060	6,120	6,180
Seed Turnover 33% (Metric Tons)	2,000	2,010	2,020	2,040	2,060
Value of Seed Needed (9,000 CFA/MT)	18,995	18,090	18,180	18,360	18,540
% Certified Seed Usage	10	15	20	25	30
Certified Seed Usage (Metric Tons)	200	302	404	510	618
Certified Seed Cost 9,000 CFA/MT	1,800	2,718	3,636	4,590	5,562
Certified Seed Hectares Required	167	251	337	425	515
% Project Seed Share	10	15	20	25	30
Certified/Registered Seed Produced (Metric Tons)	20	45	81	128	185
Certified/Registered Seed Cost (9,000 CFA/MT)	180	405	729	1,152	1,669
Certified/Registered seed Hectares Required	17	38	68	106	155
Foundation Seed Produced (Kilograms)	100	225	405	640	927
Foundation Seed Cost 130 CFA/kg	13,000	29,250	52,650	83,200	120,510
Foundation Seed Hectares Required	0.1	0.2	0.4	0.6	0.8
Breeder Seed (Kilograms)	0.5	1.2	2	3.2	4.6
Breeder Seed Cost 130 CFA/kg	65	187	260	416	598
Breeder Seed Hectares Required	0.0005	0.001	0.002	.003	.004

Multiplication Factor = 200 to 1
 Yield per hectare = 1.2 Metric Ton /ha.
 Seed rate = 6 kg/ha.
 Source: ISRA Seed Production Costs 1984

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ILLUSTRATIVE CROP SEED MULTIPLICATION SCHEME

TABLE 3: MAIZE

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
Hectares Cultivated	80,000	90,000	100,000	110,000	120,000
Seed Required (Metric Tons)	1,600	1,800	2,000	2,200	2,400
Seed Turnover 33% (Metric Tons)	534	600	667	734	800
Value of Seed Needed (9,000 CFA/MT)	4,806	5,400	6,003	6,606	7,200
% Certified Seed Usage	50	55	60	65	70
Certified Seed Usage (Metric Tons)	267	330	400	477	560
Certified Seed Cost (9,000 CFA/MT)	2,403	2,970	3,600	4,293	5,040
Certified Seed Hectares Required	134	165	200	240	280
% Project Seed Share	10	15	20	25	30
Certified/Registered Seed Produced (Metric Tons)	27	50	80	120	168
Certified/Registered Seed Cost (9,000 CFA/MT)	243	450	720	1,080	1,512
Certified/Registered Seed Hectares Required	14	25	40	60	84
Foundation Seed Produced (Kilograms)	260	500	300	1,200	1,680
Foundation Seed Value (13,000 CFA/MT)	33.8	65	104	156	218.4
Foundation Seed Hectares Required	0.13	0.25	0.4	0.6	0.84
Breeder Seed (Kilograms)	2.7	5	8	12	17
Breeder Seed Value (13,000 CFA/MT)	350	650	1,040	1,690	2,210
Breeder Seed Hectares Required	0.002	0.003	0.004	.006	.009

Multiplication Factor = 100 to 1

Yield per hectare = 2 Metric Ton /ha.

Seed rate = 20 kg/ha.

Source: ISRA Seed Production Costs 1984

ILLUSTRATIVE CROP SEED MULTIPLICATION SCHEME:

TABLE 4: COWPEAS

The following table illustrates the seed program growth potential during the life-of-project:

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
Hectares Cultivated	80,000	85,000	90,000	95,000	100,000
Overall Seed Required (Metric Tons)	1,600	1,700	1,800	1,900	2,000
33% Seed Turnover (Metric Tons)	533	567	600	633	667
Value of Seed Needed (000 CFA/MT)	7,995	8,505	9,000	9,495	10,005
% Certified Seed Usage	40	45	50	55	60
Certified Seed Usage (Metric Tons)	213	255	300	348	400
Certified Seed Cost 15,000 CFA/MT	3,195	3,825	4,500	5,220	6,000
Certified Seed Hectares Required	213	255	300	348	400
% Project Seed Share	10	15	20	25	30
Certified/Registered Seed Produced (Metric Tons)	21.3	38	60	87	120
Certified/Registered Seed Cost (15,000 CFA/MT)	219.5	570	900	1,305	1,800
Certified/Registered Seed Hectares Required	22	38	60	87	120
Foundation Seed Produced (Kilograms)	440	760	1,200	1,740	2,440
Foundation Seed Cost (20,000 CFA/MT)	88	152	240	348	480
Foundation Seed Hectares Required	0.5	0.3	1.2	1.7	2.4
Breeder Seed (Kilograms)	10	16	24	34	48
Breeder Seed Cost (200 CFA/kg)	2,000	3,200	4,800	6,800	9,600
Breeder Seed Hectares Required	0.01	0.02	0.03	0.04	0.05

Multiplication Factor = 40 to 1

Yield per hectare = 1 Metric Ton /ha.

Seed rate = 20 kg/ha.

Source: ISRA seed production costs, 1984

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ILLUSTRATIVE CROP SEED MULTIPLICATION SCHEME:

TABLE 5: IRRIGATED RICE

The following table illustrates the seed program growth potential during the life-of-project:

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
Hectares Cultivated	20,000	25,000	30,000	35,000	40,000
Overall Seed Required (Metric Tons)	1,400	2,000	2,400	2,800	3,200
Seed Turnover 33% (Metric Tons)	533	667	800	933	1,067
Value of Seed Needed (9,000 CFA/MT)	4,797	6,003	7,200	8,397	9,603
% Certified Seed Usage	20	30	40	50	60
Certified Seed Usage (Metric Tons)	107	200	320	467	640
Certified Seed Cost 2,000 CFA/MT	963	1,800	2,880	4,203	5,760
Certified Seed Hectares Required	53	100	160	233	320
% Project Seed Share	10	15	20	25	30
Certified/Registered Seed Produced (Metric Tons)	11	30	64	117	192
Certified/Registered Seed Cost (9,000 CFA/MT)	99	270	576	1,053	1,728
Certified/Registered Seed Hectares Required	5	15	32	59	96
Foundation Seed Produced (Kilograms)	400	1,200	2,560	4,720	7,682
Foundation Seed Cost (145 CFA/kg)	58	174	371.2	684.4	1,114
Foundation Seed Hectares Required	0.2	0.6	1.3	2.4	3.8
Breeder Seed Needed (Kilograms)	1.6	48	103	192	307
Breeder Seed Cost 145 CFA/kg	232	6,960	14,935	27,840	44,515
Breeder Seed Hectares Required	0.001	0.003	0.005	0.1	0.2

Multiplication Factor = 25 to 1

Yield per hectare = 2 Metric Ton /ha.

Seed rate = 80 kg/ha.

Source: ISRA seed production costs, 1984

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ILLUSTRATIVE CROP SEED MULTIPLICATION SCHEME:

TABLE 6: RAINFED RICE

The following table illustrates the seed program growth potential during the life of-project:

	1987	1988	1989	1990	1991
Hectares Cultivated	60,000	60,000	60,000	60,000	60,000
Overall Seed Required (Metric Tons)	6,000	6,000	6,000	6,000	6,000
Seed Turnover 33% (Metric Tons)	2,000	2,000	2,000	2,000	2,000
Value of Seed Needed (9,000 CFA/MT)	18,000	18,000	18,000	18,000	18,000
% Certified Seed Usage	10	15	20	25	30
Certified Seed Usage (Metric Tons)	200	300	400	500	600
Certified Seed Cost 9,000 CFA/MT	1,800	2,700	3,600	4,500	5,400
Certified Seed Hectares Required	200	300	400	500	600
% Project Seed Share	10	15	20	25	30
Certified/Registered Seed Produced (Metric Tons)	20	45	80	125	180
Certified/Registered Seed Cost (9,000 CFA/MT)	180	405	720	1,125	1,620
Certified/Registered Seed Hectares Required	20	45	80	125	180
Foundation Seed Produced (Metric Tons)	2	4.5	8	12.5	18
Foundation Seed Cost (14,500 CFA/MT)	29	65.3	116	181.3	261
Foundation Seed Hectares Required	2	4.4	8	12.5	18
Breeder Seed Needed (Kilograms)	200	450	800	1,250	1,800
Breeder Seed Cost (14,500 CFA/MT)	29	65.2	116	181.3	261
Breeder Seed Hectares Required	0.2	0.5	0.8	1.3	1.8

Multiplication Factor = 10 to 1

Yield per hectare = 1 Metric Ton /ha.

Seed rate = 100 kg/ha.

Source: ISRA seed production costs, 1984

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1. Successful National Seed Programs

As noted in the "Country Report on the Project Proposal of Niger National Cereals Production Program" by Howard C. Potts, Mississippi State University Seed Technology Laboratory, 1975, successful national seed programs have certain basic prerequisites, such as noted below:

- a. Official government support for priority seed and crop production programs.
- b. Personnel trained in use of seed technology.
- c. Sufficient financing and credit to satisfy both government seed programs and the farmers crop production needs.
- d. The availability of necessary land and facilities.
- e. International technical assistance is selectively utilised to achieve priority objectives.

The Agricultural Production Support Project relies heavily on the GOS New Agricultural Policy (NAP) as a positive official declaration of government support to fulfill the first requirement above. Interviews and reports indicate a cadre, albeit small, of trained plant breeders does exist at the Institut Sénégalais de Recherches Agricoles (ISRA) Agricultural Research Institute, trained staff does exist at the Seed Service's Direction de l'Assistance à la Production et contrôle des Semences and agricultural statisticians are conducting professional analysis at DSA. The seed program requires further training and recruitment of key personnel to satisfy the second requirement.

The credit program of the project will contribute to meeting the financial and credit requirements of seed and crop production programs noted in number 3. Several farms and seed processing plants are now available, and additional facilities under private sector management are anticipated as seed production and processing expands under number 4. International technical assistance from ICRISAT, IRRI, CIMMYT, IITA and WARDA are being utilized, as noted in number 5. The five prerequisites are being favorably addressed, thus the potential for a successful project appears very likely.

2. Seed Program Policy

In "Problems and Prospects in Seed Program/Industry Development in the Less Developed Countries" by J.C. Delouche, Mississippi State University Seed Technology Laboratory, 1969, a seed program consists of closely linked and interdependent policies and programs:

- a. The establishment of a definitive governmental policy for seed within an established national agricultural policy.
- b. A productive crop variety selection, development, testing and certification program.
- c. Programs and organizations capable of providing essential inputs, i.e. fertilizer, equipment, pesticides, and credit, to farmers and seed program agencies.

- d. A resourceful public and private extension/education program which can effectively demonstrate the advantages of improved seed and technological changes at the farmer level.
- e. An operational local level grain distribution and marketing system which permits farmers to measure tangible economical benefits generated by their additional production and subsequent expenses.

3. Major Constraints

The Mission is fully aware that the project's seed program is not without risks. The best managed seed program can be checkmated by agricultural calamities. Equally, improved seed cannot furnish economic returns in the absence of adequate rainfall of reasonable distribution throughout the growing season. The following is a summary of agricultural sector issues critical to the seed program:

- Possible error factor in estimating demand for improved seed by cereals producers.
- Need for additional valid information about on-farm crop yield responses under different micro-climatic and soils conditions, as well as of different cereal varieties that received incremental fertilizer application.

Successful achievement of the technical upgrading and financial overhaul needed to assure RDA and CER capability to conduct effective on-farm demonstrations.

Rural producers ability and/or willingness to finance cash input purchases with savings or by liquidation of capital assets.

- Possible errors in predicting the ability and long-term willingness of agricultural lending institutions to develop loan portfolios that finance cereal seed production.
- Possible errors in predicting the ability and willingness of rural producers to repay loans for improved seeds and intensive crop production based on economic stability, individual priorities and available seasonal rainfall.

Major constraints to rapid advancement of the privatization of Senegal's seeds multiplication, processing and marketing include:

- Excessively limited amounts of breeder seed available for use by private sector seed multiplication enterprises.
- Excessively limited amounts of seed certified by the DPCS for use by farmers to meet their crop production seed needs.
- Need for further significant research data to justify recommended use of specific improved varieties most appropriate for selected ecological rainfed agricultural zones in Senegal.

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- GOS distribution of less than the highest quality seed at prices too low to cover the cost of production, i.e., a subsidy by the GOS.
- Shortage of working capital by private seed companies to permit expansion of activities in the investment in seed production processing, distribution and marketing.

a Inadequate Amounts of Breeder Seed

As indicated in the FAO seed assessment report prepared in the spring of 1986 by a French IRAT scientist, Dr. Maurice Tardieu, ISRA breeders/scientists are junior in their career development and need further training to fulfill current seed responsibilities. Project Paper design team interviews and seed program discussions with cereal breeders at the ISRA Bambey Research Center during June and July 1986 indicate that several cereal breeders are very able and experienced professionals. However, these discussions also identified numerous cereal breeding staff that are indeed junior level professionals who would benefit greatly through a program of professional upgrading. Moreover, the seed sector infrastructure and the ISRA genetic research and cereal breeding facilities are in need of upgrading and remodeling to better meet the needs of Senegal's seed industry.

Current GOS financial limitations make the project essential for a turn around in the capacity to breed, select, multiply and market adequate quantities of the best available seed varieties in Senegal. The ISRA cereal breeding program needs to move from conducting minimum varietal testing and evaluation to a dynamic program that conducts viable station and on-farm variety selection and multiplication. The current potentially high-producing cereal varieties are withheld from general release to the rural farmers because of financial limitations. The project will support additional variety selection trials that take currently known high yielding varieties out of the stations to on-farm variety trials conducted by the farmers under their actual conditions. The results from two or three years of intensive on-farm trials will permit the seed selection process to make a decision at the National Seed Commission level to release the top cereal producers, as well as implement a dynamic seed multiplication program at both the breeder seed, foundation seed and certification seed multiplication levels.

Lack of effective communication between ISRA and the Direction of assistance to Production and Control of Seed (DPCS) of MDR is noted by USAID Agricultural Economist Lamine Thiam in his memo "Filiere Semenciere au Senegal", dated February 1986. The project will address the challenge to upgrade the national seed planning and management system, in order that the ISRA cereal breeders are informed in a timely manner by the DPSC under guidance of the national seed commission, of the national seed needs. Then ISRA can identify and multiply adequate quantities of the most productive improved varieties and the seed processing, distribution and marketing systems can get the high quality seed into the hands of interested farmers.

ISRA cereal breeders currently acknowledge that they need more information on the degree of performance under on-farm conditions of their potential new varieties awaiting release to Senegalese farmers. French IRAT seed expert Dr. Tardieu also reported in the spring of 1986 that ISRA cereal breeders are

under pressure to release new varieties even though additional selection would give more certainty that the performance and disease resistance of the variety was the best available. Likewise, Senegalese farmers, like farmers worldwide, must be convinced by "hands on" contact and word of mouth that a variety is superior to his local variety before the farmer will demand the new seed.

b. Inadequate Seed Certification Services

The current seed system vaguely defines the quality control criteria and standards for seed production, certification and marketing within the seed system. Development of the seed system will be enhanced under the project by further upgrading the regulations that officially govern internal and international seed multiplication, distribution and marketing. The project will upgrade the Senegalese staff responsible for the identification, control and regulation of seed multiplication, certification and marketing, as well as establish more precise lines of GOS authority with which to better control the quality of the seed that is marketed. The seed program will more clearly define the specific official regulations that govern seed standards appropriate for international seed and for internal Senegalese markets. The project will upgrade those designated GOS and international agencies charged with the implementation of a more effective seed system and offer them the financial means to do their job which is not being adequately implemented due to Senegal's current financial restrictions.

c. Inadequate Seed Cleaning Facilities

The existing DPSC seed cleaning plants at Diourbel, Saint-Louis and Tambacounda each have a five-ton per hour cereal seed cleaning capacity which may prove to be inadequate for the timely processing of the 19,780 tons of seed eventually required to meet Senegal's seed requirements for 1,350,000 hectares of cereal crops. The project's objective is to provide adequate quantities of the best possible improved seed to meet the seed needs of 407,000 hectares of the cereal crop, equal to 30% of the area under cereal crop cultivation. The project will encourage the establishment of additional seed cleaning treatment and processing facilities under management by the private sector if they appear to be needed.

d. Poor Seed Varieties

Current fertilizer recommendations by ISRA are based on research data obtained on research stations which often produce crops in a more favorable environment than the very diversified soil and climatic conditions the Senegalese farmers work under. Therefore, the project will focus on upgrading the cereal variety seed selection system in order that the system conducts on-farm trials to both confirm seed variety and production input recommendations, as well as to get the farmers directly involved in selecting the most productive cereal varieties that offer high production under their ecological production environments.

e. GOS Indirect Subsidy of Seed

Recent discussions with the MDR during the final approval of the project paper on November 12, 1986, confirm that the GOS is very concerned about the market pricing of seeds in order that the private sector be able to make

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successful entries into the seed multiplication, processing and marketing business. They also reassured USAID that the following seed prices reported in CFA per kilogram in the newspaper Le Soleil, dated November 7, 1986, are not heavily GOS subsidized prices:

TABLE 7

Seed Cost for Selected Food Crops

	<u>Millet/ Sorghum</u>	<u>Maize</u>	<u>Cowpea</u>	<u>Irrigated Rice</u>	<u>Rainfed Rice</u>	<u>Oil Peanut</u>	<u>Eating Peanut</u>
Breeder Seed	130	130	200	145	145	115	135
Foundation	130	130	200	145	145	110	130
Registered	90	90	150	90	90	100	125
Certified	90	90	150	90	90	100	125
Grain Price	70	70	100	85	85	90	110

The project will further analyze the actual seed production costs for future seed crops produced by the GOS and private sector entrepreneurs, as well as GOS parastatals. The Seed Production Agreement between ISRA and DPSC calculated the cost per kilogram of ISRA breeder seed for the limited quantities produced to be 333 CFA for millet, 360 CFA for sorghum and 719 CFA for cowpeas. (See Table 7A). These figures contrast sharply with the GOS breeder seed prices in Table 7 above.

Table 7A
Breeder Seed Costs for Selected Food Crops

<u>Cultural Practice</u>				<u>Rainfed</u>	<u>Irrigated</u>
	<u>Millet</u>	<u>Sorghum</u>	<u>Cowpeas</u>	<u>Rice</u>	<u>Rice</u>
Soil Preparation	41,096	40,235	41,096	44,800	151,750
Fertilizer	33,125	28,390	28,590	28,390	28,390
Fertilizer Application	33,766	33,766	33,766	672	672
Seed	8,780	21,700	50,000	80,000	150,000
Planting	6,703	4,171	5,886	5,876	67,200
Herbicide	-0-	-0-	-0-	14,624	15,792
Early Cultivation	9,401	-0-	9,401	-0-	-0-
Middle Cultivation	16,731	25,097	25,097	22,400	44,080
Urea Application	38,352	49,104	-0-	21,372	21,372
Late Cultivation	44,682	44,600	-0-	-0-	88,480
Crop Protection	-0-	-0-	11,271	-0-	-0-
Harvest	5,586	17,840	178,723	11,200	69,825
Technicians	44,685	43,232	44,055	50,000	50,000
Grain	53,619	53,619		145,600	145,600
Rouging	4,424	4,424	4,424	13,272	-0-
Threshing	20,774	20,774	12,065	37,896	1,113,688
Winnowing	14,679	17,873	5,999	22,867	68,600
Drying	23,679	23,873	17,005	21,384	53,504
Fumigation	-0-	2,880	-0-	15,930	47,792
Storage	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>-0-</u>	<u>270,000</u>
Total Cost/Ha.	400,082	431,588	467,383	536,283	1,386,745
Est. Yield/ Ha.	<u>1.2 MT</u>	<u>1.2 MT</u>	<u>.65 MT</u>	<u>1.5 MT</u>	<u>3.5 MT</u>
Production Cost/Kg	333	360	719	358	396

High seed costs at any or all phases of the multiplication cycle result in additional costs that are passed on to the farmer. The private seed industry cannot be expected to participate in seed multiplication unless it can be assured of profitable remuneration. The private seed industry will hesitate to gamble on the GOS allowing seed to be distributed at less than production costs, resulting in an indirect seed subsidy. The private seed industry must also feel that there will be a market for its high quality cereal seed at a per kilogram price above that of ordinary grain.

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4. Stimulating Private Industry

Compared with other industries, expansion of Senegal's seed industry should not be capital intensive. Although the price paid for unprocessed seed varies with each crop, the market premium paid for processed seed should be approximately 50 to 100 percent higher than grain prices.

The rural market for high quality seed will exist only if local farmers are convinced that high quality selected seed will result in crop yields that will return more than the production costs for seed, fertilizer, crop protection products and animal traction equipment. The project will undertake a series of programs that will assure that adequate applied research data generated from on-farm demonstrations will be available to persuade the farmer to demand high quality seed from the market place and from his own home grown improved variety plots.

C. Technical Assistance

The project will provide a senior expert with experience in private agriculture and management as Chief of Party for the life-of-project to support the Minister of Rural Development in the ongoing NAP policy dialogue, act as a catalyst in the mobilization of the private sector and propose interventions to help the GOS to "stay the course." The Chief of Party will provide policy level guidance for the privatization of agricultural input and cereals marketing. As Chief of Party, the economist will coordinate the U.S. technical assistance team support of the agricultural statistics program, seed improvement, multiplication and certification program, the media program and credit program to assure that they interface and move toward the project's goal.

The project will provide technical assistance, professional and technical training and limited equipment to the Ministry of Rural Development's Agricultural Research Institute (ISRA) to upgrade their ability to produce improved breeder and foundation seed as well as the DPCS's ability to certify improved seed. Short-term consultants will be available for ad hoc technical assistance in related fields, e.g. farm trials of improved varieties under various micro-climatic and soil conditions. A cereal variety selection specialist will live and work at ISRA/Bambey to upgrade the cereal variety selection and seed multiplication program.

The U.S. Technical Assistance Seed Production Agronomist will live and work at ISRA/Bambey to encourage agronomic research, determine varietal response to fertilizer and provide research results justifying the use of improved varieties and fertilizer to the MDR Division of Production. The seed production agronomist will coordinate program recommendations to promote the use of certified seed and fertilizer.

A second Seed Production Agronomist would assist the Division de l'Assistance à la Production of DPCS (DAP/DPCS) in developing a group of contract seed growers capable of multiplying certified seed of high quality. This should begin in the first year of project operations. The Seed Production Agronomist will support organizations of private groups of farmer in the production of certified seed for their own use in the next growing

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season or for sale on the local seed market. The DAP staff will increase demand for certified seed through on-farm demonstration programs for the duration of the project. Technical assistance will be phased down as the GOS and private sector assume greater responsibility.

A Seed Certification Specialist will assist the Division du Controle et de la Certification of DPCS (DCC/DPCS) in developing seed regulations to further clarify the official framework to guide the development of Senegal's seed program and private seed industry. This specialist will also increase the proficiency of the DCC/DPCS in seed certification procedures by upgrading the seed quality laboratories with equipment and training of personnel in laboratory and field inspection techniques. The Seed Certification Specialist will determine (1) the seed cleaning facilities available for processing seed and (2) which projects require additional investment by private sector individuals to meet the needs of an expanding seed industry. Education and training for operators of additional seed plants will be provided. The specialist may be complemented by short-term consultants to address specialized needs of the project. Again, U.S. technical assistance will be phased down as the GOS certification service and the private sector seed industry become established and prove their capacity to do the job.

The project will provide special support to private sector interests who, under the NAP, will supplant GOS entities in the multiplication and certification of needed seed. Technical advice and credit facilities will enable individual farmer-entrepreneurs, farmer associations and interested business ventures to multiply and distribute improved seed of certifiable quality. The production and marketing of seed will be closely linked to field trials which will demonstrate to farmers the utility of improved seeds, fertilizer, agricultural equipment and crop protection products under different soil and climatic conditions. The GOS will conduct on-farm demonstrations in collaboration with GOS Regional Development Agencies to give farmers first-hand understanding of the benefits of improved products and methods.

The project staff will formulate a detailed plan to implement the on-farm trials so that they are representative of the major ecological zones in Senegal. The project will provide appropriate equipment with which to conduct a variety selection program at the on-farm level. These on-farm trials will be composed of three or four varieties and two fertilizer application rates. There will be two replications at each on-farm plot. Twenty-five experiments in representative agricultural ecological zones should generate adequate statistically viable data upon which to base more productive input recommendations.

The on-farm trials program for twenty-five trials of one hectare in size would require an annual seed, fertilizer, and crop protection products appropriate for twenty-five hectares of cereal crop production. The planting of the seed with fertilizer placement in a band two inches down and two inches to the side of the seed will be undertaken with animal traction or tractor seed drills to highlight the importance of how much fertilizer is applied per hectare and where it is placed in the soil to best benefit the young crop plants. Additional fertilizer application and crop protection measures, as well as trial plot harvesting can be done by the farmer with the assistance and supervision of project staff.

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The project will upgrade the organizational legal structure of the seed industry in order that more precise lines of responsibilities by each participating government and private sector agency will evolve into a more effective seed system. Presently, the seed multiplication program is conducted on an "ad hoc" basis along the lines provided by the Memorandum of Operations for Control of Certified Seeds prepared by the Ministry of Rural Development, 1977. An agreement, the Protocole d'Accord pour la Production de Semences de Prébase au Sénégal, dated 9 January 1986, was signed between the ISRA and the Directorate of Agriculture for the amount of breeder seed necessary for foundation seed production in the 1986/87 crop year. These short-term agreements do not provide the continuity critical for the long-term development of a viable seed industry.

The project will upgrade Senegal's Seed regulations to more precisely define the authority that is responsible for the guidance of such activities as breeder seed selection, foundation seed multiplication, and certified seed production, seed certification and official seed testing at a respected seed laboratory. The project will focus on regulations needed to stimulate as well as to control international and domestic seed trade, meeting acceptable phytosanitary and quality standards.

Upgraded seed regulations would also facilitate international seed trade by establishing quality standards, terminology and policies in conformity with international requirements. The project's seed certification specialist assigned to the Division for Control and Certification of Seeds will assist in the development of improved official regulation and provide leadership in applying quality control standards in the seed certification program.

1. Participant Training

The project will provide seven Master of Science degree long-term training programs for project personnel, as well as short-term travel-study programs for some private sector seed industry managers. The staff selected for M.S. degree training will receive English training, then go to a selected U.S. University for 12 to 18 months. The participant will then return to Senegal to conduct an in-country thesis program under the guidance of his university advisor with support from the long-term technical assistance statistician based with ISRA and DPCS. The university advisor will visit Senegal once or twice as needed to guide the participant and conduct a short-term technical assistance assignment in collaboration with the project's statistical staff.

A continuity of personnel must be developed. Subordinates at lower levels of education and experience should be included in the staffing. Two of them require short-term course instruction, one in cereal production at CIMMYT, Mexico City, and the other in seed technology at Mississippi State University. These short-term courses are offered each summer in English and French. Further training of these participants is projected for the fourth year of the project. Additional subordinates should be brought into the program in the third year with a similar training schedule.

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Travel-study is planned for private sector trainees to visit other successful seed multiplication projects, for example, in Tunisia, a French speaking country with an excellent seed program or Morocco or the Ivory Coast. Such travel increases the knowledge and appreciation of the participant's role in the seed program. Provisions have been made for such trips after the third year when the program should be well underway.

2. Seed Program Management

The project's innovative private sector orientation will require precise monitoring and evaluation to determine whether the design is a viable approach to increasingly the shift of responsibility to a dynamic Senegalese private sector. The joint GOS-USAID annual work plan reviews and regular audits by management consultant firms will assess the impact of ongoing and planned project activities and will permit an in-depth assessment of project activity needs and impact.

During the joint GOS-USAID work plan reviews, the GOS, USAID, direct AID contractor and host country contractor staff will coordinate the provision of needed resources for the priority activities and will define the project's annual implementation plan, procurement plan, training plan, and the short-term and long-term technical assistance plans. In addition to the annual review process, every two years USAID will contract for a one-month outside evaluation to focus on project impact and possible design weaknesses. A Privatization Panel of specialists will annually assess the project's seed program progress toward establishment of the dynamic private sector involvement needed to achieve the goal of the project.

The GOS will establish a National Seed Working Group that will represent the government, the private sector, the government parastatals, and the other donor community, which will include USAID representatives. The National Seed Working Group will act as a forum for the formulation of each year's national seed variety multiplication plan. The National Seed working group will make recommendations to the DPCS responsible for the establishment and implementation of Semegal's national crop variety multiplication plan for each season.

D. Institutional Analysis

The Ministry of Rural Development (MDR) is composed of the following major divisions : Directorate of Agriculture, Directorate of Plant Protection, Directorate of Production and Control of Seed, Directorate of Cooperatives and the Directorate of the Institute for Agricultural Research. The GOS organogram (Fig. 1) illustrates the units that compose the GOS MDR system. The high quality seed selection and multiplication program involves the Institute for Agricultural Research (ISRA) and the Direction of Production and Control of Seeds (DPCS). Both of these Directorates are in need of personnel support, training and equipment. There has been a lack of coordination due to professional inexperience and frequent administrative personnel changes. The project will upgrade these GOS agencies through on-the-job and professional training and procurement of equipment necessary for their efficient operation.

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1. ISRA

The GOS has given ISRA the responsibility to test and select new cereal crop varieties based on viable agronomic research conducted at research stations as well as on-farm. Over the past few years, ISRA has selected new varieties for which fertilizer recommendations have been established. Tables 8 and 9 are illustrative of the new varieties released from ISRA. Additional work remains to challenge the project to push for advances known but not yet accomplished. The project will provide a Cereal Variety Selection Technical Advisor to assist ISRA to surpass the selective challenges to improve the cereal breeding seed selection and multiplication system. The project will focus on the maintenance of pure parent stock to cross breed to produce seed of released improved varieties to assure quality seed stocks for the future. Under appropriate cold storage facilities currently at ISRA, a portion of their cereal breeder seed, perhaps up to 250 Kilograms, will be carried over from one season to the next to give Senegal a seed security buffer stock.

While ISRA crop land available for variety selection, as well as the production of breeder and foundation seed appears to be adequate, the project will focus on increasing seed yield per hectare and overall system production efficiency by upgrading critical laboratory and applied research equipment as well as increasing the private sector's capacity for seed multiplication, cleaning and storage.

In collaboration with other donors and USAID, ISRA is currently undergoing reorganization, thus we await an update of the final structural revisions. The zones of ISRA crop research specialization in breeder seed and foundation seed selection and multiplication will surely continue. Kaolack will focus on maize, Bambey on sorghum and millet, Louga on cowpeas and Richard Toll on irrigated rice. With the passage of time, the ISRA staff who have already collaborated with previous AID projects will assume greater leadership responsibilities for the applied research program.

Large areas of land and large quantities of breeder seed are not required for cereals which have a multiplication ratio of 1 kilogram of seed producing 200 to 250 kgs of seed. Therefore, the project will focus more on a defined crop area where it can implement a more intensified varietal selection and multiplication program. Careful handling of the seed after harvesting, during seed processing and treating, as well as storage by the GOS and the private sector will be further encouraged under the project.

Present Organization

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FIGURE 1

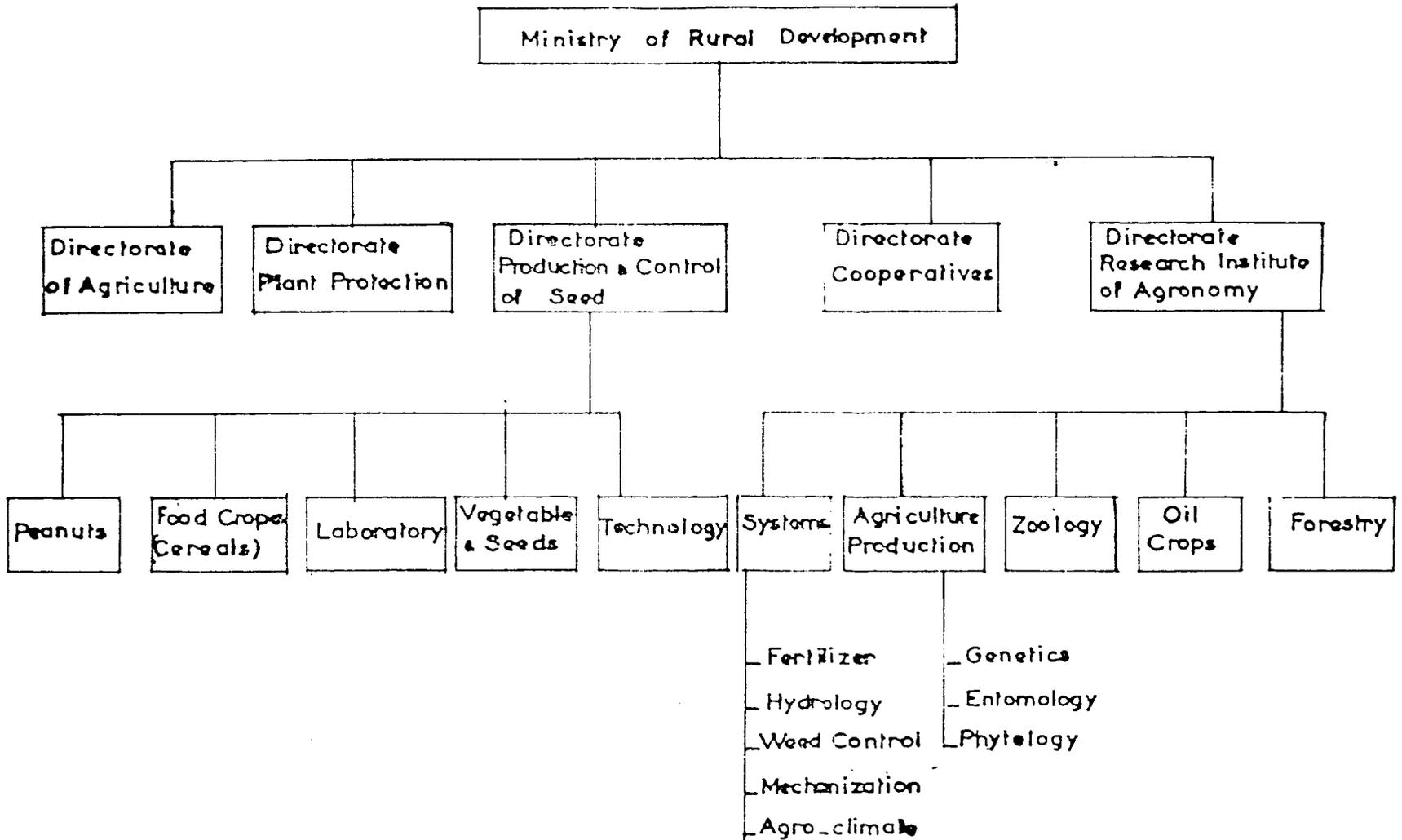


TABLE 8

IMPROVED CEREAL VARIETIES RELEASED
BY ISRA AND RECOMMENDED FOR SENEGAL

<u>Crop Variety Zone</u>	<u>Days to Maturity</u>	<u>Preferred Agricultural</u>
<u>Millet:</u>		
IBV 8001	82	Rainfed zones eg Kaolack, Fatick
Souna 3	85	Rainfed zones eg Kaolack, Fatick
34 HK 878	85	Rainfed zones eg Kaolack, Fatick
IBV 8004	81	Lower rainfed zones eg Louga,
Thies, Djourbel		
1 GAM 8203	81	Lower rainfall zones eg Louga,
Thies, Djourbel		
5 GAM 8301	80	Lower rainfall zones eg Louga,
Thies, Djourbel		
<u>Sorghum:</u>		
73-13	90	Northern lower rainfed zone
SSV 3	85	Casamance zone
75-14	95	Favorable rainfall zones
SSV 4	95	Favorable rainfall zones
SSV 5	90	Favorable rainfall zones
SSV 6	95	Favorable rainfall zones
<u>Maize:</u>		
Synthetic C	95	Favorable rainfall zones
BDS	95	Favorable rainfall zones, Kaolack.
Fatick		
ZM 10	85	Favorable rainfall zones
JDS	95	Favorable rainfall zones
Bambey Hybrid 95	German Maize	project area South of Kaolack
Camara 1	85	Favorable rainfall zones
HVB 1	95	Favorable rainfall zones
<u>Rice:</u>		
144 B9	110	Rainfed zones
IRB	120	Irrigated Zone
IKP	110	Irrigated Zone
IR 112	120	Irrigated Zone
DJ684D	110	Irrigated Zone
IR 422	120	Irrigated Zone
DJ12519	110	Irrigated Zone
IR 1529	110	Irrigated Zone
Jaya	120	Irrigated Zone
<u>Cowpeas:</u>		
CB-5	45	Lower rainfall zones
NDiambour	44	Lower rainfall zones
58-57	44	Lower rainfall zones
Mougne	47	Lower rainfall zones
59-9	73	Favorable rainfall zones
Bambey 21	41	Lower rainfall zones
34-B	65	Favorable rainfall zones
TV x 3236	70	Favorable rainfall zones

TABLE 9

CEREAL BREEDING CHARACTERISTICS ILLUSTRATIVE
OF SIX MILLET VARIETIES (*Pennisetum americanum*)
RECOMMENDED BY ISRA CEREAL BREEDERS FOR SELECTED CROP ZONES IN SENEGAL

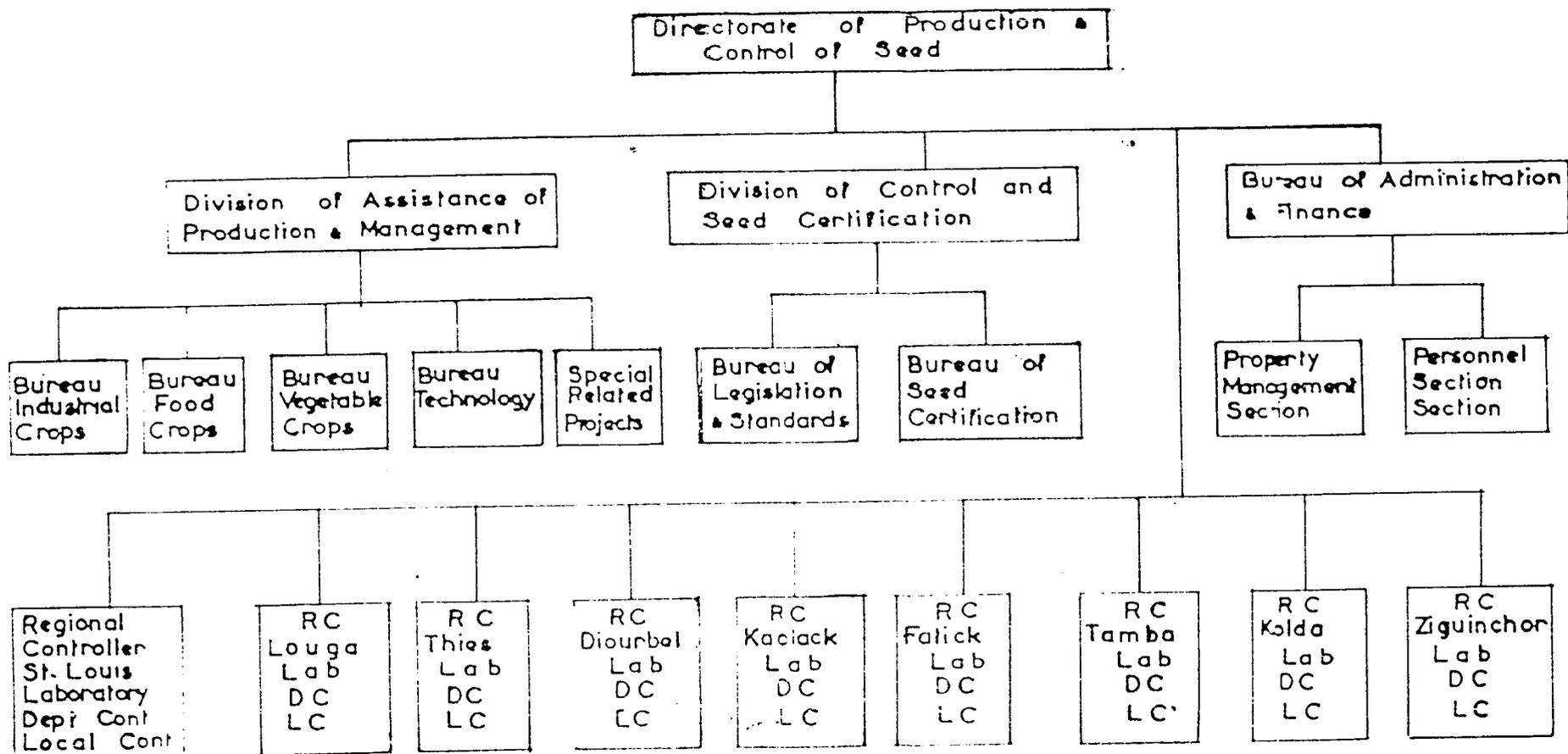
Varieties	!days to !maturity	!Height !of plant	!Length !of ear	!Useful !Tillers	!Weight of !1000 grains !(gms)	!Threshing !Yield	!Diseases		!Crop Yield (kgs)			!Crop Zone !Recommended
							!Downy !Mildew	!Rust	!Louga !Zone	!Bambey !Zone	!Nioro !Zone	
IBV 8001	! 32 days	! 232 cm	! 34 cm	! 4	! 8.7	! 66%	! 3.2%	! 6.5%	! 1,440	! 2,460	! 3,330	! Regions Fatick ! and Kaolack
IBV 8004	! 81 days	! 229 cm	! 38 cm	! 4	! 8.6	! 65%	! 3.1%	! 7.1%	! 1,200	! 2,340	! 3,250	! Regions Louga, ! Thiès & Diourbel
1 GAM 8203 H7-66	! 81 days	! 211 cm	! 46 cm	! 4	! 8.8	! 66%	! 3.7%	! 8.1%	! 1,190	! 2,550	! 3,280	! Regions Louga, ! Thiès & Diourbel
34 HK 878	! 85 days	! 154 cm	! 50 cm	! 5	! 7.8	! 59%	! 1.8%	! 6.6%	! 1,080	! 2,440	! 3,520	! Regions Fatick
Souna III	! 85 days	! 238 cm	! 52 cm	! 3	! 7.7	! 60%	! 12%	! 5.1%	! 1,150	! 2,020	! 2,850	! Regions Fatick ! & Kaolack
5 GAM 8301	! 80 days	! 194 cm	! 43 cm	! 6	! 8.7	! 73%	! 2.5%	! 7.6%	! 1,380	! 2,500	! 3,350	! Regions Thiès, ! Louga & Diourbel

Source: ISRA Millet Breeders/Bambey, 1984 Data bank

Proposed Plan for

FIGURE 2

Directorate of Production & Control of Seed



2. DPCS

The Director of DPCS has proposed an elaborate plan entitled "Projet de Renforcement et d'Amélioration de la Production et de l'Utilisation des Semences Sélectionnées au Sénégal," which includes a much larger program dimension focused on peanut seed multiplication needs of Senegal that is beyond the scope of the APS project which focuses on the cereal seed multiplication, distribution and marketing. MDR, AID and the EEC will be actively discussing the GOS plan prior to its release in December 1986. Nevertheless, the proposed plan provides an insight into improvement of the DPCS. The project will focus on the privatization of the seed system while the GOS shifts responsibilities undertaken by the GOS agencies.

The DPCS is currently in transition to adopt selected parts of the MDR plan that calls for the establishment of two divisions within the Seed Service. The Division of Assistance and Production (DAP) would be responsible for the production of foundation seed and assisting certified seed growers. The Division of Control and Certification of Seed (DCC) would be the official seed certification agency responsible for implementation of official seed regulations and quality control. The two separate divisions are essential to the development of a seed industry and certification program which contains adequate checks and balances. The project will provide technical assistance, commodities and training to each of these divisions in order to upgrade them to meet the challenges of Senegal's seed industry.

II. GENERALIZED SEED MULTIPLICATION SCHEME

Under the project, varieties developed and released by ISRA are both multiplied by ISRA and made available to the DPCS for seed treatment and further multiplication by contract growers on the DPCS seed farms. The DPCS currently receives foundation and registered seed at any one of their three warehouses located in Diourbel, Saint-Louis and Tambacounda. The laboratories sample seed and test it for quality in order to issue a seed certification on each lot. Then they treat, weigh and package the certified seed for distribution.

ISRA and DPCS can direct limited quantities of newly released seed to private seed multiplication contractors. At harvest time, the seed would be cleaned, tested, certified, weighed and bagged by DPCS seed facilities. The private sector could then market the seed and the RDA's could provide limited quantities to farmers at the competitive market price.

The foundation seed produced by ISRA can be handled by DPCS, then distributed by regional cooperative unions and MDR for multiplication and harvested as registered seed. Likewise, the foundation seed from ISRA can pass directly to the private sector and then to farmers at competitive prices.

When certified seed is multiplied by either private or governmental agencies through careful quality control procedures, it maintains the improved variety developed by ISRA plant breeders. Further multiplication of this seed is usually not eligible for certification. The benefits, however, of the improved seed usually continues for 3 to 4 years, therefore farmers need not renew their seed supply every year.

The project will conduct analyses of certified seed production costs to formulate recommendations for the GOS and private sector seed growers to assure competitive production costs. The private sector could become further involved in the seed processing through investment in simple equipment or management of seed treatment facilities. They could also contract with local farmers or farmer groups to actively sell seed under commission.

To better understand the dimensions of the project's seed program, the following tables of seed multiplication programs will illustrate the operating principles of the Senegalese seed multiplication, distribution and marketing system.

The illustrative seed multiplication schemes use an average cereal crop seeding rate as follows:

TABLE 10

Cereal Crop	Seed rate		Multiplication Ratio (kg)	Crop Yield Metric Tons
	Kg/Ha	MT/100 Ha		
Maize	20	2.0	1:100	2
Millet	6	1.2	1:200	1.2
Sorghum	6	1.2	1:100	1.2
Cowpeas	20	2.0	1:40	1
Irrigated Rice	80	8.0	1:25	2
Rainfed Rice	100	10.0	1:10	1

The above seed crop yields should be attainable with the skill level of the selected seed multiplication growers and their proper application of agronomic techniques currently available in Senegal. The proportion of each crop within Senegal's land-use cropping pattern may change over time with a subsequent shifting of resources to meet the revised needs. The most appropriate crop production mixture may change very quickly to adjust to more favorable economic forces and climatic conditions during the life-of-project.

TABLE 11

ILLUSTRATIVE MILLET SEED MULTIPLICATION SCHEME

Project Year	Kilograms		! Metric Tons	
	! Breeder ! Seed	! Buffer ! Seed Stock	! Foundation ! Seed	! Certified ! Seed
1897	0.5	5	0.1	20
1988	1.2	10	0.225	45
1989	2.0	20	0.405	81
1990	3.2	30	0.64	128
1991	4.6	45	0.927	185

TABLE 12

ILLUSTRATIVE MAIZE SEED MULTIPLICATION SCHEME

Project Year	Kilograms		Metric Tons	
	Breeder Seed	Buffer Seed Stock	Foundation Seed	Certified Seed
1897	2.7	10	0.260	27
1988	5.0	25	0.5	50
1989	8.0	40	0.8	80
1990	12.0	60	1.2	120
1991	17.0	80	1.7	168

TABLE 13

ILLUSTRATIVE COWPEA SEED MULTIPLICATION SCHEME

Project Year	Kilograms		Metric Tons	
	Breeder Seed	Buffer Seed Stock	Foundation Seed	Certified Seed
1397	8.5	40	0.425	21.3
1988	15.4	75	0.765	38.0
1989	24.0	120	1.2	60.0
1990	34.0	175	1.74	87.0
1991	48.0	240	2.4	120.0

TABLE 14

ILLUSTRATIVE IRRIGATED RICE SEED MULTIPLICATION SCHEME

Project Year	!Kilograms		!Metric Tons !	
	!Breeder !Seed	!Buffer !Seed Stock	!Foundation ! Seed	!Certified ! Seed
1897	1.6	20	0.4	11
1988	48.0	50	1.2	30
1989	103.0	100	2.56	64
1990	192.0	200	4.72	117
1991	307.0	350	7.68	192

TABLE 15

ILLUSTRATIVE RAINFED RICE SEED MULTIPLICATION SCHEME

Project Year	! Kilograms		!Metric Tons !	
	! Breeder ! Seed	! Buffer ! Seed Stock	!Foundation ! Seed	! Certified ! Seed
1897	200	100	2.0	20
1988	450	225	4.5	45
1989	300	400	3.0	30
1990	1,250	500	12.5	125
1991	1,800	600	18.0	180

Breeder Seed/Foundation Seed

The ISRA production of breeder seed and foundation seed will be closely supervised by the ISRA cereal plant breeders responsible for the development of each variety to assure maintenance of the desired agronomic and physical characteristics as manifested in the initial varietal selection process. A deviation from the desirable plant characteristics of the variety during the early multiplication process can have detrimental effects when one plants the seed from the first generation or second generation crop. During the transition period, estimated to be three additional years, the DPCS may be responsible for limited foundation seed and registered seed multiplication, in order to meet the critical seed needs while the private sector takes over.

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Seed Quality Control

The DPCS has also been charged with control of seed quality and certification. The Division of Control and Seed Certification, a separate organization within the DPCS, will be responsible for the standing seed crop inspection during the growing season and the laboratory testing of the certified seed during post harvest seed processing, storage and marketing. DPCS staff who assist the local private contract certified seed multiplication growers will not be responsible for seed certification or the collection of seed samples that will be the basis for certification of a farmer's seed crop.

The project will support the production of foundation, registered and certified seed under the management of the private sector in Senegal. During the three-year transition from DCPS to private sector management of the seed sector, private entrepreneurs will actively pursue the production, cleaning, treating, bagging, and storage of certified seed, later expanding into foundation seed. They will be expected to collaborate with ISRA cereal plant breeders to continue to produce a quality seed of varieties demanded by farmers. Current private sector analysis indicates several private entrepreneurs that have the capital and management capacity to successfully enter into seed production, processing, and marketing.

A. National Seed Plan

The New Agricultural Policy contains a definitive policy for seed production. The GOS will release its National Seed Plan in December 1986. As quoted in the New Agricultural Policy Report, "This plan will cover all aspects concerning production, supply, marketing and distribution and price policy in the seed sector. The project will assist the GOS with the preparation and implementation of its National Seed Plan and will support further clarification of the GOS Official Seed regulation.

The Mississippi State University Seed Technology Laboratory article, "Economic and Technical Factors Associated with Establishment of Seed Industry in Less Developed Countries" by J.C. Delouche, 1972, notes official seed regulation is generally of two types:

1. Regulations that authorize and legally sanction activities, such as a breded seed, a foundation seed and a certified multiplication seed program.
2. Regulations that govern seed cleaning, treatment, bagging, storage, distribution and marketing.

Official seed regulations should clearly describe the functions of the various responsible agencies and the mechanisms for effective coordination and management planning. The regulations should define how varieties are selected for release into large scale seed multiplication programs, what control measures are necessary for quality seed production, who will determine seed quality during progressive stages of seed multiplication, and how seed will be cleaned, treated, bagged, distributed and marketed. The project will support official seed regulations that authorize the establishment of a National Seed Commission which will coordinate the national seed program as well as advise the GOS.

The project supports the GOS evolution from the current seed system to a system of seed multiplication, processing and certification that greatly involves Senegal's private sector. An illustrative scheme of the allocation of responsibilities for an ideal seed multiplication, processing, distribution and marketing project are:

<u>1. Operational Components</u>	<u>Sector</u>
Plant breeding, varietal assessment and varietal maintenance.	Government
Initial multiplication: breeder and foundation seed.	Government
Production and processing, contracting, seed growing, harvesting, transportation, cleaning, grading, treating, packaging and storage.	Private sector
Marketing: Determining needs, accumulation of seeds and services, communication and distribution.	Private sector
Seed quality control within individual enterprises.	Private sector
<u>2. Service Components</u>	
Quality Control: Varietal and source verification, field equipment, seed inspection, labelling and quarantine operations.	Government
Education and information services.	Private and government
Marketing supply and demand forecasts.	Private and government
<u>3. Varietal Development, Testing and Maintenance</u>	

An applied research program is the foundation on which a good seed program is built. New, improved varieties are the life blood of the seed program. The ISRA plant breeder's task is to develop improved varieties or select from existing available varieties that consistently perform better than local varieties.

During the testing of varieties, data will be collected to prove superiority in agronomic characteristics, yield and/or quality attributes. The data will be submitted to the National Seed Commission to determine release of a variety into a large scale seed multiplication program. The commission will also publish recommendations for the use and distribution of these varieties to farmers.

There is currently a serious lack of coordination between ISRA and other agencies responsible for implementation of Senegal's National Seed Multiplication Program. The DPCS has been slow to articulate the seed needs of a national seed program for breeder and foundation seed to ISRA in order that they implement their variety selection and multiplication programs. A

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second problem that has hampered past seed multiplication programs has been the lack of payment for foundation seed purchased by SONAR from ISRA. This forced ISRA to use research funds to finance foundation seed production. A third problem is that ISRA had previously sold the seed below production costs.

Even in the initial stages of the project's seed program, improved seed production must become self-sustaining. The project will encourage private sector investment and enterprise start-up to accelerate the development of Senegal's seed industry. But private industry will participate in a seed program only if it can be assured a fair profit. Therefore, the project will closely monitor seed production costs and seed selling prices so that the GOS can make necessary policy revisions.

B. Project Assumptions

The seed program of the APS project makes two assumptions:

- High quality seed of improved varieties, together with the use of specific rates and forms of fertilizer, will increase yields significantly, thereby giving farmers a fair economic return on their investment.
- Farmer demand exists, or can be stimulated, for the use of improved cereal seed and fertilizer.

The design process for the project has generated initial data to confirm these two assumptions which the project staff will monitor.

During the project design, the GOS expressed concern about the degree of yield response generated by the improved cereal varieties to fertilizer application of 0-15-20 NPK formula fertilizer. The GOS commissioned a "Fertilizer Working Group" responsible for the formulation of the guidelines for the national fertilizer program for 1987. The fertilizer working group noted that 0-15-20 NPK fertilizer will be replaced by several NPK formulas that are more acceptable to Senegalese farmers due to previous positive experiences.

Until recently fertilizer has been distributed for the most part by RDA's to producer groups and individuals growing seed under a subsidized, contract program. Farmers were provided seed and fertilizer with little need for credit or investment decisions. The withdrawal of these programs, as dictated by the NAP, will require farmers to see assured economic benefits before investing in costly inputs. The Kelly and Gayes' ISRA report, "Input Acquisition and Use in the Departments of Gossas and Niore," noted that farmers have used fertilizer in the past and understand the potential value of timely fertilizer application, but farmers prefer an economic benefit of four times the fertilizer cost before they will invest. Likewise, the Chief of the Exploitation Division of ISRA reports that farmers are aware of fertilizer benefits because "they have been mobilized for seed production and had fertilizer available. Now they do not have cash available to buy it."

The project will support the demand for fertilizer through the revolving credit program. The project will also focus on the generation and dissemination of data from on-farm applied research trials that will generate a crop yield response curve which will show how to achieve the greatest return

from limited fertilizer applications. Likewise, the project will support improvements to the overall production input supply system. FAO's 1985 Senegal Agricultural Policy Analysis states "the inadequacy of input supply and distribution seriously handicaps agricultural production. This is especially true for the supply of improved cereals seeds and fertilizer."

The distribution of cereal seeds of improved varieties has been hindered by the lack of an efficient organizational structure for a seed multiplication program. The government's Agricultural Research Institute (ISRA) provides the genetic material and breeder seeds. However, originally the responsibility for production of foundation seed (i.e., the next generation) was also given to ISRA. When insufficient amounts of foundation seeds were produced, it was realized that seed multiplication should not be a function of the research agency. This resulted in the establishment of the Seed Service, which was given this responsibility. While obviously an improvement, a revolving door succession of five Seed Service directors in a period of three years indicates a lack of continuity in program development and policy coordination. Unfortunately, the Seed Service has not been able to provide sufficient amounts of foundation seed to regional agencies (RDA's) for distribution to seed growers. With lack of foundation seed for certified seed production, there has been little scope for quality control by the Seed Service.

As noted earlier, ISRA plant breeders have developed, released and are recommending varieties of millet, sorghum, maize and cowpeas that have higher productivity because of their improved genetic capacity to resist disease, drought and soil fertility adversities. These are improved varieties capable of superior yields if varietal purity is maintained. Yields are reported by ISRA and the Seed Service in the range of 1,000 to 1,500 kg/ha compared to farmer yields of 500 to 750 kg/ha.

The International Fertilizer Development Center and ISRA have reported good increases in yields of millet and maize from fertilizer. Recommended fertilizer application rates are:

<u>Crop</u>	<u>Fertilizer Application Rate in Kilograms per Hectare:</u>
Millet	100 kg of 14-7-7 with side-dressing of 50 kg of urea
Sorghum	100 kg of 14-7-7 with side-dressing of 50 kg of urea
Cowpeas	100 kg of 6-20-10
Rainfed Maize	110 kg of 14-7-7 with side-dressing of 110 kg of urea
Irrigated Maize	110 kg of 14-7-7 with side-dressing of 100 kg of urea
Rainfed Rice	75 kg of Diammonium phosphate with side-dressing 75 kg urea
Irrigated Rice	200 kg of Diammonium phosphate with side-dressing 100 kg urea

Value-cost ratios have been calculated for millet crops analyzing the effects of increasing fertilizer usage and corresponding increased production costs. The analysis assumes a base yield of 500 kg/ha and a selling price of millet at 70 CFA/kg. A yield increase of 60% (to 800 kg/ha) has been assumed as a reasonable yield response to the use of fertilizer without improved seed and a doubling of the base yield (to 1000 kg/ha) as the response from improved seed and fertilizer.

TABLE 16

MILLET CROP FERTILIZER WITHOUT IMPROVED SEED
(Base Yield 500 kg/ha)

NPK Fertilizer Cost (CFA/kg)	800 Kg/Ha Yield	
	Value-Cost Ratio	Increased Net Revenue (CFA/ha)
60	2.51	12,650
68	2.20	11,450
76	1.95	10,150
84	1.76	9,050

TABLE 17

MILLET CROP FERTILIZER WITH IMPROVED SEED
(Base Yield 500 kg/ha)

NPK Fertilizer Cost (CFA/kg)	1,000 Kg/Ha Yield	
	Value-Cost Ratio	Increased Net Revenue (CFA/ha)
60	3.52	25,050
68	3.14	23,850
76	2.83	22,650
84	2.58	21,450

A yield increase from 500 kg/ha to 800 kg/ha results in a value-cost ratio of 2.51 at the full 60 CFA fertilizer price. This is above the FAO standard ratio of 2 units increase for each unit invested in production inputs like seed and fertilizer. However, it would be considered to be a minimal acceptable level by ISRA researchers. As the fertilizer increases, the value-cost ratio drops below 2 at the 76 CFA price level, and to 1.76 when the fertilizer price is 84 CFA per kilogram. Net revenues from fertilizer are positive at all noted prices, but the increased benefits decline from 12,650 CFA to 9,050 CFA per hectare, a reduction of 28%.

If the farmer applies both fertilizer and improved seed, yields may be expected to double. This gives a value-cost ratio of 3.52 and net revenue increases of 25,050 CFA/ha at 60 CFA fertilizer prices. This increase in revenues is large enough to interest farmers in using additional fertilizer and high quality seeds. With the fertilizer prices at 84 CFA, the value cost ratio drops to 2.58 and additional net revenue to 21,450 CFA/ha, a reduction in net revenue to the farmer of 14%.

Maize is more responsive to fertilizer than millet and yield increases of 70% may be expected from the use of fertilizer with improved seed. The value-cost ratios shown below assume a base yield of 850 kg/ha with traditional inputs. A yield of 1,500 kg/ha is shown for applying fertilizer without improved seed and a yield of 1,750 kg/ha when improved seed and fertilizer are used.

TABLE 13

MAIZE CROP FERTILIZER: WITHOUT IMPROVED SEED
(Base Yield 850 kg/ha)

NPK Fertilizer Cost (CFA/kg)	1,500 Kg/Ha Yield	
	Value-Cost Ratio	Net Revenue (CFA/ha)
60	3.56	39,750
68	3.16	37,750
76	2.83	35,750
84	2.57	33,750

TABLE 19

MAIZE CROP FERTILIZER WITH IMPROVED SEED
(Improved Seed 300 CFA
Base Yield 850 kg/ha)

NPK Fertilizer Cost (CFA/kg)	1,750 Kg/Ha Yield	
	Value-Cost Ratio	Net Revenue (CFA/ha)
60	3.88	56,800
68	3.53	54,800
76	3.23	52,800
84	2.98	50,800

Using only fertilizer, the value-cost ratios range from 3.56 with fertilizer at 60 CFA per kilogram to 2.57 with fertilizer at 84 CFA per kilogram with corresponding decreases in net revenues from 39,750 to 33,750 CFA per hectare. With fertilizer prices at 84 CFA per kilogram, the value-cost ratios are more than adequate to stimulate farmer demand for seed and fertilizer. Increases in net revenues fall about 15%, but fertilizer generates impressive increases of revenue.

With improved seed and chemical fertilizer on maize, farmers can expect yields up to 1,750 kg/ha. At this yield the value-cost ratios range from 3.88 with fertilizer at 60 CFA/kg to 2.98 with fertilizer priced at 84 CFA/kg. Not only are the value-cost ratios very attractive, but the increases in net revenues drop only about 10% from 56,800 CFA down to 50,800 CFA.

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The noted fertilizer recommendations are based upon results obtained on research farms with better production techniques than practiced by farmers. However, they are indicative of the potential for doubling the cereal crop yields per hectare prior to the year 2000. Although these crop yields were obtained by trained technicians under research station conditions, there are Senegalese farmers who have the resources and management skills to likewise achieve high crop yields with economical costs of production. Average farm crop yields under corresponding climatic and soils should attain at least a 50% increase by 1991 from greater use of the improved inputs and better cultivation practices.

The project will collect scientific on-farm data and information on the use of improved varieties, certified seed and fertilizer applications. This information will be used for promotional purposes. The project will finance an educational publicity campaign that will be conducted by the GOS with the help of media firms. Positive data on the economic returns that result from the proper use of improved seed in conjunction with fertilizer will be put into various types of ethnic-specific, audio-visual, broadcasted and pamphlet messages. The media program will translate the advantages of these inputs into the "value system" of the prospective farmer users. The local fertilizer industry has expressed interest in associating itself with such publicity activities. As these efforts stimulate demand, private enterprise will take advantage of the new profit opportunities that will emerge throughout the entire agricultural input spectrum: importation, local fertilizer production, seed multiplication, input distribution and the marketing of resulting cereals. The project's revolving credit program (see Annex G) will serve as a vital catalyst in the privatization of agricultural inputs marketing.

The personnel requirements for the seed component are foreseen as follows:

<u>Year of Project</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
<u>Technical Advisors</u>					
Research Agronomist	x	x	x	x	x
Production Agronomist	x	x	x	x	x
Seed Technologist	x	x	x	x	x
<u>Local Personnel:</u>					
ISRA Research Agronomist	x	x	x	x	x
Division Chief Production	x	x	x	x	x
Division Chief Control	x	x	x	x	x
Asst. D.C. Production	x	x	x	x	x
Assts D.C. Control	x	x	x	x	x
Subord. Production	x	x	x	x	x
Subord. Control	x	x	x	x	x
Subord. Production	x	x	x	x	x
Subord. Control	x	x	x	x	x
Private Sector Personnel	x	x	x	x	x

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C. Seed System Definitions

The designation of seed names under the project will conform to those used in the New Agricultural Policy statements. To be in agreement with International Seed Testing Association rules, each designated name will be raised one level, i.e., Genetic Material = Breeder Seed, Breeder Seed = Foundation Seed, Foundation Seed = Registered (or certified N-1) seed. Certified Seed is the last controlled multiplication level. To clarify the names of the multiplication levels and to conform to international usage the following classifications and definitions should be used:

1. Breeders Seed is defined as genetic material produced and maintained by the plant breeder in the research center, or by private sector companies who developed the variety. This should not be a large amount of seed so that it can be maintained in a manner that preserves the genetic characteristics for which the variety was developed and described. It may include more than one multiplication to provide sufficient seed. These multiplications are identified by ISRA as prebase G1, G1...GX.
2. Foundation Seed is the first multiplication of breeder seed released by ISRA. It should be produced under conditions which maintain its varietal purity under the supervision of the plant breeder on government seed farms or by selected seed growers. This is Semence Prebase seed in GOS terminology.
3. Registered Seed is the foundation seed meeting varietal purity and seed quality standards, multiplied by seed growers and eligible for further multiplication in the certified seed program. This is the Semence Base in GOS terms.
4. Certified Seed is the product of registered or foundation seed produced by seed growers and meeting varietal purity and seed quality standards. It is the final multiplication in the seed program. Its production is used for commercial purposes or retained for the farmers' own use. Seed regulations usually limit its sale, by variety name, to certified and higher multiplication levels.

TABLE 20

Seed Certification Terminology

<u>Responsibility and Use</u>	<u>NAP Terms I*</u>	<u>ISTA Terms**</u>	<u>OECD***</u>
Multiplied by plant breeder for multiplication (may include more than one generation)	Pré-base G1, G2..Gx	Breeder Seed	Prebasic
Multiplied under plant breeder's care or by special agency	Semences Pre-base	Foundation	Basic
Multiplied by seed growers, seed farms or seed enterprises and sold for further multiplication	Semences Base	Registered	Certified 1st generation
Multiplied by seed growers, seed farms or seed enterprises	Semences Certifiées N-1	Certified	Certified 2nd Generation
Multiplied by seed growers, seed farms or seed enterprises 3rd Generation	Semences Certifiés N-2	Certified 2nd Generation	Certified

RELATED PROJECTS

A number of related on-going and planned projects have been reviewed in the context of this APS component. There is no conflict or duplication of effort between these and the projected activities under the APS. Instead, there are important elements that will mutually reinforce these ongoing and planned activities.

German Maize Project

This joint GOS-Federal Republic of Germany project, which started in 1980, has encouraged maize production in the Sine-Saloum region. It has completed its second phase (1982-85) and is beginning the third (1985-89). An irrigated, 12-hectare farm with storage hanger has been established. The project obtains breeder seed of synthetic varieties from ISRA for multiplication on the farm and distribution to contract growers.

Seed was also obtained from CIMMYT and is being multiplied without selection for distribution to SODEVA. In 1985, on 1,716 hectares with contract growers, 2,000 tons of food grain was produced. For 1986, 750 hectares have been prepared for farmers with contracts in anticipation of 1,000 tons at harvest.

It has proven difficult to sell seed priced at 200 CFA/kg. At this time, 450 tons of seed remain to be sold. Reports are that farmers have no money. Farmers were given the necessary inputs and paid 90 CFA/kg for seed produced under contract at harvest time. The project expected to recover the cost of inputs and payment for seed by selling the seed at the 200 CFA price.

The project is already cooperating with ISRA in the varietal development and seed multiplication program. It will provide extension services, contacts to producers and service as processing and distribution agents for the improved seed/multiplication element of the APS project.

Lutheran Mission Seed Technology Project

The project plans to work in cooperation with a number of organizations including ISRA and the Seed Service. A stated purpose is to "encourage and enable the use of improved seed stock and improved varieties of food crops, using both seed selection and seed multiplication as appropriate." The project fits well with the aims and goals of the APS project's seed improvement/multiplication/certification component.

It hopes to develop small-scale seed centers in different production areas of the country. They would include cleaning and processing facilities, storage space and classroom/meeting buildings for training meetings. Seed production would take place on plots developed by local producer groups.

"This phase of the project is intended to dovetail with the current, established Senegalese Government seed development program whereby ISRA provides the newly developed and/or improved varieties to the Seed Service which is responsible for production of foundation seed." The local farmer producer groups of the Seed Technology project would then extend the seed multiplication process.

Catholic Relief Service Cereal Seed Bank Project

This project has been in operation since 1977. Organized at the village level, a producers cooperative (Silo Committee) and revolving fund have been established. Grain for food which has been produced at harvest time is stored until needed. At that time, members may repurchase grain for food, seed or marketing. Storage facilities for 320 tons of grains have been constructed. In addition, 250 villages have collected the required 50,000 CFA needed to qualify for participation in the project. There are currently 52 agents at the arrondissement level.

While the present program involves mainly food grain, farmers recognize the value of good seed, which has been lacking. It is intended to shift the emphasis on food grain to seed production and storage in some villages or storage sites.

This appears to be a well organized program with producer groups and trained agents who could benefit with the help of the APS project activities when adequate supplies of foundation seed become available.

Title III Cooperative Warehouse Construction

During the period 1981-84, 50 grain storage warehouses were constructed with Title III funds in the Peanut Basin region. Supervision and training of managers for the warehouses was turned over to the Direction de l'Action Cooperative. The storage facilities are located outside villages at the rural cooperative level. There is little use being made of them at the present time.

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The warehouses could be useful as seed processing, storage and distribution centers. These structures could be leased or sold to local agricultural input dealers when demand for improved seed stimulates private investment interest. Credit facilities provided under the APS could serve as a catalyst in the privatization of these facilities.

Cowpea Collaborative Research Support Project (CRSP)

The Cowpea CRSP is upgrading ISRA's institutional capability by sponsoring two scientists from ISRA in their studies for Master of Science degrees in agronomy and entomology at the University of California, Riverside (UCR). During the 1986 cropping season, the Cowpea CRSP in Senegal conducted "Mini-Kit" experiments on farmers' fields in northern Senegal with 15 trials in 1985 and 30 trials in 1986. Different varieties were compared under one set of improved, farmer-managed cultivation and storage practices. Hydrologic budget analyses were conducted to determine the extent and timing of drought in each village. Yields were excellent on some of the farms, exceeding 1000 kg/ha, and evaluations of the cooking quality of different varieties were obtained from farm families. These experiments complemented a major cowpea project conducted by the European Economic Community to combat famine and poverty in which California Blackeye 5 was introduced into Senegal on a large scale in 1985, causing the area under cowpea production to increase four-fold.

Private marketing organizations rapidly responded to the increased supply buying all of the available cowpeas. A survey of 222 farmers conducted by the extension agency in the dry Louga region indicated that half of the farmers preferred California Blackeye 5 over the local Senegalese varieties. Furthermore, 74% of these farmers were planning on saving CB 5 seed for the 1986 season. This farmer level CB 5 seed was useful in 1986 because the rainy season started extremely late with farmers sowing in August 1986. The millet crop has completely failed in large areas of northern Senegal and CB 5 and local cowpeas are the major source of food and cash.

Under the CRSP, a seed production project was initiated in Senegal that is designed to produce foundation cowpea seed which is free of known seed-borne diseases. Progress was made in breeding cowpeas with improved adaptation to hot, dry conditions with 418 advanced lines selected in Senegal in 1985 and placed in preliminary yield tests in 1986. Likewise, at UCR, 31 heat-tolerant lines and 13 drought-resistant lines are being yield tested in 1986. Six vegetable-type cowpeas were released and registered by UCR and have been adopted on a small scale in California. Vegetable cowpeas with heat tolerance have been developed.

Cowpea germplasm has been provided to many countries. Physiological studies demonstrated that the susceptibility of cowpeas to heat stress during early floral bud development depends on the photoperiod, being more pronounced in long days. Likewise, progress was made in evaluating leaf discrimination against Carbon 13 as an indirect index of water-use efficiency. These studies have shown that ureide levels in petioles may provide an index of biological nitrogen fixation rates for use in screening germplasm. In searching for characteristics that confer higher yield potential, the seasonal dynamics of carbohydrate partitioning to pods was studied with contrasting genotypes at different row spacings.

Under the CRSP, in-country tests were conducted for the effects of neem (Azadirachta indica) seed materials on cowpea weevils under field and storage conditions. Dried, ground neem seed or neem leaves effectively killed weevils. Respiration studies indicated that mixtures of cowpea seed and weevils remove oxygen at a fast rate and that damage may be minimal with sealed-drum storage, even when initial infestation levels are high and insecticides are not used. CRSP programs are implemented in cooperation with IITA to strengthen screening of cowpea strains for heat tolerance and insensitivity to photoperiods in Senegal. Heat tolerance has been incorporated into one of the most promising early lines from IITA.

CRSP Intsormil

The Intsormil CRSP focuses on pearl millet and sorghum research in Asia and Africa. Priority areas of research under this CRSP are the production and utilization of millet and sorghum in Asia and Africa; sorghum and millet food quality; sorghum and millet genetic resources and their utilization; millet and sorghum plant breeding techniques and progress in breeding varieties and hybrids; millet and sorghum crop disease and insect problems and utilizing genetic resistance to control them; and climatic factors affecting pearl millet and sorghum growth and crop yield.

Under the Intsormil CRSP, priority research continues to be conducted on pearl millet diseases for West Africa that includes downy mildew, smut, ergot, rust, and the parasitic weed Striga. The Intsormil CRSP team will focus on the need for more data on insect pests of millet and sorghum and host-plant resistance to these insect pests with other control measures.

The Intsormil CRSP gives high priority to breeding pearl millet lines for Sahelian Africa. Prominent variety traits that make them outstanding are high stand establishment (survival and emergence of seedlings under drought and high-temperature stresses), high insect resistance (Raghuva and stem borers in West Africa), high efficiency of water and nutrient use, and stability of grain and fodder production under highly variable climatic conditions. Several lesser priority aspects of research under the Intsormil CRSP include sorghum and millet diseases, weed control, grain quality, early maturing varieties, and high crop yields through soil and water management as well as soil fertility and plant nutrition.

ANNEX G

BANKING AND CREDIT ANALYSIS

ANNEX G
BANKING AND CREDIT ANALYSIS

I. The Context

- A. The Monetary System
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 - 1. The RF Mechanism
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 - 1. Commercial Banks
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- E. Interest Rates

ANNEX G
BANKING AND CREDIT ANALYSIS

Lack of capital is a critical constraint to increasing cereals production. Credit, previously available through parastatal organizations, has all but disappeared; farmers, after years of drought, are impoverished and without cash resources to satisfy their own demand for agricultural goods and services. This is illustrated by the results of this year's fertilizer cash sales program. The 7,414 tons of cash fertilizer represent a huge increase over the previous year but is insufficient to significantly affect overall cereals production.

Input suppliers and cereals marketers also need credit facilities. While these traders currently have access to largely informal credit sources, demand for organized credit at reasonable rates is persistently cited by traders as a major constraint. In addition, credit terms for input suppliers must link repayment to the harvest and marketing period. Need for this credit will grow with increasing farmer demand for additional supplies.

I. THE CONTEXT

A. The Monetary System

Senegal is a full member of the West African Monetary Union (WAMU) together with the French-speaking West African countries of Benin, Burkina Faso, Ivory Coast, Mali, Niger and Togo. The Monetary Union was created in 1962 in the years initially following the end of French rule.

The member countries share a common currency, the CFA franc, which is issued by a single union-wide Central Bank (Banque Centrale des Etats de l'Afrique de l'Ouest, BCEAO). The BCEAO is headquartered in Dakar and has national agencies in each member country. The CFA has been tied to the French franc since 1949 at 1 CFA = 0.02 FF and France provides support for the maintenance of the free convertibility of the CFA franc into French francs, particularly by extending overdraft facilities through BCEAO operating accounts maintained with and managed by the French Treasury. In return for France's support of the Union, the member countries surrender the management of 61 percent of their foreign exchange reserves to the French Treasury. These funds are deposited into the operating account and are covered by an exchange guarantee from France. Senegal, Ivory Coast, and Benin currently have a negative balance in the operating account position. Burkina Faso, Togo and Niger maintain a surplus position, thus justifying French hopes that, in the end, balance will be redressed.

Monetary policies, including money supply targets and credit ceilings, are centralized and coordinated by the BCEAO. Sectoral allocation of the credit ceiling within each country is determined by each member country's national credit committee. Each of the targets and ceilings is reviewed annually and adjusted if circumstances warrant. The minimum and the maximum lending interest rates for each sector are also determined by the BCEAO for each country. Through this policy the BCEAO influences the level of private credit allocation to different sectors. Current interest policy has negatively affected Senegalese agriculture. For example, the discount rate charged for

most agricultural and non-agricultural credit is 7.5 percent. The maximum bank on-lending rate is plus five points, or currently 12.5 percent. Since the agricultural sector carries higher risk, most banks prefer to lend to safer, non-agricultural sectors.

Indeed only 3 percent of all credit now extended in Senegal goes to the agricultural sector. Furthermore, Monetary Union policy and performance criteria negotiated with the IMF in the context of past and current standby programs, limit the amount of credit that can be outstanding at a given time. Thus, some banks have credit funds available and clients identified but are restrained by their credit ceiling quota from making the loans.

The inability to pursue an independent monetary policy, coupled with the fact that all credit applications of 70 million CFA and above to any individual or enterprise have to receive the Central Bank's prior authorization, especially if the lending institution wishes to refinance the corresponding loans at maturity through the Central Bank's rediscount mechanism, constitutes a major constraint to speedy and efficient credit extension by Senegalese banking institutions. Any deviation from the Union's guidelines must be negotiated with the Central Bank and negotiations, as might be expected, are lengthy.

B. The Banking System

There are currently 14 banks and 5 non-bank financial institutions in Senegal. Together they have a network of 59 branches of which 34 (58 percent) are located in Dakar. The remaining 25 branches belong to 5 banks. A list of Senegalese commercial banks is found in Table 1.

Five banks have a positive liquidity position. These banks have maintained deposit levels above their loan portfolio and, through careful lending, have maintained a low level of non-performing loans. As a consequence they have been consistently profitable. The aggregate lending of these banks to the economy represented 12.4 percent of all outstanding loans in 1980 and 16.6 percent in 1984. These banks have not been major lenders to the agricultural sector.

The lending rate of the banking system has been much higher than its ability to mobilize corresponding resources in the form of deposits. Aggregate lending by the banks in 1984 increased from 286.7 billion CFA in 1980 to 390.6 billion CFA, a net increase of 103.7 billion CFA. Total deposits for the same period grew from 193.4 billion CFA to 288.4 billion CFA. The financial gap therefore widened between the bank loans and their deposit sources by a further 8.7 billion CFA. This gap has been financed mainly by drawings from the Central Bank and by foreign correspondents.

Structural low profitability is a result of low lending rates on most agricultural loans imposed by the Central Bank. The Central Bank discount rate is 7 percent, (the preferential rate applicable to special agricultural credit), 7.5 percent for general agricultural lending and for other sectors. Due to a liquidity squeeze, most banks have recourse to the Central Bank for

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the refinancing of their loans. The Central Bank's discount rates become therefore the standard measurement for cost of funds in Senegal and the lending spreads generated from these rates are insufficient to cover the high cost of lending to agriculture.

The credit ceilings constitute another major constraint to lending to the agricultural sector: with limited loan making ability, Senegalese banks prefer to channel their lending into more lucrative and less risky short-term and trade financing areas.

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TABLE 1
SENEGALESE COMMERCIAL BANKS

Name	Capital (in billion CFA)	Direct share	GOS BCEAO+Local* Banks %	Foreign Ownerships %	National Private Participation %	Branches in Dakar	Branches in regions	Liquid	Profitable
1. B.C.C.I.	300	-	-	100	-	1	NONE	YES	YES
2. B.C.S.	571	-	-	-	100%	1	NONE	NO	NO
3. B.H.S.	1,100	32	31	9	28%	1	NONE	NO	NONE
4. B.I.A.O.	3,077	35	-	65	-	7	4	NO	NO
5. B.I.C.I.S	2,000	42	-	50	8%	7	6	YES	NO
6. B.M.D.S.	2,400	73	-	27	-	1	7	NO	NO
7. B.S.K.	2,000	5	-	50	45%	2	NONE	NO	YES
8. CITIBANK	250	-	-	100	-	1	NONE	YES	YES
9. M.F.I.S.	1,750	-	-	51	49%	1	NONE	NO	YES
10. S.G.B.S.	2,156	-	-	62	38%	7	1	YES	YES
11. U.S.B.	2,000	62	13	25	-	4	3	NO	YES
12. C.M.C.A.S.	2,300	29	39	20	12	1	3	YES	YES
13. SONABANQUE	300	38	50	-	12	1	1	YES	YES
14. SOPISEDIT	1,300	19	40	38	3	<u>1</u>	<u>NONE</u>	-	-
						36	25		

Local Banks' shares include shares from GOS owned banks.

C. Rural Credit: Past and Present

The reluctance of the banking sector to lend to agriculture is based mostly on past experience and current regulations including:

- Poor liquidity positions due largely to ex-ONCAD debt.
- Low lending rates imposed by the Central Bank which are believed insufficient to cover risks and cost of lending to agriculture.
- GOS forgiveness of the ex-ONCAD debt at the farmer level which has encouraged farmers to expect renewed loan forgiveness.
- Tight credit ceilings imposed by the Central Bank which limits the amount of credit that the banking system can make available to the economy.

During the 1970's the major farmer input supplier was a parastatal, ONCAD. ONCAD provided inputs to local cooperatives and large individual farmers though distribution operations did not necessarily respond to farmer requirements. When ploughs were available, for example, they would be distributed based, in part, on "non-economic" criteria. A farmer who was lucky enough to receive a plough, and either did not need it or could not afford to pay for it, could sell it on the market (at a much reduced price), and not reimburse the credit.

The government forgave farmer debt four times since 1970 following years of drought-induced poor production and this has had a dramatic impact on farmers' perception of credit. It became perceived as a gift and not an obligation. The cumulative effect of such behavior was that by 1980 ONCAD owed the banking system 75 billion CFA in capital and 16.3 billion CFA in interest.

ONCAD, mismanaged and bankrupt, was dissolved in December 1980, and the GOS absorbed the ex-ONCAD debt burden. The Senegalese National Development Bank (BNDS), which contributed up to 36 percent of the total outstanding credit to the economy by the banking sector in 1982, carried the major burden of the ONCAD debt. Following ONCAD's dissolution, the GOS redistributed 21 billion CFA of the ONCAD debt among other banks to lessen the impact of the debt burden on BNDS and improve its liquidity position. Despite this gesture the BNDS' share of total outstanding loans still represented 26 percent of total banking credit in 1983 compared to its deposit base for the same period of only 16 percent. This gap amounted to 86.7 billion CFA in 1983 or 44 percent of the Senegalese banking systems total financing gap.

In ONCAD's wake a smaller parastatal, SONAR, was created to continue provision of inputs to producers. With credit funds unavailable, inputs were to be financed through retained earnings on peanuts. Until August 1983, subsidies against retained earning purchases were financed by the national budget.

Recognizing the hardship that the lack of credit placed on the farmers, the government with donor help (principally France) undertook an in-depth analysis of rural credit programs in 1981/1982. The key conclusions were that (1) the only possible way to obtain loan reimbursement was by relying on village solidarity since all but a few farmers cannot provide collateral and (2) the credit mechanism had to be insulated from GOS political pressure.

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Village solidarity meant the creation of viable farmer organizations and donors pushed for the creation of village sections and producer groups, free of the existing cooperative movement (which had been deeply involved in the "problems" of ONCAD). In May 1984 a new law granted both organizations the right to independent legal status. These groups may now organize themselves and enter independent borrowing relationships.

In the meantime the cooperative movement, in order to survive, has reorganized and is beginning to play a supply and marketing role similar to that of the private sector.

D. Caisse Nationale de Credit Agricole du Senegal (CNCAS)

The CNCAS was created in 1984 to provide rural credit to village sections, producer groups, individuals or suppliers (private sector, cooperatives). The bank currently has four branches located in Dakar, Thies, Matam, and Ziguinchor. A new branch is scheduled to open in Kaolack this year.

During the first year of operations the bank concentrated its portfolio on short-term overdraft facilities while staff and management systems were developed. A lending program was also carried out with potato cooperatives under strict criteria and supervision. Repayment rates exceeded 97 percent and the CNCAS and GOS, in a precedent breaking action, have sought recourse through the legal and enforcement apparatus to gain repayment of the non-reimbursed loans.

Buoyed by this initial experience, the CNCAS is lending to both producers and the agro-industrial sector. Total outstanding loans and commitments in May 1986 amounted to CFA 1,320 million of which CFA 30 million (2.3 percent) were overdue. The Dakar branch made 88 percent of the loans. The Thies and Matam branches have acted in the past as deposit-gathering centers. The Thies branch, now gaining momentum and expected to become the major lending branch in years to come, lent funds this year according to the following conditions:

- 200 kg of peanut seeds were delivered on credit to the members of the village sections which had reimbursed on time 100 percent of their previous year's debt to the cooperative movement.
- 100 kg of peanut seeds per member of village sections which had reimbursed 100 percent of their previous year's debt by April 1, i.e., with some delay.
- No credit for the other sections.
- Each village section receiving credit had to deposit 25 percent of the loan value in cash at the time of the loan.

The CNCAS' sound liquidity position is attributable to as yet unutilized, paid-in capital (CFA 1,300 million) and a relatively healthy deposit base of 500 million CFA of which 22 million CFA (4.5 percent) are in interest bearing deposits. The initial capital was established at CFA 2.3 billion but to date only CFA 1.54 billion has been paid-in. Notifications have gone to the shareholders requesting the payment of the remaining CFA 760

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million. The GOS share of the capital represents 28.2 percent, but only 240 million of the subscribed total of 648 million have been actually paid in by the GOS with assistance from CCCE (France). In view of its increasing loan portfolio, CNCAS will need to secure additional new sources of funding in any case.

Table 2 details the capital distribution of the CNCAS among its shareholders and the composition of the board of directors. A new General Manager with substantial banking experience was named in 1986 and approved by the Board of Directors. Institutional development is currently hindered by the lack of experienced low-and middle-level managers. This must be remedied before implementation of the CNCAS' expansion strategy which calls for the establishment of 20 branches throughout the country within 5 to 7 years. This ambitious growth program must be accompanied by adequate mobilization of resources, expansion of the capital base, the implementation of well thought-out training programs and adherence to strict loan criteria.

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TABLE 2

CNCAS CAPITAL DISTRIBUTION AND BOARD REPRESENTATION

(IN 000s CFA)

SHAREHOLDERS	NATURE	No OF SHARES	%	SEAT ON THE BOARD	PAID-IN CAPITAL	BALANCE	TOTAL SUBSCRIPTION	REMARKS
GOS	Public	64,825	28.2	3	240,000	408,250	648,250	
BNDS	Parastatal Bank	34,500	15.0	2	240,000	105,000	345,000	
B.I.C.I.S.	Private Bank	8,625	3.75	-	86,250	-	86,250	1. All private banks together have 10.85 shares and only hold one seat on the board.
B.I.A.O.	Private Bank	3,450	1.50	-	34,500	-	34,500	
B.S.K.	Private Bank	4,500	2.10	-	45,000	-	45,000	
U.S.B.	Private Bank	3,500	1.52	-	35,000	-	35,000	
SCBS	Private Bank	4,000	1.75	-	40,000	-	40,000	
BCCT	Private Bank	500	0.23	-	5,000	-	5,000	
SEPPA (SSEPC)		10,000	4.3	1	100,000	-	100,000	2. CCCE expects GOS to request assistance to pay additional subscription as they did for the original subscription.
MAS	Ag. Insurance Co.	2,300	1	-	23,000	-	23,000	
SPIDS/UNISYNDI	Trade Unions	100	0.05	-	1,000	-	1,000	
SNTI	Priv. Tomato Prod.	3,200	1.4	-	32,000	-	32,000	
UNCAS	Ag. Coops Union	10,000	4.3	1	100,000	-	100,000	
CNCA - France	French Ag. Bank	23,000	10.0	1	160,000	70,000	230,000	
CCCE	French Aid Agency	23,000	10.0	1	160,000	70,000	230,000	
BCEAO	Central Bank (regional)	34,000	15.0	2	248,000	105,000	345,000	
16 shareholders		230,000	100.0	12	1,541,750	758,250	2,300,000	

II. ORGANIZATION OF THE CREDIT COMPONENT

A. Overall Organization

Through the APS project, the banking system will recycle approximately U.S. \$51.503 over 10 years (\$9.0 million in the form of fresh drawings from the fund and \$ 42.503 from capital and interest repayments). In other words, the \$9.0 million being made available for on-lending purposes will have a multiplier effect of 4.7. If properly managed, the credit component should achieve its intended purpose of encouraging the private sector to get involved in the production and distribution of agricultural inputs.

The organization of the credit scheme is summarized in Figure 1 which outlines the credit, commodity and reimbursement flow for the project credit component. An American bank resident in Senegal will manage the revolving fund. This fiduciary bank will draw down funds from the U.S. Treasury on an as-needed basis.

The on-lending commercial banks include any bank in Senegal (excluding the fiduciary bank) which wishes to lend to the agricultural sector in strict accordance with standard banking practices. Credit recipients may be (1) manufacturers or importers of agricultural inputs, (2) commercial input distributors, (3) cereals marketers, or (4) units performing supply or marketing functions on a businesslike basis. No loans will be made directly to producer groups.

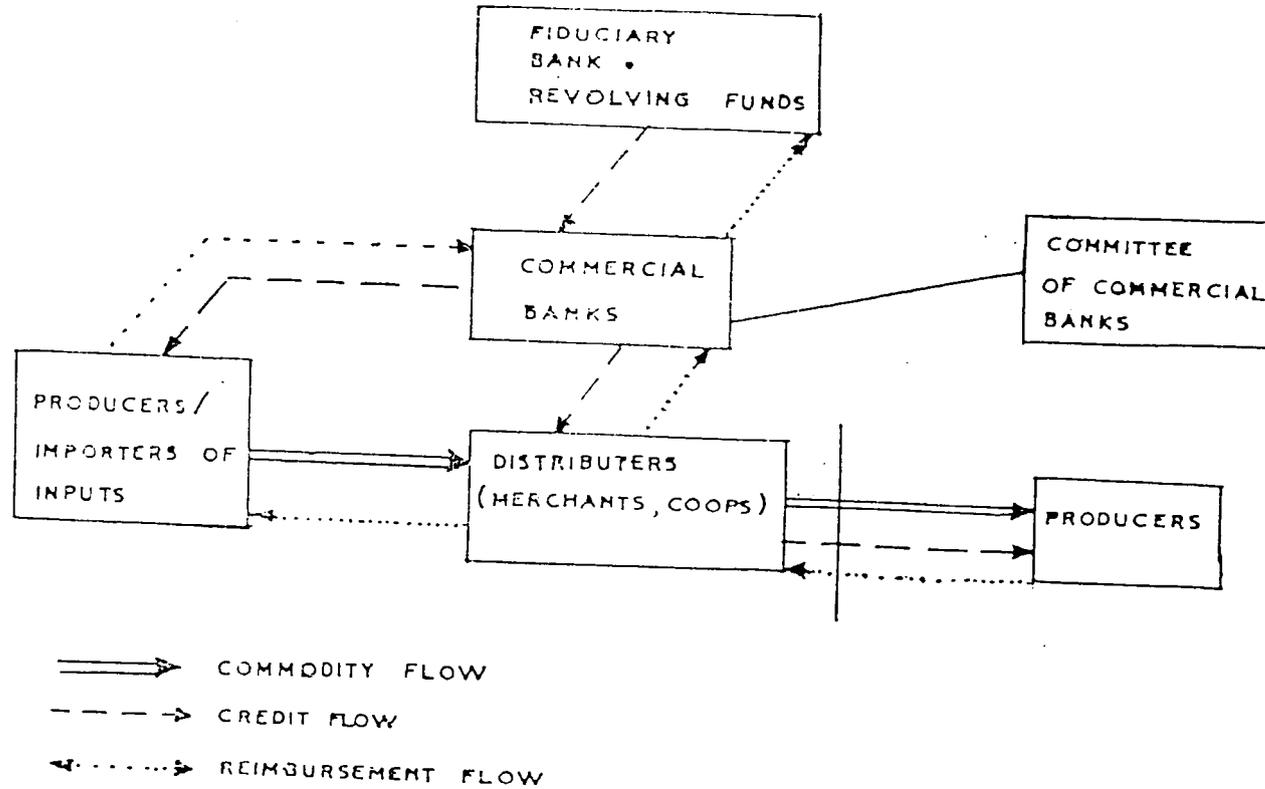
B. The Revolving Fund (RF)

Drawdown, disbursement and repayment will be managed through a Revolving Fund (RF) established within a fiduciary commercial bank which may not, in turn, loan RF funds to the credit recipients.

The fiduciary bank must be a private commercial bank which is familiar with USAID and U.S. Treasury disbursement methods, has presence in Senegal, and is not itself involved in agricultural lending. The bank will manage the utilization of the Revolving Fund and make periodic and detailed Fund Status reports for both the donor and the grantee. This institution can at the same time complement the fund management with auxiliary project training and inspection, thus enhancing the technical and risk analysis ability of the lending banks. The fiduciary bank will be compensated through transaction commissions earned from the on-lending banks and from a modest annual administration charge to be negotiated.

FIGURE 1

CREDIT SYSTEM ORGANIZATION



The fiduciary bank will enter into a host-country contract with the Ministry of Finance to manage the Revolving Fund. USAID will participate as an observer during the negotiations. The contract should clearly identify fund management procedures including criteria for lending and the actions, legal or otherwise, to be undertaken by the parties to ensure proper fund management and loan reimbursement.

1. The RF Mechanism

The RF will be funded through incremental, periodic drawdowns by the fiduciary institution on the U.S. Treasury as requested by the approved participating bank and authorized by USAID/Senegal. These drawdowns will be limited to the amounts needed for up to 60-day periods and the account, referred to as RF-1, held in a US dollar account in the name of the project and the lending institution. Where necessary, the fiduciary bank may invest these funds until they are converted into local currency and disbursed. The resulting interest earnings (minus the bank's commissions) must be returned to the U.S. Treasury in U.S. dollars. The disbursements of the RF-1 are effected through two different payment methods:

- a. The Direct Payment Method. Under this method, the participating bank presents the necessary documents to the fiduciary bank (loan agreement, letter of credit application, purchase order) which verifies and checks their conformity against established guidelines. If the fiduciary bank is satisfied with the completeness of the documentation, it will either effect payment or confirm the letter of credit in favor of the suppliers and reimburse itself by debiting the RF account under authorization from USAID/Senegal.
- b. Reimbursement Method. Under this method the on-lending bank will first make payments to, or open a letter of credit in favor of, pre-selected, pre-screened suppliers and present documentary evidence to the fiduciary bank for reimbursement. Payments not conforming to the established guidelines will be rejected.

Periodically, an updated list of suppliers and approved borrowers should be submitted to the fiduciary bank by the participating lending institutions. Documents acceptable as evidence for either payment or extension of credit will include, but are not be limited to:

- Loan agreement between the lending institution and the borrower.
- Purchase order issued or approved by the lending institution.
- Commercial invoice from the suppliers.
- Evidence of the receipt of the merchandise by the borrower (or evidence of the delivery by the supplier).

The RF-1 will be periodically replenished subject to evidence of proper utilization of prior disbursements. Loan repayments including interest from the borrowers will be deposited into a second local currency RF account (RF-2) in the fiduciary bank and are subject to the same disbursement guidelines governing the initial RF-1 account. Drawdowns from the dollar RF-1 account will be effected until completely disbursed. Utilization of the funds from RF-2 will be made following depletion of RF-1. A projection of funds available under the revolving fund is found in Table 3.

TABLE 3

Credit revolving fund: two hypothesis

	\$ '000	1	2	3	4	5	6	7	8	9	10	Total
Hypothesis 1 10% decapitali- zation	Dollar funds	1,000	2,000	3,000	3,000	-	-	-	-	-	-	9,000
	Revolving fund (dollars equivalent of CFAF (1))	-	900	2,610	5,049	7,244	6,520	5,868	5,281	4,753	4,278	42,503
	Total A	1,000	2,900	5,610	8,049	7,244	6,520	5,868	5,281	4,753	4,278	51,503
Hypothesis 2 7% interest on the account	Dollar funds	1,000	2,000	3,000	3,000	-	-	-	-	-	-	9,000
	Revolving fund	-	1,070	3,285	6,725	10,406	11,134	11,914	12,747	13,639	14,594	85,514
	Total B	1,000	3,070	6,285	9,725	10,406	11,134	11,914	12,747	13,639	14,594	94,514

2. Advantages of Revolving Fund Mechanism through Private Commercial Banks

The RF system provides benefits to the donor, the grantee, the lending institutions, the borrowers and the project.

a. The Donor:

- is relieved of the complexity of disbursements to various beneficiaries;
- in addition to subsequent verification of relevant documentation, the RF system assures a priori that all relevant and technical documents are handled through and checked by a reputable, private commercial bank that understands USAID procedures before any payment is made;
- knows at any stage of the project how funds are being managed and, therefore, can act to freeze the fund if the project moves off track or the funds are being mismanaged.

b. The Grantee:

- receives the same benefits as those accruing to the donor;
- provides positive track record in the area of project management.

c. The Lending Institution:

- benefits from the fact that the RF accounts are maintained in the name of the lending institution providing a positive balance sheet effect as these accounts become part of the lending institution's liquidity position;
- exposes its managers to modern commercial banking practices, rigorous controls of payments and reporting standards by interfacing with a senior, experienced fiduciary bank.

d. The Borrowers:

- are assured of rapid payments when all payment conditions are satisfied;
- provide the supplier the most efficient form of payment;
- benefit from better terms and conditions as a result of bank competition;
- receive maximum protection through the documentation and the disbursement mechanisms designed to assure that the supplier is paid only after the delivery of the product.

e. The project benefits include:

- safe and rapid transfer of funds and documents;
- optimum fund management;
- psychological element of trust and confidence since all transactions, documents and payments are handled through the banking system. Control mechanisms at each level will make

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implementation a manageable, controllable, self-sustaining and self-policing activity eliminating complicated supervisory requirements and permitting the fund to continue on a self-perpetuating basis.

- An independent banking expert will periodically evaluate the validity of implementation procedures and a local accounting firm will perform semi-annual audits and/or ad hoc reviews of the project's financial aspects.

C. Conditions of Eligibility

1. Commercial Banks

- a. Willingness to lend to agriculture and assume the full risk for loans.
- b. Have established branches outside of Dakar which can serve as deposit gathering and savings mobilization centers.
- c. USAID reserves the right to exclude a given bank on the basis of qualified criteria such as poor liquidity.
- d. Any bank late in reimbursing the revolving fund will be automatically excluded from further participation in the program and proper remedies will be applied according to the GOS/MOF contract.

2. Beneficiaries

a. Business

- The banks will apply selection criteria in accordance with standard banking practice.
- The fiduciary bank will also examine files on a random basis.
- The exact content of the loan request file will be agreed to prior to the beginning of the program by the fiduciary bank, the lending banks, USAID and the government.

b. The cooperatives

This project will not provide credit directly to farmers. However, cooperative organizations playing a supply role to their members may apply for credit. The cooperative organization at the national and regional levels has resources available each year through the marketing of peanuts. The banks could obtain guarantees on these resources to lend money under the following conditions:

- (1) The cooperative organization unions will be allowed to supply input on credit only to the village sections or producer groups which have reimbursed 100 percent of their debt of the previous year by a given date (probably March 15).

- (2) The village sections or producer groups will have to deposit 25 percent of the value of the purchase at time of loan.
- (3) The cooperative organizations agree to permit outside audits of this credit operation both during or after the operation.
- (4) Renewal of the credit to cooperative organizations will be possible only if 90% of the village sections and producer groups have reimbursed the cooperative organizations on time. The objective of this criteria is to avoid a decapitalization of the cooperative organizations.
- (5) To benefit from the line of credit the following year, the cooperative union itself will have to have reimbursed the bank at 100% in due time. Village sections which have not reimbursed on time are automatically excluded from further credit.

D. Technical Assistance to Banks

Senegalese banks are at present neither fully staffed nor operational to handle lending to large numbers of agricultural borrowers. In some cases staff with banking experience are not familiar with lending in the agricultural sector; in others, staff with agricultural experience are short on basic banking skills. Furthermore, due to the small volume of current lending to agriculture, in-house reporting and management systems have not been developed. Therefore, a technical assistance program should be included in the project to strengthen Senegalese banks participating in the project. The program will be composed of consulting services to help the participating lending institutions to strengthen their management systems, and a training program for the local staff. The consulting services are available to all the participating banks which meet the conditions of eligibility and have expressed interest in receiving the technical assistance. The fiduciary bank will provide these services on an as-needed basis.

1. Consulting Services

In order to make banks viable lending institutions capable of successfully implementing the agricultural lending program, it will be necessary for an experienced financial institution to act as a "technical" bank for a period of two years. The main task of the technical bank will be to help the other banks to build up systems and reporting mechanisms, organize the loan administration and internal audit functions and strengthen their treasury department. The technical bank will send French-speaking experts on short-term assignments to set up management systems, but will train local staff to carry them out. This will probably be the fiduciary bank.

2. The Training Program

A one-year training program should be designed to provide basic training for banking supervisors and agricultural loan production officers. Most courses will be given in Dakar (in French), with the possible exception of a correspondent banking course which could be given either in the U.S. or in Europe.

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Illustrative Course List

<u>Description</u>	<u>Number of Courses</u>	<u>Duration (per session)</u>
Accounting	5	2
Credit	3	3
Operations	3	4
Controls	2	1
Management Skills	3	1
Correspondent Banking	1	5
Training the Trainers	1	1

The trainees will be required to execute an affidavit stating that (a) they will do the utmost to satisfactorily complete the course work, (b) they are prepared to serve in any location in Senegal upon completion of the training and (c) they will remain for a reasonable period of time in institutions engaged in agricultural lending upon completion of their training.

The training program is conceived to train two categories of bankers: (a) Operations trainees who will learn the so-called "back room operations" (i.e. accounts, bills, cash management, accounting, transfers, letter of credit, documentary collections, etc.) and will benefit from the following courses: accounting, operations, controls and management skills and b) Credit and Marketing employees who will be trained to become rural loan officers, and required to take the following courses: accounting, credit, management skills and correspondent banking.

Operations employees trained under this program should become operational (i.e. able to function with minimum supervision) within six months after completing accounting and operations courses. The Credit and Marketing candidates should be able to handle basic lending decisions one year after the completion of the accounting and credit courses.

These courses are both concentrated and accelerated. The trainees are required to take a proficiency test as the courses are designed to train high achievers with managerial potential.

The accounting course is designed to teach the trainees how to read, interpret and analyze financial statements. They will not be trained as accountants.

The credit course will provide the basic analytical tools for risk assessment credit evaluation, credit analysis and marketing skills.

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The operations module is designed to teach basic banking operations: issuance of drafts, processing current and time deposit accounts, cash management, letters of credit, issuance of transfers, documentary collections, processing bills and sundries.

Controls will teach the trainee how to establish adequate internal control mechanisms.

Management skills will teach basic supervisory skills to first and second-level supervisors.

Correspondent banking is formatted to teach bankers how to deal with other banks and how to foster correspondent banking relationships among banks.

Since training is an ongoing process, it will be necessary to train a local trainer who will follow-up on the program.

It is hoped that both the consulting and training programs will sufficiently strengthen the position of participating banks to make them viable institutions through which donors, GOS and international organizations can channel various development programs.

E. Interest Rates

Many Senegalese believe that interest rates to the rural sector should be low due to the low rates of return on agricultural investments. Yet the fact that potential profit from agricultural lending is restrained by ceilings on interest rates by the Central Bank also explains why the banks are reluctant to enter agricultural lending. Market interest rates to agricultural borrowers within the WAMU interest rate structure (currently 12.5 percent) will be applied in the project. The GOS has further agreed to begin discussions with the Central Bank aimed at permitting the interest rate to be adjusted. In fact interest rates are not the problem in rural Senegal; the problem is the lack of credit sources. In the absence of credit, loans are taken from traders, family and friends though often at usurious rates (as much 80 percent).

The APS project emphasis on marketing of inputs and outputs implies at least a 10-month turnaround time. Traders and marketers are attracted to this program because it links input sales to repayment after the harvest permitting reimbursement at all levels. Current credit availability is limited to short-term credit requiring traders to repay before harvest time which most are incapable of doing. Clearly, loan conditions between banks and the private sector and producers will have to be flexible.

The USAID has also obtained guarantees from the Ministry of Finance, after consultation with the Central Bank, that the project line of credit will be exempted from the imposed credit ceilings. This exemption means that the banks will be able to increase the amount of loans they can make. Assuming banks can make a reasonable profit they will be motivated to subscribe to the program. The current Central Bank discount rate is 7.5 percent, leaving a 5 point margin for the banks. The project proposes to reduce initially the lending rate to banks by two additional points as an incentive factor to the banks.

This will enable banks to cover administrative costs and bad loans and make a profit. Most importantly it will provide a cushion to protect against major default. The discount rate spread will be reviewed no less than once a year by a committee composed of USAID, COS, and the fiduciary bank representatives to determine its continuing validity.

ANNEX H
AGRICULTURAL STATISTICS

ANNEX H

AGRICULTURAL STATISTICS

I. BACKGROUND

- A. Recent History of Agricultural Statistics Collection**

II. CURRENT STATUS OF AGRICULTURAL STATISTICS REPORTING

III. FOUNDATION FOR THE PROJECT

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- B. Bureaucratic Hierarchy**
- C. DSA Resource Base**
- D. Statistics Collection Methodology**
- E. Statistics Reporting**

IV. TECHNICAL FEASIBILITY OF THE PROJECT

- A. Objectives**
- B. Means**

V. PROJECT ACTIVITIES TO SUPPORT AGRICULTURAL STATISTICS

- A. The Issues**
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ANNEX H

AGRICULTURAL STATISTICS

I. BACKGROUND:

A. Recent History of Agricultural Statistics Collection

The GOS Regional Development Agencies (RDA) and the Direction of Agriculture (DA) chaired the responsibility for the collection, analysis and distribution of agricultural statistics from the mid-1970s until the announcement of the New Agricultural Policy (NAP) in 1984. The RDAs played the principal role in the collection of data on the main crops in their zones of activity prior to the NAP, . 1/ The collected data included planted area, crop yields, total crop production and agricultural production inputs used. - the agricultural statistics the GOS considered most important. Until recently, the RDAs in most areas also took charge of input supply marketing of the principal crops. The local MDR Inspections were left the responsibility for minor crops and agriculturally less important areas outside the zone of direct intervention by the RDA.

The principal agricultural statistics role belonged to the RDAs. The DA's role was reduced to the collection of rainfall and crop development data on those major crops cultivated in peripheral zones not touched by the RDAs and on minor crops under cultivation in Senegal. With the inception of the NAP and the DA has expanded its responsibilities to include collection and reporting of all agricultural statistics. The RDA's role and resources have been cut back sharply.

1/ Several other agencies collect or distribute statistics that touch upon agriculture, but none of them are responsible for national crop production statistics. They include the Direction of Animal Health and Production (livestock data), the Direction of Meteorology (weather), the Senegalese Institute for Agricultural Research (ISRA, for specific research studies), and the Direction of Statistics in the Ministry of the Economy and Finance, which uses and distributes agricultural statistics collected by the above agencies but collects none of its own.

II. CURRENT STATUS OF AGRICULTURAL STATISTICS REPORTING:

The project will focus on the improvement of the DSA's statistical reporting by strengthening the present Direction of Agricultural Statistics (DSA) team through introduction of new technology and organization provided by U.S. technical assistance, commodity procurement and training. In 1985, the DA was reorganized and elevated to a full DSA division within the DA from its previous administrative designation as a sub-division of MDR. Its responsibility for Statistic collection was increased. The overall GOS plan is to establish a nationwide statistics network from the capital, Dakar, to the county level. The APS project will collaborate closely with other donors interested in expanding and strengthening the DSA's statistical analysis and reporting capacity. The DA continues to receive financial assistance through the Permanent Diagnostic Project of the Comité Permanent Inter-Etats pour la Lutte contre la Sécheresse au Sahel (CILSS). The Ministry of Rural Development and other donor agencies have also executed field surveys to estimate crop production and food aid needs.

III. FOUNDATION FOR THE PROJECT:

The DSA is beginning the transition into an agency capable of meeting its nationwide responsibilities. This transition will require several years of continued structural and procedural evolution supported by increased resources and training.

A. DSA Personnel

The DSA headquarters in Dakar use regional statistics staff who work for the MDR Regional Inspection Units, shared with the other divisions of the DA, i.e., they perform a variety of different tasks and are available only part-time to the DSA. Five DSA headquarters' staff members that compose the central agricultural statistics collection, analysis and management unit include two GOS civil servants holding Ingenieur Agronome degrees (approximately equal to a B.S.). The additional three civil servants hold Ingenieur de Travaux Agricoles (ITA) degrees (vocational training degree after graduation from high school). The head of the DSA division received his degree in agricultural economics from the University of Louvain in Belgium. A second Ingenieur did his degree work in the U.S.S.R. in plant breeding (rice) followed by an M.S. in agricultural economics at the University of Hawaii. The three ITA holders received their degrees from the Ecole National des Cadres Ruraux (ENCR) at Bambey, Senegal. However, none of the DSA headquarters staff has participated in specialized, intensive agricultural statistics training.

The agricultural statistics regional field staff have three hierarchical levels. At the top is the Regional Inspection, of which there is one in each regional capital. Next comes the Sectoral Office at the departmental level, followed by the Centre d'Expansion Rurale (CER) at the county level. Their responsibilities are shifted by the GOS and depend in part upon the level of activities and support budget of the rural development agencies in their zones.

The regional and sectoral offices are well staffed relative to the work load. All regional offices are headed by an Ingenieur Agronome and sometimes have one or two other holders of degrees at that level. All sector heads have ITA-level training, as do many assistant heads and a smattering of others. Most CERP technicians are trained at the agent technique (ATA) level, corresponding to three years training after completion of the BEPC (elementary school certificate), roughly equivalent to a U.S high school diploma. To give an example, in July 1986 the Region of Kaolack had two Ingenieurs Agronomes (with two more expected), eight ITA's and twenty-seven ATA's assigned to it.

B. Bureaucratic Hierarchy

The GOS bureaucracy is similiar to the French bureaucratic structure. The GOS field organization is divided into separate technical and administrative hierarchies. Thus, the Regionale Inspection is administratively responsible to the regional governor, who provides it with operating funds and gasoline allowances. Technically, however, agricultural statistics program implementation plans of action and directives are issued from the Direction of Agriculture in Dakar. Similarly, the Section Agricole is under the umbrella of the department level GOS "prefect", a local level GOS governmental unit representing the Ministry of Interior, who is very interested in administrative efficiency regardless of the developmental consequences. Likewise, the CER is under the arrondissement level GOS sub-prefect, also linked directly with the Ministry of Interior.

Therefore, under the GOS system, field office managers have two directors: a) one who is on location at the local level, controls the GOS funds and is not directly interested in the DSA's agricultural statistics program; and b) a second director that is technically responsible but frequently distant and financially without direct means to provide logistical support.

C. DSA Resource Base

The DSA headquarters and many field offices are poorly equipped to meet the expanded need for accurate data gathering, analysis, and preparation and distribution of reports in a timely manner. The DSA headquarters in Dakar have recently moved into new quarters in the building housing the Direction of Agriculture. Under the project, the DSA will receive additional resources such as desks, chairs, file cabinets, bookcases, typewriters, photocopying equipment, computers and office supplies.

Currently, DSA staff analyzes data using hand-held calculators. However, a recently received IBM XT microcomputer from a USAID-funded demographics project (RAPID) will be combined with computers procured under the APS project. A climate-controlled, dust-proof location for the computer will be established under the project to safeguard the equipment and permit function without breakdown.

Other donors are collaborating in the strengthening of the DSA. The DSA received support funds from CILSS's Permanent Diagnostic Project for all operating expenses. This amounted to 15 million francs CFA in 1985 and 25 million FCFA in 1986. In 1985 these funds paid for mopeds for the sectoral

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offices, one vehicle (Renault 12) for headquarters, gasoline for the regional and sectoral offices, plus office supplies and travel expenses for the headquarters staff who trained the field technicians.

Under the project, selected regional offices will expand their resource base through procurement of limited equipment, desks, typewriters, photocopying equipment and calculators. Selected GOS facilities in need of repairs, ranging from leaky roofs to faulty electrical wiring, will be restored.

Generally, each regional inspection office has one four-wheel drive vehicle which is supervised by the GOS Direction of Plant Protection (DPV). The offices usually receive very modest gasoline allowances that significantly limit their ability to implement programs. For example, in 1985, the regional inspection office in Kaolack received a gasoline allowance of 600 liters (180 gallons), only enough to drive a vehicle some 4,000 kilometers (2,400 miles) during a twelve-month period. Regional inspection offices currently operate on annual budgets of approximately \$1,000 excluding salaries. The modest operating fund must provide the office supplies and finance travel per diem at daily rates ranging from \$7 to \$10 (2,500-3,500 FCFA).

Under the project, the regional inspection offices will be provided limited additional resources such as typewriters, office furniture, improved electrical capacity, etc. As part of the CILSS-supported 1985 farm survey work, the DSA borrowed vehicles from other GOS agencies. The meager resources available for the agricultural statistics program and vehicles are obtained only after considerable bureaucratic effort. One example describes twelve administrative approvals necessary to obtain access to a gasoline allowance. The APS will finance purchase of mofylettes (less than 125 cc) to help overcome the transport problem.

D. Statistics Collection Methodology

The DSA's sampling and data collection methodology is in transition. After a survey of 50 townships (communes rurales) in 1985, the division hosted a national seminar in April 1986 and redefined its methodology. The DSA-revised methodology follows a stratified, two-stage sampling to obtain data on planted area, yields and agricultural production. Survey results are extrapolated to the county level and then summarized by department and by region. Before sampling, villages in each county are ranked by population. Subsequently, they are grouped into three equal-sized strata. The first stage of sampling is the choice of a random 10% sample of villages from each stratum. After a census of the selected villages, 2% to 5% of the farms are chosen from villages in the small and medium strata and 1% to 2% of farms in the large stratum villages. In all, about 100 farms will be surveyed in each county. Crop plots are to be assessed on one-fifth of all fields of the sampled farms with one plot per half-hectare of land under crop production.

Under current DSA data collection methods, the planted area is estimated by measuring all fields on sample farms with compass, measuring tape and a trigonometric calculator program. Yields are to be estimated during the season by counting the number of heads of grain present in the yield plot (10

m² for cereals and 25 m² for legumes) and multiplying this by a coefficient linking it with the likely final harvest. These figures will be complemented by farmer interviews on expected yields. Total production is calculated as yield times planted area. To obtain production and planted area estimates, village stratum averages are extrapolated to all villages in the stratum. Extrapolations for the three strata are added to obtain figures for the entire county. Final post-harvest yield data are gathered by weighing the net production of the yield plots and are then used to correct the harvest forecast and to improve yield forecasting coefficients in the future.

The statistical methodology will be evaluated under the project, at two general levels: 1) its theoretical validity, and 2) its practical success. Given the resources available, two stage list-frame sampling makes sense from a theoretical standpoint. However, there is no immediately apparent reason why it is important to stratify the sample by village size. So far as can be determined, the final statistics are not disaggregated by village size and the DSA reports do not demonstrate why stratification would give more reliable figures. Under the project, the DSA statistics methodology will be revised to gather more accurate data for timely analysis. Plot size to be sampled will be assessed to assure that the smallest reasonable area is sampled in adequate replication to ensure accuracy and best use of time and statistical program resources. Having several yield plots of small size in various parts of the field will probably capture the crop microvariation within the field better than having just one large plot. The World Bank has published a primer entitled Estimating Crop Production in Development Projects: Methods and Their Limitations, which the project will consult. The primer was written by C.D. Poate and Dennis J. Casley as a supplement to the widely used Monitoring and Evaluation of Agriculture and Rural Development Projects.

There are obvious deficiencies in the training of field technicians. For example, three of them were found to be mistaken about how many square meters are in a hectare. Likewise, statistical error was identified when GOS technicians discussed price marketing methods and realized that farmers were using a volume measure equal to four liters which equaled 2.5 kg, not 4 kg as farmers had stated to date gathering units. In the one village office visited where it was possible to obtain details on the 1985 survey, it appeared that yields and surface area for the entire department had been estimated based on data from some seventeen fields distributed among four farms. While there were seven to eight millet fields, production and planted area estimates for all other crops were extrapolated from a sample of only one to four fields. As the original field data are retained at the village level and only the extrapolated figures are transmitted to the regional office, there is no way to calculate regional or national means and indices of dispersion around the mean. No one above the original enumeration level could say how many fields or yield plots had served as the basis of the extrapolated figures.

Field interviews indicated the existence of other practical problems. Virtually no monitoring trips were made by regional office staff in 1985 to insure the quality of the data collection because so little gasoline was available. In 1986, scarce resources in fuel and equipment will be a limitation to data gathering and monitoring of the program. Equipment and

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training for the survey became available very late in the 1985 season and were delayed once again until July in 1986. This highlights the project focus on upgrading the management and coordination capacity of DSA as well as streamlining the bureaucratic system. Travel orders for DSA headquarters staff must be signed by the Minister himself or, in his absence, another Minister. It may thus take a week or more to get permission to go on a field inspection trip.

A description of field-level data collection would be incomplete without reference to the observations on rainfall and crop development collected by the field technicians for the Division of Actions and Programs (DAP). This information is transmitted to the President and to the Sahelian regional AGRHYMET project. Data from rain gauges and crop observations is collected on forms supplied by AGRHYMET and transmitted by arrondissement level field technicians to the DA Dakar office through the hierarchical chain. The data are eventually entered into a regional agrometeorological model at AGRHYMET headquarters in Niamey. Beginning in 1986, an AGRHYMET team will install a national harvest forecasting computer model at the Direction of Meteorology in Dakar. It is expected that field data will eventually be incorporated directly into this model.

E. Statistics Reporting

The recent major transformations in the DSA and its role in agricultural statistics gathering have seriously disrupted the reporting of DSA survey results. The latest annual report produced by the Direction of Agriculture covers the 1982-83 season, three years ago. The DSA crop yield, production and planted area estimates originally released in October 1985 for that season have not been revised in light of actual harvest data from yield plot measurements. For cereals, many yield plot harvests may not have been accurately weighed, as enumerators were unable either to get to the plots on time or else they could not convince farmers to thresh the harvest for weighing.

Because current data gathering and analysis are prone to error, the DA "massages" national statistics when they diverge too much from expected values or from figures gathered by the RDA's. The newspaper Le Soleil, 1 July 1985, page 3, cited one example where the DSA raised the 1985 estimate of the area planted in peanuts in Kaolack by 30%. Under the project, DSA capacity to gather data on planted area and production forecasts will be systematically improved to generate prompt accurate reports based on a revised analysis after a follow-up field verification.

IV. TECHNICAL FEASIBILITY OF THE PROJECT

The feasibility of the Agricultural Statistics program of the project is technically, socially and economically sound. The following describes the project in more detail.

A. Objectives

The project is concerned with privatization of input supply and marketing. Decisionmakers, both private and public, need information on which

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to base their actions. Both the Direction of Agriculture and the PID agree that the primary agricultural statistics information needed to meet privatization objectives of the project consists of reliable data on planted area, crop yield, crop production inputs used, and overall production of Senegal's major crops. Overall project monitoring and evaluation of the input supply component will be made possible by generating statistics on the consumption of improved seeds and fertilizer by crop.

The DSA also has a secondary objective to accurately report on such things as the number of farms, livestock units, farmgate prices, volume of market transactions, and regional trade, and data on agrometeorology, pest infestations, and dry-season gardening. The DSA must establish priorities to sort out the massive amounts of desired additional information since it is still unable to properly handle present statistics.

When asked to rank their secondary objectives in data collection, the DSA staff and the director of the DA first named dry-season gardening, followed by cereal and crop production, input marketing data, agrometeorology and livestock statistics. However, under the project, DSA will concentrate on the crop production data which the GOS needs to assess the impact of the NAP. The key is to insure that acceptable progress has been made on the preferred objectives before addressing additional ones. The project will collect and analyze data on the primary, priority criterion until adequate accuracy is achieved.

B. Means

The means proposed by the PID to attain these objectives are: commodity procurement including automated data processing equipment, long- and short-term technical assistance, and participant training, and use of agrometeorological satellite data. As shown in the description of the current operation of the DSA, there exist very real needs for training in both statistics and management. These can be met by the proper mixture of participant training and technical assistance. Similarly, improved data processing capability will be needed to meet the increased analytical demand required by systematic data collection. Given the difficulties of repairing mainframe computers in Dakar, the project will procure at least two microcomputers having large central processing units and hard disk storage facilities.

Based on the Sudan and the Moroccan experience, we conclude that area-frame sampling (AFS) is a methodology which is too costly to install at this time. Agrometeorological satellite imagery is another assessment methodology which cannot be expected to become useful for Senegal for yield and crop harvest projections for several years. At present, reports from the National Oceanic and Atmospheric Administration (NOAA), distributed through the AGRHYMET project, provide satellite imagery comparing total biomass to established norms. They also furnish climatic information, particularly on the movement of the intertropical front heralding the advance and retreat of the monsoon rains. However, this information needs considerable refinement before it can be relied upon to project probable yields of specific crops. At present, the resolution of LANDSAT images used by AGRHYMET is not better than one-tenth of a hectare (one-quarter acre). This is inadequate for identifying

planted areas or predicting yields of individual crops where fields are small and intercropping is sometimes practiced. However, satellite imagery technology is rapidly improving. The French SPOT satellite, whose images the French Aid Mission in Senegal is considering making available to the Senegalese Government, provides resolution ten times higher. The satellite imagery technology is definitely promising, but will not be employed under the APS project.

The project's statistics program will start with clear, simple objectives using techniques that can be expected to yield results rapidly. The project will focus on generating the statistics needed to estimate crop production and input use as well as assess the implementation impact. Such statistics include forecasts and subsequent verifications of planted area, yield and total production by crop. For the sake of evaluating the other project programs, priority will be assigned to the collection of statistics on improved seed and fertilizer use by specific crops. Initially, the most practical way to generate these figures reliably is to use list-frame sampling and to provide the resources necessary to permit the large number of underemployed field technicians to make productive contributions to the DSA. Computer modeling may become a useful tool once adequate data can be reliably obtained in the field and promptly transmitted and analyzed.

V. PROJECT ACTIVITIES TO SUPPORT AGRICULTURAL STATISTICS

A. The Issues

The existing agricultural statistics reporting system exhibits both valuable capabilities and crippling constraints. On the positive side, it can draw upon a large staff reaching all the way down to the arrondissement level. Compared to other Sahelian countries, the Senegalese field staff has good academic credentials. All regions have at least one university graduate, and most will shortly have two or more. Virtually all sectors are supervised by technical staff having a substantial amount of university-level training. Even the lowest-level field technicians are trained nearly to high school equivalence. The existing infrastructure of staff and buildings stretches through the nation's ninety-two arrondissements. Such a comprehensive network is a resource not to be underestimated.

This network is currently underutilized due to a web of interlocking constraints. The most obvious limitations are the shortages of equipment and operating funds. Less obvious, but equally problematic, is the shortage of applied, practical training. Despite considerable theoretical instruction, many agricultural technicians still have difficulty when confronted by practical statistical implementation problems in the field.

Two serious structural constraints would likely hinder the smooth functioning of the statistics collection apparatus, even if it were endowed with all the materials, operating funds and training it lacks. The first is technical responsibility. Outside the headquarters office in Dakar, DA civil servants currently have multiple responsibilities, including extension, rainfall measurement, project management and monitoring, as well as statistics gathering. In order for reliable statistics to be gathered, field staff must be directly responsible to the Division of Agricultural Statistics. The GOS

local directors must give priority to statistical data collection to assure that field staff will not have their time and energy diverted to other duties. Bureaucratic procedures constitute the other structural constraint. The project will improve the steps required to make money available through normal channels and to obtain travel orders in a timely manner. Previously they were extremely cumbersome and constituted a serious obstacle to timely statistics collection.

At the DSA headquarters, two limitations will be upgraded. First is a lack of management training and experience, making for less-than-optimal management of scarce resources. Management training will be provided in farm survey planning to insure that results are matched with available resources. A second limitation is in statistical analysis. All the DSA staff are trained in general agriculture or in agricultural economics but have limited exposure to statistics. The current problems in data collection have concealed this shortcoming, but it is likely to become more obvious once the data are flowing properly into Dakar headquarters. Project training will focus on survey design, computer data processing and statistical theory as applied to national agricultural statistics reporting. Other constraints will also be alleviated to facilitate DSA collaboration with other government bodies experienced in statistics generation, particularly the GOS Direction of Statistics and the macroeconomic analysis research team at ISRA.

B. Other Donors

The Government of Senegal and USAID are not alone in taking an active interest in improved agricultural statistics. For three years, CILSS has been supporting agricultural statistics activities, first through its Small Farmer Cost of Living project and more recently through the Permanent Diagnostic project. The current financial support of the CILSS project is provided by the European Development Fund (FED).

Two other donors are considering activities in this area. The World Bank project for restructuring the MDR, which is currently in a preplanning diagnostic phase, is likely to cover information flows, particularly statistics collection and dissemination. The French Fund for Assistance and Cooperation (FAC) is also considering supplying eight to ten experts to help the MDR carry out the New Agricultural Policy. One of these would likely work in agricultural statistics for an agricultural ministerial advisory committee which would monitor and support programs to advance achievement of NAP objectives.

The most important upcoming assistance in agricultural statistics is that planned by the Food and Agriculture Organization of the United Nations (FAO) under its Early Warning and Harvest Forecasting System project. It aims to improve statistics collection and reporting in order to obtain more timely drought alert information. It is designed in two phases, the first a 15-month effort covering two agricultural seasons. This phase, budgeted at \$367,000, was accepted for funding by the Dutch government in June 1986 for immediate implementation. That project would provide technical assistance to both the DSA and the Directions of Meteorology and of Climate. That project would provide an agricultural economist for fifteen months, a statistician for six months, an agrometeorologist for three months and a remote sensing specialist

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for two months. The project would purchase two vehicles, one or two microcomputers, some office supplies and duplication equipment for DSA headquarters, plus a small amount of training, mostly short-term. During the course of the fifteen months, the project staff would attempt to elaborate a more precise design for the second phase of the project.

As currently foreseen, the 3-year second phase of the FAO project will be budgeted at \$1.2 million. The FAO project would provide two experts in agro-meteorology and two specialists in statistics for the entire duration of the project. In addition, it would supply two vehicles, ninety mopeds, farm survey equipment, telecommunications facilities between Dakar and the regional capitals, plus microcomputers (in Dakar) and long-term training.

In light of the constraints faced by the DSA, the project assistance will fill in gaps and take the lead to upgrade the statistics capacity to surpass the limited APS project objectives and overall GOS goals. The CILSS/FED support is programmed annually and cannot be relied upon either for large amounts of funding or for multi-year efforts in training and technical assistance. The FAC role does not appear to be oriented toward improving the institutional capacity of the DSA. The project will focus upon providing information necessary for the GOS to evaluate implementation of the New Agricultural Policy. At the present time, the direct World Bank intervention is hard to project. Most likely, given the presence of other donors with established programs, the World Bank will limit its role in statistics to the critical removal of the GOS structural constraints that make it difficult for the DA field programs to operate in a timely fashion. The World Bank will probably also support the project's efforts to encourage closer cooperation among MDR directorates and between the DSA and other Senegalese statistics gathering and reporting services.

The proposed FAO project is comprehensive and focuses on drought early warning systems, although it appears to concentrate heavily on agrometeorology. Presumably, the FAO project will assure close cooperation between the DSA, the DAP and the Direction of Meteorology. However, the FAO project goes rather lightly on improving the data gathering system in the field. Likewise, it includes very little technical assistance specializing in the management of national statistical surveys.

C. Summary of Project Activities

In collaboration with other donors who will carry out the programs currently envisioned, the key roles for USAID support lie in improving management of the data collection system for the substantive and geographic areas of relevance to the project, elaborating a computerized data input and analysis system, upgrading the list-based sampling frame, and training statistical staff specifically in agricultural statistics.

Management improvements will be achieved through long and short-term technical assistance, training and the provision of equipment and funds necessary to make the existing personnel productive. Enumerator training sessions will be held before the cropping season begins. Adequate fuel and office supplies will be available to selected DSA personnel throughout the year. Routine and systematic survey monitoring at all levels, with periodic

transmission of data from the field enumerators to input centers at the Dakar headquarters, will be supported by the project. Finally, the project will demonstrate the ability of DSA to initiate new surveys as needed to assess the impact of the NAP.

The data input and analysis system is designed around regional data input gathering centers and a computerized data analysis center at DSA headquarters in Dakar. The project will use existing data entry software such as the recently released SPSS/PC+ Data Entry modules, for the processing of the coded data gathered from the field. Both Michigan State University projects are using this software in the BAME at ISRA. The project will collaborate with BAME to establish a functional computer analysis capability at DSA that meets its needs adequately and could perhaps be used for data entry by others collecting agricultural and agro-economic data.

It is useful to think in terms of the desired outputs (reports) and inputs (questionnaires, data recording forms) before specifying hardware requirements, particularly number and types of machines. Computers without hard disks, perhaps even laptops may be suitable for data entry and editing/verification. In addition, the project will provide supplementary equipment such as surge suppressors, data savers, alternative sources of electricity (generators or truck batteries). It will be important to teach people how to use the equipment in an environment where electrical outages are frequent.

The Dakar center should have at least two 30-MB hard-disk microcomputers similar to an IBM XT with 512K RAM. The computer system will be installed, hands-on training will be given, and specialized software will be adapted by DSA with assistance from long and short-term computer science/statistics specialists. Short-term management training will also be provided to the staff of the DSA Computer Team.

The regional centers will manually handle completed, coded questionnaire forms designed specifically for computerized analysis at Dakar. Equipped with project vehicles, the regional teams will regularly check upon progress and gather questionnaire forms from statistical gathering teams at the arrondissement and sectoral levels. Completed coded forms from the regional input centers will be transmitted regularly to Dakar following verification of any apparent inconsistencies. Dakar headquarters will issue regular reports and forecasts calculated from original field data. These reports will be distributed and cross checked at the village and sectoral levels by the regional office staff. Measurable outputs for the regional centers by the end-of-project will include timely early crop harvest estimates followed by final crop production estimates well before the next rainy season as well as reports that explain data dispersion and statistical conclusions.

One long-term M.S. training program in agricultural statistics will begin the first year of the project and one the second year. This will lead to a better grasp of applied statistical theory within the DSA without excessive disruption of normal activities.

M.S. training will involve 12 months of academic training at a U.S. university followed by a 12-24 month in-country thesis research program

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coordinated by the U.S. university professor and supported by the long-term technical assistant working with DSA. The professor will visit Senegal twice to support the in-country thesis research. The MS degree will be awarded at the university to which the participant will return for 4 months to complete the training.

The project's long and short-term statistical training will not only focus on experimental design and analysis of variance techniques, but will also focus on applied statistics in the areas of yield plot measures, field measurement, price data collection and analysis, collection of farm and market level survey data, and the design and implementation of statistical survey instruments.

D. Narrative of Project Activities

1. Year 1: Establishing the Base

The order of priorities for project activities in agricultural statistics should be as follows:

- 1) Technical assistance in survey design, planning and management at headquarters level.
- 2) Establishment of an efficient data collection, computer input, verification and processing system.
- 3) Establishment of survey monitoring procedures insuring data reliability.
- 4) Provision of long-term statistics training to appropriate DSA staff.

Due to normal procurement delays, the two four-wheel-drive vehicles, passenger vehicle and mopylettes should be ordered for the DSA and technical assistants as soon as the GOS and U.S. Government sign the project agreement. The number of vehicles for the DSA assumes that other donors will also provide vehicles for both regional and Dakar headquarters. Fifty mopylettes will be provided to sector chiefs and field agents who are expected to receive additional mopeds from FAO. Adequate access to statistical program vehicles is absolutely indispensable for monitoring survey activities. Compasses, measuring tapes and calculators should also be ordered without delay after signing the project agreement. Early in 1987, the GOS should nominate the first candidate for M.S.-level training in statistics. This person should begin English training in Dakar immediately so as to be ready to depart in August 1987. The second M.S. candidate should also be selected as soon as possible.

The long and short-term statistics management advisor should rapidly become acquainted with existing survey design and procedures in data collection, monitoring, verification and processing and reporting. As early as possible and accompanied by the head of the DSA, visits should be made to the DSA regional offices to assess their capabilities and the characteristics of data collection unique to their areas. This will provide the background for a planning exercise with DSA headquarters staff and regional directors on survey design reforms, to be held prior to April 1987. A senior consultant experienced in national agricultural statistics reporting may also assist in this survey planning for one month. The plan will define the pace at which desired changes can reasonably be made. The short-term computer scientist/statistician should arrive in-country in time to participate in the computer equipment installation and to provide instructions on operation, maintenance and programming.

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The long-term computer statistician should order computer hardware and software early in the project. Procurement from the United States is significantly less costly and can arrive promptly when sent by airfreight. Following agreement on survey objectives and design, the computer statistician should collaborate with the DSA team to develop improved questionnaire forms and user-friendly data input software. The IBM XT microcomputer currently used by the DSA is appropriate for this. A computer room should be designated at the DSA in Dakar. The project will support necessary renovations undertaken to insure a dust-proof, climate controlled, computer environment with adequate electrical outlets. These renovations must be able to guarantee smooth, prolonged microcomputer operations. New construction or major modification of existing structures is not envisioned under the project.

In April, well before the onset of the rains, regional survey training courses will be held to introduce the new survey and monitoring procedures to the regional, sector and village level teams. These sessions should incorporate regional DSA staff feedback and should take advantage of field survey experts with the macroeconomic analysis research team (BAME) of ISRA. These training courses must be meticulously planned in advance and should focus on upgrading the practical aspects of survey execution by the field gathering teams.

As the computer equipment arrives and is installed, specialized staff will be trained. They will be introduced not only to microcomputer operations and input procedures, but also to hardware problem diagnostics and maintenance procedures. DSA staff will be responsible for the care and access to each system, with assistance from the long and short-term U.S. personnel.

To insure a clear chain of command and direct line of responsibility, the local GSO offices will assign individual regional and arrondissement staff directly to the DSA statistics gathering program. The DA and GOS local offices agree that this would function adequately as long as the selected field staff would be kept fully employed by the DSA. Over a longer period, steps should be taken to transfer administrative powers from the hierarchy of the Ministry of the Interior (governor and prefect) and the Secretariat for Decentralization (sub-prefect and CRR) to the MDR and, specifically, to the DSA. Assistance in fostering such fundamental bureaucratic reform may be forthcoming from the project on the "redynamization" of the MDR currently being planned with assistance from the World Bank.

The new activities during 1988 will include short-term training for two DSA Ingenieur Agronomes. The first M.S. degree participant should return from the U.S. to begin gathering data for his thesis.

The second M.S. degree participant should pass the English language training needed for university placement and depart for the U.S. in August 1988. The long-term technical assistant will support the in-country thesis program and collaborate with the U.S. university professor offering MS degree guidance.

Hands-on training of key staff members during the first two years of the project will upgrade the DSA capacity to design and manage practical data

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gathering and analysis programs. Section heads will estimate desirable sample size with theoretical parameters and determine how to define the best sampling procedures given fixed resources in staff time and equipment. Useful short-courses in these areas are given by the U.S. Department of Agriculture in Washington, D.C. and by the International Statistics Program Center of the U.S. Census Bureau in Suitland, Maryland. The project will support short-courses in administrative management, planning and budgeting that would be useful to DSA managers and are available, for example, through the Sahel Regional Financial Management Project (SRFMP), as well as through several American universities. Considering language and cost considerations, the project will give priority consideration to use of SRFMP training to upgrade skills at a modest training cost.

The transition to more rigorous survey monitoring will begin during 1987 when field data collection under the project begins. This includes not only regional monitoring teams, but also DSA headquarters staff, who will need to be on-the-road throughout the growing season. Even if split into two monitoring teams, current DSA headquarters staff will be challenged to meet the desired number of visits in each region. Time must be allotted to check coding activities at the regional office as well as to monitor the quality of field survey monitoring. Regional staff must insure a steady flow of coded survey forms from the field through the regional offices to the office in Dakar to assure continuous input onto the DSA computers as the season progresses. Data diskette copies will be stored in a library at DSA headquarters. The DSA will analyze the data to make preliminary forecasts of planted area and ultimately of crop yield forecasts as the season progresses.

Once this system becomes functional, it should generate yields per hectare and crop production forecasts within a few weeks after data is received, i.e., by early October. Revised crop harvest estimates will be made as soon as plots have been harvested, weighed, and the data analyzed, ground by the end of January. Final crop production reports should be issued and distributed to key decision makers in the GOS and donor community shortly thereafter.

It is unlikely that an upgraded system, such as the one outlined, can be made to operate properly in its first season. Unexpected problems will surface and "bugs" will have to be worked out. For this reason, no major additional changes are proposed for 1987 and 1988. This should be a period for settling into the system. Additional assistance with national survey planning by a senior expert in national statistical surveying will be supported by the project when needed.

2. Years 1989 - 1991: Building upon the Base

With a reliable field data collection and an established input and processing system, the project will focus on (1) how to improve the accuracy of harvest forecasts, and (2) how to better meet other agricultural statistics needs expressed by the GOS and donor community.

As rainy season crop statistical gathering and analysis is improved, additional data collection can begin to focus on the next highest priority as expressed by the Director of DSA, i.e. dry-season crop production estimation. Dry season statistical gathering can be integrated successfully with the rainy

season data collection effort because data gathering teams are relatively free at this time. The project will support a chain of data collection, monitoring, input, verification and analysis similar to that used for the main rainy season crops production. However, this must at no time take precedence over upgrading the rainy season work.

Other data collection efforts in such areas as livestock, household consumption, cereal and production input marketing and so forth can be fitted into the DSA program as resources permit. Certain types of data gathering, e.g., as monitoring of product prices in weekly markets may fit into existing ad-hoc survey programs such as the BAME, ISRA program involving Production System Research Teams. Indeed, cereal market price recording is already a part of ATA field responsibilities. However, additional programs that demand more time-consuming duties should be carefully assessed, and if implemented, carefully planned.

Under the project, DSA will collaborate with the agrometeorologist to examine the linkages of climatic analysis with crop production statistics. The project staff will make recommendations to the GOS concerning the roles to be played by various government organizations and other donors to insure a continued strengthening of agricultural statistics analysis and crop harvest reporting. Before the onset of the rainy season of 1990, the donor community and the GOS should meet to assess the long and medium-term agricultural statistics strategy implementation and agree upon the appropriate division of responsibilities.

During 1989-1991, DSA list-frame survey activities would continue to be upgraded. The project will procure additional vehicles and mobylettes as well as office equipment to meet the expanded needs of DSA. After the departure of the 30-month long term statistician, a short term statistics management advisor will return for one month to assist in the management of the crop harvest data analyses. In addition, a short-term senior statistician in crop harvest forecasting will assist the staff in verifying and improving the analysis capability for crop harvest forecasting through adaptation of appropriate computer models.

To strengthen the understanding of remote sensing methodology that links satellite data with ground surveys, short-term training in remote sensing data analysis and harvest forecast modelling will be provided to DSA staff. Possible sources of such training are the U.S. Geodetic Survey Center in Reston, Virginia, and the Remote Sensing Institute at South Dakota State University. As needed, computer statisticians will provide short-term technical assistance to adapt software to agricultural surveys and to upgrade computer maintenance and operation.

By the end-of-project, the list-frame sample survey will generate sound and timely reports and descriptive statistics. The DSA staff will be capable of effective statistics reporting activities, including dry-season crop production, cereal and crop production input, and marketing. Agreements to collaborate with the Directions of Meteorology and Statistics will be established, particularly in joint crop harvest forecasting activities, as well as other survey analysis work undertaken in collaboration with BAME at ISRA. DSA staff will also possess sufficient expertise in survey management and statistical analysis to provide training for agricultural statistics gathering, analysis, and reporting programs.

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ANNEX I
MEDIA CAMPAIGN

ANNEX I

MASS MEDIA

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- B. Target Groups and Objectives for Each Component of the Campaign

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ANNEX I

MEDIA CAMPAIGN

I. OVERVIEW

Senegal's New Agricultural Policy represents a fundamental, wrenching and far-reaching change in how the country's agricultural sector will be planned, financed, supported and managed. Major decisions already taken under this evolving policy are redirecting, restructuring and reducing many of the large state agricultural agencies which have, over many years, played major roles vis-a-vis the farmer, the cooperatives and private sector operators, who are now being asked to take on new, enlarged and unfamiliar roles. There is already, as a result, a great deal of confusion, distrust and concern among farmers, suppliers and cooperatives as to the meaning and future impact of the NAP.

The Agricultural Support Program will be operating within the context of the evolving NAP, and the continuing uncertainties which major changes will bring to the agricultural sector. The success of USAID's APS, in the final analysis, will require farmer and private sector support based on:

- Farmer understanding of the basic objectives and major programs of the government's agricultural programs, and perception that agricultural inputs of improved seeds, fertilizers and equipment will increase his production. The farmer's decision to buy, therefore, will result in the creation of a demand for such inputs.
- Importer-distributor-wholesaler understanding of the private sector's role in agriculture and the perception that there is money to be made in assembling, marketing, distributing and financing agricultural inputs to the farmers. He must be ready to meet growing demand and to commercialize resulting cereals surpluses.

An important element in the APS will be to communicate to the farm community the advantages and techniques of using improved technical packages of seeds, fertilizers and equipment. This will stimulate demand, encourage intensive farming, and increase production per hectare, and thus help close the gap between national cereals consumption and domestic production.

The media component in the APS will assist and hasten the process of farmer acceptance of improved agricultural technical packages, and communicate the NAP's objectives. The program will employ a variety of media to tell the story of improved yields and financial returns obtainable through the use of better seeds, cost effective fertilizers and appropriate equipment; and the benefits for the individual, the family, the local community and the nation. The following list outlines basic objectives for the campaign program:

- publicize GOS agricultural objectives, activities and accomplishments;
 - disseminate production input and output market prices on a regular timetable;
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- provide validated information on the improvement of agricultural outputs obtainable from use of inputs;
- broadcast insect and disease apparition and treatment;
- broadcast weather and predicting planting date;
- present instructional and "how to" information on use of inputs;
- make general promotional and motivational appeals;
- clarify credit, cooperative and extension services available for obtaining and using inputs;
- encourage and advise on grassroots formation of cooperative producer level organizations;
- reinforce the relationships between increased cereals production programs and the seed bank, reforestation, vegetable gardening, local savings, cereals storage and trading, literacy-numeracy and other farm-level agricultural programs;
- organize yield contests, awards for farmers and technicians;
- organize exhibition of new varieties, chemical, new invention in mechanization.

The primary audience for the proposed program is the farmer, both male and female. However, the program, which includes short-term training, should also positively influence school children, teachers, private sector businessmen and key officials of the rural communities.

Funds are programmed for technical assistance, training, production of local media materials, such as TV, radio, films, articles, posters and instructional brochures and fliers. A budget item for follow-up evaluation studies is also provided. This will help develop basic consumer and market research data, create small media trial themes and designs, pretest pilot program elements, and monitor and evaluate results.

The nature of the proposed media campaign and the need to work with and utilize the services of the state-operated communication agencies will require a coordinating link with a number of organizations on a continuing basis. The MDR will need to be in coordination with ORTS, Ministry of Commerce, Plan, SENCHIM and Société de Groupement Economique. This coordination is essential. A lesson learned from this past year's publicity effort is that fertilizer advertising for the new 0-15-20 blend failed to address certain farmer considerations such as the belief that fertilizer normally increases leafiness in plants. Plant foliage is important as a source of fodder. The appearance of the "0" in the formula was interpreted by some farmers as having lower value than previous formulas. When farmers witnessed early demonstrations of the 0-15-20 fertilizer and noted no bushy growth above ground they believed the product was not going to result in increased crop yield. In this case, the media campaign could have emphasized the fertilizer's impact on the increased growth of the peanuts below ground which would result in increased crop production. Feedback will be necessary in the preparation of publicity which responds to farmers' concerns.

SENCHEM, the semi-autonomous export and domestic fertilizer marketing agency for the Senegal-based regional fertilizer manufacturer, Industries Chimiques du Sénégal (ICS), has expressed interest in associating directly with the development of fertilizer information and promotion campaigns. SENCHEM, which has only recently been given responsibility for domestic sales of ICS production, believes that an information-promotion theme of "enhanced productivity through fertilizer", based on what SENCHEM senior management believes is fully documented on the basis of both experimental and practical on-farm pilots is essential. Joint SENCHEM-GOS efforts in media program design and diffusion is strongly recommended. The working relationship with SENCHEM could also provide the organizational link ensuring program continuity following the end of APS involvement in the information and communications program element.

A. Mass Media Components

1. National Radio: Broadcasts are from 6 a.m. to 2 a.m., mainly in Wolof, covering 95% of Senegal. The Radio Educative Rural (Diisô) program has a long, impressive history in Senegal and is a model for successful education and dialogue. It started in 1963 and since 1973 has operated without any foreign assistance. The target audience is Senegalese farmers, livestock producers and fishermen. The objectives are to provide food producers with (1) practical information, (2) technical training and (3) opportunity to express their opinions systematically and effectively. Diisô broadcasts six days a week at 8:30 pm. It focuses on topics of local and pressing concern: social, economic, health, agriculture, administrative and allows farmer feedback through recordings made in the field and letters. Approximately 70% is recorded in the field so that the program constitutes a "radio dialogue" between the field and studio agricultural experts.

The most meaningful indicator of Radio Educative's initial impact is probably its effect on national policy. A direct outcome of the radio dialogue in 1968 was a flood of letters that eventually moved President Senghor to standardize the farmgate price given to groundnut producers. In 1970, the GOS annulled farmer debts contracted in the purchase of seeds, agricultural equipment and supplies. These examples suggest the impact of media and the positive potential of media-based dialogues.

Overall response is estimated as excellent and Diisô's impact on listeners and emphasis on feedback have not been reduced since program inception. Since anyone who understands Wolof can listen, the audience has always been wider than the target audience and there is a certain urban following. Some programs also exist in Peul, Malinke and other languages.

The Diisô broadcasts provide education and awareness for listeners and feedback to authorities, extension agents and communication support staff. Radio has many advantages. It is inexpensive and available in remote communities; messages can be repeated at low cost; it is easy to reach an illiterate audience; it can support other channels of communication; and it announces farming-related events and activities. Because of its radio-dialogue character it overcomes one of the main disadvantages: one-way communication. It records local people: farmers, women, marabouts, and broadcasts their opinions and questions. In-studio experts comment, answer questions, provide information and advice. Diisô can also record oral history; stories of the old and not so old who have relevant experiences. Radio keeps pace with activities in the field so programming remains flexible.

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2. Regional Radio: It provides short, variable afternoon broadcasts in six local languages. There are four stations: Kaolack, Saint-Louis, Tambacounda, Ziguinchor. The project should focus more attention on regional radio program impact. It will monitor program content and the coordination/translation of Diisô broadcasts with a view to stressing and/or expanding regional broadcasts. The Direction de Radiodiffusion Nationale is located in Dakar and each regional station has a Dakar based representative. GOS Regional Direction of Agriculture staff currently generate local program content. Additional upgrading could make regional radio carry a more positive impact.

3. Village Radio could be installed in villages and broadcast on certain hours during the day so the population could listen to various programs. This would be especially useful in the remote border areas where villagers listen to Radio Mali, Mauritanie or Guinea.

4. Television: National broadcasts are: Monday to Friday from 19h to 23h30 and Saturday and Sunday from noon to 1h00. Coverage is urban (mainly Dakar) and most programs are in French or Wolof.

Television is largely a Dakar-based resource. The value of television in the urban area is three fold. First, influential government, business and religious leaders have direct access to television. Appropriate programming can influence decision-making. Secondly, most Dakar residents maintain village level contact through relatives, friends or business associates. They are often influential in introducing new ideas and technologies to rural areas. Thirdly, large scale vegetable and fruit farming is carried on in the Dakar-Cap Vert area. Educational farming broadcasts will directly reach this statistically small but productively important sector.

5. Print: Le Soleil is the national daily newspaper. It gives extensive coverage to national development issues and although it is limited to literate, French readers, the influence of its readership is considerable. Le Soleil has a network of regional correspondants. Regional newspapers are few (and erratic) since current government policy has not encouraged their proliferation.

6. Small media and materials: The project will develop posters, flipcharts, models, maps, charts, flannel boards, film strips, slides, songs, folk theater, wall paintings, pamphlets, audio-visual aids for extension agents, handbooks on what is to be taught and how to teach it, large pictures, worksheets for planters, stickers, badges, schoolbook covers, school room posters, leaflets, a lottery, handbills, local and traditional media, cassette tapes (cassette tapes for a specific subject could be distributed to villagers), an audio-visual mobile unit, etc.

7. Seminars: The project will collaborate with numerous seminars to permit a forum in which a GOS-private sector dialogue can take place. Fertilizer, seed, crop protection and crop marketing seminars will bring together key decisionmakers.

8. Person-to-Person: Direct contact and interpersonal communication has proven to be the most effective "medium" for behavioral change. As far as possible, existing government and administrative structures will be used to

implement the person-to-person communication support campaign. At the same time that government officials, local authorities, and extension agents are a means of communication, they are a primary target of the media campaign. The extension agent requires intensive communication skills training as well as a fresh positive image. The private sector will be encouraged to enter this arena of person-to-person marketing of production inputs.

B. Target Groups Objectives for Each Component of the Campaign.

The objectives of the media campaign are to persuade Senegalese farmers to undertake farming practices which will increase their production and to encourage investment in agriculture-related businesses. It must create awareness and interest, increase knowledge and understanding, educate, persuade and convince, and change attitudes and behavior, all within a relatively short time.

1. Mass audience

The mass media campaign is low cost and reaches the largest potential market. It uses existing mass media: radio, television, and press. In time, additional publicity--stamps, bumper stickers, billboards, banners, cinema ads and spots, posters, match boxes, etc--can be introduced with both public and private sector participation. Special events can be sponsored by private companies as well as the government.

2. Specific groups

Some of the initial bases for segmenting the farming and entrepreneurial public are: (a) geographic; (b) demographic, e.g. age, sex, ethnicity, family size and life cycle, income, occupation, mode of production, education, religion etc, (c) behavioral e.g. knowledge, attitudes, use, use occasion, benefits sought, user status, readiness stage, and d) decision-making: final decision-makers, those who informally influence the decision-maker or constitute a barrier to change, and others with more formal influence.

Accurate segmentation requires research and analysis at the beginning and during the lifetime of the project so that after primary targets have been reached secondary and tertiary targets can be added. While final determination of targets results from pretesting, the project suggests the following organizational groups as major segments.

a. Government administrative system: national, regional, rural communities, rural councils, centers for rural extension, urban communes, regional governors, deputy governors, deputy assistants for development, heads of CR's and CERS's.

b. Private sector: farmer/entrepreneurs, businessmen, merchants, traders, cooperatives, industry, voluntary groups (PVO, youth, community interest, etc), traditional authorities (village chiefs, president communautés rurales, local leaders), religious leaders, teachers, students, curriculum designers, etc.

The project has identified the following as primary targets: farmers, extension agents, women, religious leaders, school teachers and children, upper level government and extension service workers, rural councils, centers for rural extension and the urban population. The project will pretest each target before launching a full scale media campaign.

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While mass media conveys the overall project objectives in one message, target group messages use appropriate methods to emphasize different aspects of it. For example, two of the primary targets, the farmer and the urban population, will both be reached by mass media; the farmer by radio, the urban population by radio, television, press. For the farmer, small media and direct contact approaches will be most important: extension agent, demonstrations, other farmers. The farmer/entrepreneur message could be food self sufficiency, greater returns from the land, labor and capital; income generation, education (windbreaks, intercropping, tree planting and care). The urban message could be amenity (shade), fruit value, and transfer of new information and farming methods to relatives and friends in rural areas. A one-day seminar, not a field demonstration, is the usual approach for deputy governors or heads of rural councils. Simply put, the medium and nuances of the message are different for a marabout than for a merchant. It is the job of the communications support staff to be sure the message, media and audience are suited.

When members of the target population adopt the desired project objectives, they become an asset to the media campaign. Follow up interviews with successful people will encourage key decision makers to change their behavior.

II. SUMMARY OF THE MAJOR ELEMENTS OF THE MEDIA CAMPAIGN

A. Short-term Communications Advisor

A short-term consultant is scheduled to organize and direct the Baseline Survey once the project starts. This person must plan, schedule, and budget the communications project and select a local, private sector contractor. The consultant will initially remain up to nine months. As needed, additional short-term technical assistance will be provided to assist with implementation of specific media programs.

B. Media and Information Program Design and Implementation

The program will contract with a local, private sector market research, media, advertising firm able to provide a dedicated account executive and support staff and services. This firm will develop a communications strategy, design multi-media campaigns, supervise internal staff or sub-contractors in the preparation of films, radio programs, print media and publicity. This is a 3-year annually renewable contract.

C. Baseline Communications Strategy Design Survey

The campaign will sub-contract a private sector market research firm to develop research objectives, design research methodology, supervise field research, analyze results and draw program conclusions and recommendations for USAID's Communication, Information and Media Program to support APS objectives. This survey will be supervised by the short-term communications advisor.

D. Observation Travel

Orientation travel, preferably in African or Asian countries, to observe successful agricultural information and communications programs directed at the individual farmer is available. Personnel from key organizations would be selected. Over the life of the project, up to eight individuals could be selected for specific observation tours.

III SUPPLEMENTS

This section provides supplementary information supporting the action program for the Media Campaign contained in the main body of the project paper.

A. PRE-PROPOSAL COMMENTS ON AN AGRICULTURAL INPUT PROMOTION CAMPAIGN

This section summarizes a series of discussions with a local contractor, Decibel International, a firm experienced in the development of agricultural promotion programs in Senegal.

Decibel International is a private Senegalese firm specializing in publicity, multi-media productions and program design. It has its own recording studio with modern sound mixing equipment. USAID/Senegal has previously contracted with this firm for the production of short radio messages used in connection with the recently-introduced fertilizer formula. The following summarizes preliminary views on a multi-media campaign proposed in connection with the Agricultural Production Support Program. *

1. The Primary Target is the Small Farmer

The campaign design must focus primarily on appeals to the ultimate consumer of improved agricultural inputs-- the small farmer. Farmers must be convinced that their interests are being served by decisions to buy additional seeds, fertilizer and equipment.

2. The Principal Message is Increased Output and Increased Income

The farmer must be shown that it is to his financial advantage to use improved seeds and fertilizers. He must be convinced that there is a relationship between the use of improved seed and fertilizer and production per hectare, and that he will profit if he uses the additional inputs.

3. Media and Copy Strategy Must Be Factual, Direct and Familiar

Specific campaign targets and themes can only be prepared following demonstrated proof that input packages for cereals can increase farmer yields. Program scheduling reflects the need for the media sub-program to build upon information generated during the COS agricultural research and demonstration activities.

Promises must be supported by facts and expressed in a style and language which is acceptable to the target audience. Farmers already know much about seeds and fertilizers. The program will not be introducing a new product to the market. A theme such as the following may be appropriate:

Enrich yourself and enrich your land
(Enrichissez-vous en enrichissant vos terres).
(Enrichir la terre pour s'enrichir).

Seeds and fertilizer should be presented as something which brings additional money to the farmer. Production and income themes should dominate soil enrichment themes.

- Product quality themes can be played. The message should be that seeds and fertilizers have been developed to address specific Senegalese conditions. "Our" locally mined, processed and mixed fertilizers are the right blends for "our" soils.
- It is suggested that a well known entertainment personality be used, someone familiar to the mass of farmers, e.g., Babou Faye.
- Secondary messages can appeal to the farmers' attachment to the land and the soil, and point out that land made productive by inputs can eliminate the need for rural exodus.

4. The Campaign Should Tie In Sources of Credit

Assuming that an agricultural credit system is operative, the campaign should include references to obtaining loans for financing inputs.

5. Market Segmentation Objectives Should Be Considered In Program Design

A number of segmentations may be considered:

- Geographic segmentation such as fertile or poor soil regions and higher/lower rainfall zones.
- Farmer type segmentation such as large mouride farms and small farmers, i.e., religious and ethnic divisions.
- Women farmers and groups.

Such segmentation will help determine, for example, the campaign content and mix between radio and TV.

6. The Campaign Should Consider the Possibility of Special Promotions and Special Events

Consideration can be given to special promotions such as prizes, bonus awards, gifts with purchase, a large prize for record production, etc. The "Radio Educative Rurale" could be used for these purposes.

Official and semi-official events could be scheduled in connection with a "National Month of Farm Productivity," for example, sponsored by the Ministry of Rural Development.

7. A Print Media Element Should Be Designed into the Program:

Print media could be developed for different audiences: farmers in general, men and women farmers separately, school teachers, children. Distribution could be effected by the rural agricultural organizations, coops, schools, or by sub-contract distribution in major centers.

B. Short-term Communications Advisor Responsibilities and Qualifications

The second section is a position description and qualifications statements for the Short-term Communications Adviser.

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1. Responsibilities

- a. Carry out an in-country preliminary research and interview program to become familiar with APS programs and program objectives and the Senegalese agricultural environment including both public and private sector.
 - Review project files and documents.
 - Interview members of the APS project team and USAID management and project staff.
 - Interview GOS officials and Senegalese private sector executives.
 - Carry out orientation visits to farm communities.
- b. Develop, organize, schedule and direct a market and media research program to serve as a basis for the communications and information program design.
 - Develop research objectives and methodology.
 - Qualify and select local consultants.
 - Supervise and coordinate research efforts.
 - Review and approve market and media research conclusions and recommendations.
 - Recommend payments to consultants upon successful completion of the research assignment.
- c. Establish criteria, pre-qualify companies, review proposals and recommend final selection of advertising and media program development specialist.
- d. Supervise the activities of the selected advertising and media consulting firm in developing and testing program elements.
 - Develop program goals, purposes, outputs and inputs in logframe format.
 - Ensure utilization of market and media research results in detailed program design.
 - Approve campaign themes, audience segmentations, media selection, schedules and budgets.
 - Produce or supervise production of film, radio and print media presentations in accordance with pre-agreed schedules and budgets.
 - Ensure market testing of presentations prior to final release, and plan and monitor feedback.
 - Evaluate test market response and make appropriate program/product changes.
- e. Evaluate and assess the program's effectiveness annually and prepare a mid project and final project evaluation.
 - Utilize logframe criteria.
 - Assess program effectiveness in reaching target audiences and eliciting desired response.
 - Determine changes required in program focus, theme, schedules and budgets.

- Submit a written report on conclusions and recommendations.
- Participate in the annual project workplan review and future campaign planning seminar.

2. Qualifications:

- a. Possess a minimum of ten years experience in multi-media information, communications and advertising.
- b. Demonstrate success in developing and supervising multi-media programs in a variety of cultural and language settings. Experience with or on behalf of international agencies or multi-national companies desirable.
- c. Qualify in French at the SR 4 level.
- d. Have direct experience in design and supervision of advertising and media oriented market research.
- e. Have direct overseas experience, preferably in an African developing country environment.

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ANNEX J
ECONOMIC ANALYSIS

ANNEX J

ECONOMIC ANALYSIS

I. MACRO ECONOMIC BACKGROUND

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Table 1

Senegal: Primary Economic Sector GDP
at 1977 Prices, 1979-1985

(annual percentage changes)

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u> Revised	<u>1985</u> Estimated
Primary Sector	27.2	-18.3	- 5.6	24.8	4.8	-17.5	10.6
Agriculture(crops)	68.8	-31.7	-11.4	48.8	6.3	-42.2	16.0
Livestock	3.0	- 1.9	2.0	2.9	3.1	16.5	9.5
Fishing	-25.1	5.2	- 3.5	8.8	5.4	15.4	5.3
Forestry	2.4	4.8	- 1.1	1.1	-1.1	--	--

As shown in Table J., agricultural production in Senegal has fluctuated widely in recent years, owing mainly to changes in weather conditions. In 1982/83 millet and sorghum production declined by 21 percent to 585,200 metric tons, owing to a drop in the areas under cultivation in favor of peanuts, maize, and other rainfed crops. In 1983/84 agricultural production experienced a severe setback because the rainy season began unusually early in May 1983, followed by a period of drought in July-August. Thus, the 1983/84 peanut crop amounted to only about one half the level of the previous year, while the production of millet and sorghum declined further by 40 percent to 351,800 MT. In 1984/85 weather conditions improved, but the rains were uneven and the northern part of the country continued to suffer from drought. In 1984/85 millet and sorghum production increased by 34 percent, due to both better yields and larger areas under cultivation (21 percent more than in the previous year). Cotton and maize production also increased markedly, while rice output reached a high level.

Estimates for the 1985/86 season indicate some recovery for peanuts and record crops of millet and sorghum, maize, rice, and cowpeas because of highly favorable rainfall conditions during the period May-October 1985. Output of millet and sorghum is estimated to have doubled to some 950,000 MT due to higher yields and a 33 percent increase in planted areas. Paddy production, at a new record level of 147,000 MT, is projected to be about 8 percent higher than in 1984/85. Lastly, cowpeas production is estimated to have surged from 15,800 MT in 1984/85 to an unprecedented 80,000 MT in 1985/86.

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Table 2.

Senegal: Production of Principal Crops,
1979/80-1985/86

(in thousands of metric tons)

	<u>1979/80</u>	<u>1980/81</u>	<u>1981/82</u>	<u>1982/83</u>	<u>1983/84</u>	<u>1984/85</u> Prov.	<u>1985/86</u> Prel.
Export Crops							
Peanuts	676.0	523.0	883.7	1,109.4	575.0	500.0	600.0
Cotton	26.9	20.9	41.0	47.5	30.4	46.9	40.2
Food Crops							
Millet and sorghum	520.6	545.0	736.4	585.2	351.8	471.4	949.6
Maize	46.3	56.8	78.5	82.1	60.8	98.5	146.9
Rice(paddy)	96.6	64.6	103.3	95.0	109.7	135.8	147.0
Cowpeas	18.8	17.1	28.7	10.9	12.8	15.8	80.0
Manioc	24.6	25.1	33.7	9.5	46.1	50.0	31.0
Vegetables	85.0	90.8	103.5	107.3	116.0	120.0	125.0
Fruits	149.9	150.0	155.0	155.0	160.0	165.0	170.0

As shown in Table 2., following two consecutive droughts, production of millet and sorghum recovered to 736,400 MT in 1981/82 (one of the best recent crops), but then declined to 351,800 MT in 1983/84. The decline was due to a reduction in the areas under cultivation, as well as to lower yields. While lower yields reflect the effects of poor weather, the reduced acreage is essentially due to problems of profitability: millet as a subsistence crop in Senegal versus peanuts as a cash crop. Since the profitability of growing alternative crops is affected by price differentials whenever two or more crops are in competition with each other for the same acreage, it is clear that the past pricing policies did not give an advantage to millet production. Since 1983/84, producer prices of millet and sorghum have been raised every year, and, as a result, the areas under cultivation and production have increased considerably. In 1985/86 the millet and sorghum crop is estimated to reach the record level of some 950,000 MT, double the crop harvested in the previous year. The ultimate goal of the Senegalese authorities is to boost domestic cereal production without compromising the peanut industry.

As a result of the weaknesses in past production and pricing policies, rice imports have more than tripled since 1975. At the present time, rice consumption amounts to about 400,000 MT per year, mostly in the city of Dakar. Some 85 percent of this amount is imported, largely from Thailand. Approximately 140,000 MT of rice (paddy) are produced locally, with about one half coming from the Casamance and the remainder from the irrigated areas controlled by the Société d'Aménagement et d'Exploitation du Delta (SAED). Domestic rice production has been erratic due to both acreage and yield changes.

In 1983/84 domestic production of rice (paddy), at 109,700 MT, was 15.5 percent higher than in the previous year, but about 26 percent lower than in 1978/79. Rice production increased considerably in 1984 and 1985 as a result of favorable rainfall conditions and large increases in producer prices. It is estimated that in 1985/86 rice production will reach a peak of 147,000 MT, compared with 95,000 MT in 1982/83.

Together with rice, production of maize and other rainfed crops has increased in recent years. After a sharp drop in 1983/84 due to the drought, maize production rebounded in 1984/85 to 98,500 MT and in 1985/86 it is estimated to reach 146,900 MT, or double the average amount harvested during the previous six years. The most spectacular increase in production of food crops has been that of cowpeas. This rainfed crop was introduced on a large scale in 1985/86 in the drought-prone northern part of Senegal to replace peanuts. The program has already yielded exceptional results, with the production of cowpeas increasing from 15,800 tons in 1984/85 to an estimated 80,000 tons in 1985/86.

II. CEREALS PRODUCTION

A new set of cereals production targets for the year 2000 was established in the 1986 Cereals Plan, presented to the international community for financing during the Sectoral Meeting on Agriculture in June 1986. The technical aspects of the Cereals Plan were based on studies carried out by FAO and Senegalese government agencies.

A. The Present Situation

In formulating the New Agricultural Policy, the GOS recognized the need to restructure the production support components of cereals in order to meet its targets as set forth in the Cereals Plan. Without these changes, there would be little likelihood of improved production. The GOS estimates that total cereals production would increase about 1% a year, but because of population growth, self sufficiency in cereals would drop from 52% to about 35% by the year 2000.

Below is a brief description of some of the present input and credit situations.

Average production of cereals has changed little over the past 25 years. The average annual growth rates for the period 1960/61-1983/84 were: millet/sorghum 0.9%, maize 2.3%, and rice (rainfed and irrigated) 0.3%. These growth rates, however, mask extreme fluctuations between years, due primarily to the random pattern of rainfall, as the variation in areas harvested has been much smaller. From 1970 to 1984 the smallest harvest of cereals was 380,000 MT (1972/73) and the largest was estimated at over 1,000,000 MT (1985/86).

The concerned government departments view millet and other cereal seed as a secondary preoccupation compared to peanut seed. Millet/sorghum seed production was the responsibility of the ISRA and never exceeded a few metric tons. Multiplication and distribution were the responsibility of the RDAs and suffered from the organizational and financial difficulties of these organizations.

There is a lack of coordination, sufficient facilities, and organization at the various seed production phases. At present, there is no regular prefinancing system, and the various organizations intervening in the channel must rely on irregular, insufficient budgetary resources or on regional projects that cover only specific intervention activities. The seed distribution system has been disrupted owing to the void left by the decline of the RDAs, especially in the Peanut Basin.

Under the system that existed until 1980, fertilizer was subject to considerable subsidies, distributed by the parastatals ONCAD and then SONAR, both of which are now defunct. It was given out on credit as part of the Agricultural Program (terminated in 1980), essentially for peanuts. Since the former supply system was dismantled, transitional measures have been adopted but private sector traders have been reluctant to become involved in fertilizer distribution. In this context, annual consumption dropped from 30,000 MT between 1975 and 1980 to 25,000 MT in 1983/84 and to 40,000 MT in 1984/85 and probably less in 1985/86. The share of fertilizer earmarked for millet and maize, which never reached 30,000 MT at the high point of the Agricultural Program, is now most seriously affected by the drop in quantities distributed: under 5,000 MT in 1984-86, and that used almost exclusively for maize. No governmental subsidy is planned, however, and no new distribution system is envisaged. It is specified that the RDAs, which partially fill this role, will end that function. Donor subsidies for fertilizer will be progressively phased out.

A credit system for the agricultural sector is lacking. The Caisse Nationale de Credit Agricole du Senegal (CNCAS), newly created to replace the defunct Agricultural Program, does not plan to provide short-term financing of inputs for traditional farms in the near future. Under these conditions, and outside of the peanut needs that are partially met by the withholding system and of specific projects that only concern cotton, rice, and maize, no GOS credit system is planned to encourage the private sector in distributing inputs and marketing.

Cereals marketing suffered in the past from government price controls and regulations for the trading of cereals and licensing of traders. These restrictions have been removed, but the lack of significant marketable surpluses, and traders' concern about the financial risk of long-term storage, have limited the commercialization of cereals.

The conditions noted above are the ones that faced the GOS prior to adoption of the New Agricultural Policy. The future for any increase in cereals production looked bleak as production had stagnated, the RDAs were unable to supply the needed inputs, and private sector activities in these areas had been severely limited by government controls and regulations. The private sector support projected by the APS Project is designed to help the GOS meet the cereal production targets of the Cereals Plan.

B. Future Production with Intensification

The GOS Cereals Plan calls for a 1,040,000 MT increase in annual production by the year 2000. To meet this projected increase, yields in millet are expected to increase from an average of 500 to 700 kg/hectare. Maize yields will increase from 1.1 to 1.7 MT and yields of rainfed rice from 750 kg to 2,000 kg/hectare. As shown in Table J., the Cereals Plan targets about 1,798,000 MT of rainfed and irrigated cereals produced annually by the year 2000. Millet production is expected to be 736,000 MT, maize 301,000 MT and paddy rice 761,000 MT. The area cultivated is expected to expand about 16%, with almost all of the net expansion in irrigated lands.

Table: 3.

Cereals Production Objectives for the Year 2000

	<u>Start</u>		<u>Year 2000</u>		<u>Increase in Production ('000 t)</u>
	<u>Area ('000 ha)</u>	<u>Production ('000 t)</u>	<u>Area ('000ha)</u>	<u>Production ('000 t)</u>	
<u>Rainfed Crops</u>					
Millet/sorghum	1,048	545	1,050	736	191
Maize	76	83	150	251	168
Paddy (rainfed & lowland)	59	67	62	121	54
Sub-total.....	1,183	695	1,262	1,108	413
<u>Irrigated Crops</u>					
Paddy	21	55	128	640	585
Maize/sorghum	2	8	11	50	42
Sub-total.....	23	63	139	690	627
TOTAL.....	1,206	758	1,401	1,798	1,040

Source: FAO studies and sectoral working groups. Reproduction from Ministry of Rural Development, Cereals Plan, April 1986, Table 8.

As a whole, the objectives of the Cereals Plan are to be achieved through a combination of intensification of rainfed crops and tapping of the very high potential afforded by irrigated crops, which will supply 38% of production in the year 2000, as against 11% at the start.

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The increase in rainfed cereals production will come essentially from intensified production from land currently being cultivated. Theoretically, such intensification is possible to a very considerable extent, in that there have been but few improvements in cultivation practices, improved seed, use of fertilizer and plant health protection measures over the last two decades.

Further increases in productivity can be obtained by better adapting the species and varieties cultivated in the various agro-ecological zones to actual growing conditions, substitution of cowpeas for cereals (and peanuts) in the northern part of the Peanut Basin, and substitution of sorghum (once appropriate varieties have been adapted) and maize for millet in the more humid regions.

The economic returns to intensification will not be the same throughout the rainfed cereal producing areas, as there are wide variations in rainfall in the three major climatic zones. Three levels of intensification have been considered for the northern, central and southern Peanut Basin, and the Senegal Oriental area. The intensification packages generally include the following items: use of selected seed, compliance with a crop timetable together with sound farming practices, and use of fertilizer coupled with proper plant health protection. The levels of intensification are defined as:

- level F0 with no new intensification program, characterized by the absence of agricultural credit, scarcity of high-quality seed, and meager use of fertilizer;
- level F1 corresponding to slight intensification, a low-cost program with quality seed, improved cultivation techniques, and the widespread use of chemical fertilizer together with good plant health protection measures;
- level F2 corresponding to moderate intensification, requiring a medium-cost program with high-quality seed, regular replacement of agricultural equipment, even higher doses of chemical fertilizer, and full plant health coverage.

The F2 level of the Cereals Plan is assumed to represent Senegal's production in the fairly distant future, given the state of agronomic know-how. If this level were achieved, the production of rainfed cereals would be more than double the current level, which would virtually ensure the country's self-sufficiency in cereals (including rice) at current consumption levels. However, the adoption of the F2 level by all farmers is virtually impossible, as soil and climatic conditions would make recommended input levels uneconomical.

It has been assumed that a level of intensification is deemed acceptable by farmers if the benefit cost ratio is 2 or higher. In climatic high risk areas it must be 2.5 - 3. Maize intensification is profitable between F0 and F1; an unfavorable movement of input prices would make intensification hazardous unless fertilizer is subsidized or prices paid to maize producers are increased. For millet/sorghum, transition from a low level of intensity

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to a higher level increases gross margins, both per hectare and per day worked. In the northern regions, gross margins are quite low and climatic risks high, but in the southern regions, margins improve and drought risk is reduced.

Table J.4 shows expected rates of intensification that would be undertaken by farmers in different regions.

C. Yield Potential of Different Agro-Climatic Zones

The northern zone (Fleuve and the northern peanut basin) is characterized by drought and irregular rainfall which have worsened considerably since the 70's. The average rainfall in Louga has been under 300 mm., i.e. 30% less than during the previous decade. Under these conditions, rainfed agriculture is difficult and yield potential is poor. Little long-term benefit would be expected from the use of commercial fertilizer. Yields may be improved by using short-cycle varieties of millet, the use of quality, processed seed, and improved cultivation techniques.

The central peanut basin has also had far less rainfall than in previous decades, although the average remained at least 400 mm or more. Farming in this region rotates between millet and peanuts almost exclusively. Due to a combined population explosion and land shortage, soil is left fallow for excessively short periods and fragile soil is farmed. Maintaining or even improving yield will require the same measures as those defined for the North Zone.

The southern peanut basin, which extends 100 km north of the Gambia, averages between 600 and 800 mm of rainfall. The problems are similar to those of the central peanut basin, but less pronounced.

The southern zone (Casamance, Senegal Oriental) has historically averaged at least 800 mm, though it has declined somewhat in recent years, making it suitable for long-cycle grain crops. Water is not a limiting factor. Yields can be increased by using commercial fertilizer as well as improved seeds and improved cultivation methods.

Table J.5 shows production levels for rainfed millet, maize, cowpeas and rice based on expected levels of intensification, and fertilizer requirements to reach those levels.

TABLE 4
Crop Intensification by Zone:
Share of Production by Degree of Intensification 3/

Zone	Millet/Sorghum			Maize*			Rice (rainfed or lowlands) 1/			Irrigated rice		
	F0	F1	F2	F0	F1	F2	F0	F1	F2	F0	F1	F2
Northern Peanut Basin (P.B)	0.5	0.5		-	-	-	-	-	-	-	-	-
Central Peanut Basin (P.B)	0.3	0.6	0.1	-	-	-	-	-	-	-	-	-
Southern Peanut Basin (P.B)	0.3	0.5	0.2	O 0.2* N 0.5	0.4 0.4	0.4 0.1	0.5	0.3	0.2	-	-	-
Fleuve Region	0.3	0.7	-	0.5	0.4	0.1					0.5	0.5
Sylvopastoral Region	0.5	0.5	-	-	-	-	-	-	-	-	-	-
Casamance 2/	0.3	0.3	0.4	O 0.2 N 0.7	0.3 0.3	0.5 -	P 0.5 N 0.5 A 0.5 M 0.5	0.5 0.3 0.3 0.5	- 0.2 0.2 -	-	0.5	0.5
Senegal Oriental	0.3	0.3	0.4	O 0.2 N 0.7	0.3 0.3	0.5 -	0.5	0.3	0.2	0.3	0.5	0.2
Niayes	0.3	0.7	-									

Source: FAO Studies and Agriculture Sectoral Working Group. Produced from Ministry of Rural Development, Cereals Plan, April 1986, Table 13.

1/ Maize: A distinction has been made between the crops already established (O) and expansions (N) in Casamance, Senegal Oriental and the Southern Peanut Basin. O = old; N = new.

In the Fleuve Region, the rates are for irrigated maize.

2/ Rainfed rice in Casamance: P = rainfed rice, N = groundwater/rainfed rice, A = lowland rice and M = mangrove rice.

3/ See next page.

Table 4 (continued)

Hypothesis about the rate of program implementation

for maize, a significant share of production (50%) would be at the F2 level, with only a small amount (20%) remaining at the F0 level: $0.2 F_0 + 0.3 F_1 + 0.5 F_2$.

for millet/sorghum, the hypotheses vary according to region, depending on potential:

Northern Peanut Basin	$0.5 F_0 + 0.5 F_1$
Central Peanut Basin	$0.3 F_0 + 0.7 F_1$
Southern Peanut Basin	$0.3 F_0 + 0.5 F_1 + 0.2 F_2$
Casamance	$0.3 F_0 + 0.3 F_1 + 0.4 F_2$
Fleuve Region	$0.3 F_0 + 0.7 F_1$
Sylvopastoral Region	$0.5 F_0 + 0.5 F_1$
Senegal Oriental	$0.3 F_0 + 0.3 F_1 + 0.4 F_2$
Niayes	$0.3 F_0 + 0.7 F_1$

for rainfed or lowland rice:

Southern Peanut Basin	$0.5 F_0 + 0.3 F_1 + 0.2 F_2$
Casamance	$0.5 F_0 + 0.5 F_1$ (rainfed)
	$0.5 F_0 + 0.3 F_1 + 0.2 F_2$ (groundwater/rainfed)
	$0.5 F_0 + 0.3 F_1 + 0.2 F_2$ (lowland)
	$0.5 F_0 + 0.5 F_1$ (mangrove)
Senegal Oriental	$0.5 F_0 + 0.3 F_1 + 0.2 F_2$

for irrigated rice:

Fleuve and Casamance	$0.5 F_1 + 0.5 F_2$
Senegal Oriental	$0.3 F_0 + 0.5 F_1 + 0.2 F_2$

for irrigated maize:

Fleuve and Casamance	$0.5 F_1 + 0.5 F_2$
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TABLE 5
Production and Fertilizer Requirements: Millet, Maize, Cowpeas and Rice

MILLET PRODUCTION (RAINFED)

	<u>Northern P.B.</u>	<u>Central P.B.</u>	<u>Southern P.B.</u>	<u>Other Regions</u>	<u>Total</u>
Area (Ha)	60,000	385,000	350,000	225,000	1,050,000
Yield (Kg/Ha)	400	589	672	575	585
Total Production (MT)	24,000	226,545	235,000	129,375	614,970
Fertilizer Requirements (MT)					
PK & Urea	-	3,033	10,500	8,900	22,433

MAIZE PRODUCTION (RAINFED)

	<u>Southern P.B.</u>	<u>Casamance</u>	<u>Sen/Oriental</u>	<u>Total</u>
Area (Ha)	35,000	55,000	60,000	150,000
Yield (Kg/Ha)	1,794	1,646	1,618	1,670
Total Production (MT)	62,800	90,550	97,100	250,450
Fertilizer Requirements (MT)	7,705	9,780	10,123	27,608

COWPEAS PRODUCTION (RAINFED)

	<u>Northern P.B</u>	<u>Central P.B</u>	<u>Fleuve</u>	<u>SYLV/Post</u>	<u>Casa/So</u>	<u>Total</u>
Area(Ha)	50,000	65,000	15,000	15,000	6,000	151,000
Yield (Kg/Ha)	575	675	525	525	675	612
Total Production (MT)	28,750	43,875	7,875	7,875	4,050	92,425
Fertilizer Requirements (MT)						
(TSP)	2,500	3,250	750	750	450	7,700

RICE PRODUCTION (RAINFED)

	<u>Southern P.B</u>	<u>Casamance</u>	<u>Senegal Orient</u>	<u>Total</u>
Area(Ha)	1,000	2,000	4,000	7,000
Yield (Kg/Ha)	1,125	1,125	1,225	1,182
Total Production (MT)	1,125	2,250	4,900	8,275
Fertilizer Requirements (MT)				
(DAP or TSP)	125	250	580	955

D. Basic Assumptions for the Project Analysis

The project analysis is based on assumptions about producer demand for seeds and fertilizer and the ability and willingness of the private sector to respond. Farmers in Senegal have had experience in using fertilizer and improved seed (peanut seed) and are aware of the increased production potential. However, for the past twenty years these inputs were heavily subsidized and were made available through the RDAs. Inputs were accompanied by various credit schemes which, more often than not, proved to be merely financial transfer programs rather than credit programs requiring reimbursement. A commercial credit system will be established on a financially viable basis. There is uncertainty concerning the farmer's response to being faced with purchasing inputs at higher prices. Private sector traders have not been officially involved in input distribution, but many have developed networks of consumer goods distribution. The project anticipates that traders will respond rapidly to opportunities to distribute inputs as soon as there is a clear indication of demand. The following are the basic assumptions on which the project is based.

- The effects of using fertilizer and the ratio of the price of fertilizer to the producer price of cereals will encourage fertilizer use.
- Fertilizer distribution by the private sector will be more efficient than the system of distribution by the agricultural parastatals that is being dismantled.
- Fertilizer will be made available on time to the farmers because private sector distributors have to be concerned with retaining their customers.
- The system will be financially viable because private sector distributors will sell only on a cash basis or on a selective credit basis.
- Development of private sector seed multiplication on a commercial basis will increase the availability of improved seeds at economic prices.
- Further, development of a viable system of private sector cereals marketing will encourage production of millet, sorghum and maize as cash crops rather than solely as subsistence crops.
- Development of a reliable system of crop statistics will provide credible information on the basis of which the government and private sector traders can make policy, price and marketing decisions.
- Establishment of a commercial credit system for the agricultural sector will promote private sector initiative at all levels.

- Credit availability to cooperative entities will permit farmers, the ultimate consumers, to purchase fertilizer, improved seed and other required inputs.

III. BENEFIT/COST ANALYSIS

The Agricultural Production Support project is composed of four distinct components: input production and distribution, credit, information/media, and statistics. The first three are aimed at increasing the flow of inputs and outputs to and from the rural world. The project's level of success can be measured by the increase of these flows directly attributable to the project.

For the economic analysis we follow two approaches: (a) farm level benefit/cost ratios for agricultural inputs and (b) benefit/cost analysis for Senegal as a whole.

A. Farm Level Benefit/Cost Ratios for Agricultural Inputs

From the farmer's viewpoint, is it worthwhile to buy selected seeds or fertilizer given his short cash position? Are the benefits to be obtained high enough in relation to the cost so that it becomes an attractive proposition compared to his traditional way of working, i.e., low input, low output. To answer these questions, we compute benefit/cost ratios for different crops and different regions.

Farmers have the choice between four basic scenarios of production regarding seeds and fertilizer:

- ordinary seeds, no fertilizer;
- ordinary seeds, fertilizer;
- selected seeds, no fertilizer;
- selected seeds, fertilizer.

A detailed analysis would look at all the regions and all the crops for each of the four scenarios. As a short cut, it seems more reasonable to look at a limited number of regions, representative of the whole country for the three most important crops in the context of this project, i.e., millet, corn, and rice.

Furthermore, there are scenarios which do not make sense in the real world:

- For example, it is not possible to obtain a significant yield increase due to fertilizer if rainfall is lower than 400-500mm. In the Louga region in the north of Senegal, which gets between 200 and 300 mm of rain per year, the two scenarios that include fertilizer do not apply.
- Similarly, in regions with enough rainfall, using high yielding varieties without fertilizer does not make sense.

The first scenario, i.e., ordinary seeds and no fertilizer, represents, in fact, the reference case. All other scenarios are (or should be) improvements in comparison to that situation. The benefit of using fertilizer or selected seeds is the difference in yield obtained using that input compared to the reference case.

We have taken the average yield per region over the last ten years (1976-1985) as the reference case (Source: MDR). These figures probably represent an overestimation of the yields obtained without selected seeds and without fertilizer since at least some selected seeds and fertilizer have been used in these regions over the past ten years and may therefore have increased the average yields slightly.

1. Millet

Four areas have been selected: Louga, Diourbel, Sine Saloum and Casamance.

Assumptions are as follows:

- The quantity of fertilizer applied is 150 kg of (0-15-20) and 50 kg of urea.

- Two prices of fertilizer have been considered, a subsidized price and an unsubsidized price. We have used the price structure in effect during the 1986/87 crop year (see Table 6). There is no indisputable study of yield increase obtained by fertilizer application. The IFDC did a study in 1976 and 1977 which gives good indications but cannot be considered as scientific (see IFDC Senegal Fertilizer Study for ESF, Oct. 1982). The regional development agencies (RDAs), in particular SODEVA, have made some measurements of yield increases in farmers fields in the recent past. The rule of thumb which is appearing is that yields increase by about 50 percent when nutrients are applied closely enough to the extension recommendations. This is an unsatisfactory approximation, and it would be very useful for Senegal if some long-term research were undertaken on fertilizer impact on farmers' fields by region, rainfall levels and nutrient levels.

- For the price of selected seeds (again for lack of specific information) we have retained a price representing three times the market price of millet, i.e., CFAF 70 x 3 = CFAF 210.

- For the yields obtained in the scenarios using selected seeds, we have based our figures on results obtained in the field, as measured by SODEVA, the RDA covering the Peanut Basin. For example, research has created two short cycle (75 day) varieties (IBV 8001 and IBV 8004) which have obtained very good results in the northern part of the country. In 1985 SODEVA Louga registered yields of 900 kg/h for IBV 8004, and SODEVA Thiès 1.26 tons. But 1985 was a very good year, and even with short cycle varieties, there are climatic and other risks. We therefore retain an average yield of 500 kg in Louga and 600 kg in Diourbel for short cycle varieties.

Table 6
Fertilizer Retail Prices in Senegal in Effect for the
1986/87 Growing Season (1) (CFA/kg)

	UREA		0 - 15 - 20	
	With Subsidy	Without Subsidy	With Subsidy	Without Subsidy
Dakar	48	72	59	83
Thies	49	73	60	84
Kaolack	53	7	64	88
Fatick	52	76	63	87
Tambacounda	58	82	69	93
Louga	53	77	64	88
Diourbel	51	75	62	86
Kolda	61	85	72	96
Ziguinchor	59	83	70	94
Saint-Louis	56	80	67	91

(1) Price of DAP (18-48-0) in the Fleuve: CFAF 119/kg.

When chemical fertilizers are used, yields increase rapidly. Short cycle varieties with fertilizer will yield an average of 900 kg in the Diourbel area. In Sine Saloum the Souna III millet variety produces an average of a little over 1 MT (the potential is close to 2 MT), and in Casamance average yields of 1.3 MT are obtained.

The millet yields with the different scenarios are presented in Table 7.

Table 7:
Millet Yields: Four Scenarios, Four Regions
(in kg per hectare)

Region	!Ordinary Seeds, !No Fertilizer	!Ordinary Seeds, !Fertilizer	!Selected Seeds, !No Fertilizer	! Selected Seeds ! Fertilizer
	Louga	338	-	500
Diourbel	477	715	600	900
Sine Saloum	625	937	-	1050
Casamance	766	1149	-	1300

Table 8 presents the benefit/cost ratios that can be deduced from Table 7 with the assumptions detailed above.

Table 8:
Millet: Benefit/Cost Ratios, Different Scenarios

Regions	! Ordinary Seeds, ! Fertilizer		!Selected Seeds, !No Fertilizer	Selected Seeds, Fertilizer	
	! With Subsidy	! No Subsidy		! With Subsidy	! No sub
Louga	-	-	10.8	-	-
Diourbel	2.03	1.41	8.2	3.2	2.3
Sine Saloum	2.62	1.83	-	3.16	2.29
Casamance	2.90	2.09	-	3.63	2.69

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Table 8 identifies two interesting points:

- First, the potential benefits for the farmers who use short cycle varieties of millet in the northern part of the country are impressive. One of the priority actions of the project should be to make sure that these varieties, which are available in ISRA's refrigerated chambers, be multiplied and made available as soon as possible.

- Second, using fertilizer with ordinary seeds, is not a very attractive proposition if the unsubsidized price has to be paid, but when both selected seeds and fertilizer are used at the same time, the benefits for the farmers are more attractive.

2. Maize

Assumptions are as follows:

- There are three production regions: southern Sine Saloum, Senegal Oriental and Casamance. For southern Sine Saloum, we cannot take the average yield for the last ten years as the reference case since the German maize program has raised yields by providing selected seeds in the region and fertilizer to the seed multipliers. Maize can hardly be cultivated without some kind of nutrient and the traditional way of cultivating it in the three regions is as maïs de case, i.e., directly around the village itself, at a place where manure and other wastes are available. This means that we overestimate the yields of the reference case. It seems reasonable to take such inflated figures since farmers, when deciding whether or not to produce maize with modern inputs, will compare potential benefits to what they know, i.e., maïs de case. For Sine Saloum we have chosen a figure of 900 kg which is a reasonable estimate of what a farmer can get on a small field near the village.

- Fertilizer application retained is 100 kg of urea and 150 kg of NPK, 0-15-20.

- Fertilizer prices are those given in Table 6.

- Farmgate maize price is CFAF 70/kg.

- Selected seed prices are set at CFAF 210/kg (i.e., 3 times maize farmgate price).

- Seed requirement per hectare: 20 kg.

- Yields: With selected seeds and fertilizer and existing farming techniques it is possible to obtain up to 3 MT per hectare, but specialists say that a reasonable average is 2 MT/hectare. This figure is valid for the three regions studied (but probably underestimates the real potential of Casamance). The two other scenarios are less interesting from a practical point of view, although they occur in real life. Indeed it does not make sense for a farmer to pay the equivalent of \$55 per hectare for fertilizer and refuse to pay \$12.5 additional for selected seeds, though it may happen that selected seeds are not available. The other case, selected seeds with no

fertilizer, is for the moment more frequent, at least in southern Sine Saloum where first or second generations of selected seeds may be available at a reasonable cost, but farmers do not want to, or cannot, invest more money in fertilizer. There are no real yield measurements on these two scenarios since they do not represent typical cases for the RDAs or for a project. The figures proposed at this level are "educated guesses" which we put between parentheses (see Table 9).

Table 9:
Maize Yield: Four Scenarios, Three Regions
(in kg/ha)

Regions	! Ordinary Seeds, !		! Selected Seeds, !	
	No Fertilizer	Fertilizer	No Fertilizer	Fertilizer
Sine Saloum	! 900	! (1500)	! (1100)	! 2000
Eastern Senegal	! 782	! (1400)	! (1000)	! 2000
Casamance	! 1025	! (1600)	! (1200)	! 2000

Table 10 presents the benefit/cost ratios that can be deduced from Table 9 with the assumptions detailed above.

Table J.10: Maize Benefit/Cost Ratios, Different Scenarios

Region	! Ordinary Seeds !		! Selected Seed !	
	Fertilizer		Fertilizer	
	! With Subsidy !	! No Subsidy !	! With Subsidy !	! No Subsidy !
Sine Saloum	! (2.90)	! (2.05)	! (3.33)	! 4.12
Eastern Senegal	! (2.68)	! (1.95)	! (3.63)	! 4.19
Casamance	! (2.45)	! (1.80)	! (2.92)	! 3.31

This table indicates that:

- Assuming our educated guesses are valid, selected seeds are very profitable for the farmer even without fertilizer.
- Selected seeds with fertilizer give the farmer an excellent return on his investment (as indicated, the Casamance return may be underestimated).
- Using fertilizer with ordinary seeds is interesting if fertilizer is subsidized, much less so if market prices are applied.

3. Irrigated Rice

Assumptions are as follows:

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- There are two areas where irrigated rice is produced: Casamance and Fleuve. We will study the Fleuve case only, because there is greater potential due to construction of two dams, and because we have the most data. Irrigated rice production per hectare varies between 1.5 MT and 8 MT in the Fleuve region. The major variables are ploughing, weeding, water level, fertilizer and seeds. In this analysis we are concerned only with fertilizer and seeds and the yield variations we present imply that other factors used are unchanged.

- The fertilizer recommendation of SAED is 200 kg of urea and 150 kg of DAP (18-48-0).

- There has been almost no subsidy on fertilizer distributed by SAED this year. For fertilizer sold on credit, SAED has applied the average cost price, transportation included (but has charged the same rate on all perimeters along the Fleuve). For fertilizer sold for cash, a discount of about 7 percent has been granted (but little has been sold for cash). We will take the price of fertilizer sold on credit for our computations, i.e. CFAF 80.5/kg for urea, CFAF 119/kg for DAP.

- The official farmgate paddy price is CFAF 85/kg. Many farmers sell it at a higher price in Mauritania or after transformation on local markets.

- Seeds: SAED sells two categories of seeds: semence de multiplication améliorée which are not really certified selected seeds, but of better quality than average (price: CFAF 128/kg) and semences ordinaires (price CFAF 106/kg). If a really selected seed program were to occur, the cost of selected seed would be much higher. For lack of cost information, we kept our approach of multiplying by 3 the normal price of paddy, i.e., CFAF 85 X 3 = CFAF 255.

A hectare requires 100 kg of seeds.

- Yields: Even more than in the case of maize, it seems a heresy to plant ordinary paddy and not put fertilizer on irrigated perimeters which have cost between \$5,000 and \$12,000 to build; but this happens, and it gives us a reference case and information for our different scenarios. The reference case occurs, for example, when a producer group has not reimbursed its debts to SAED for the previous year. Then SAED cuts the supply of seeds and fertilizer, so farmers sow their own seeds without fertilizer. In such cases, if farmers apply the same quantity of other inputs, they can obtain about 2,500 kg per hectare. When fertilizer is used on non-selected seeds, the yield is around 4,500 kg/ha. When selected seeds are used without fertilizer, the average yield is 3,000 kg/ha. When fertilizer and selected seeds are used together, farmers get around 6,000 kg/ha. It is to be noted that this last figure might be an underestimation of potential yields, since the quality of the selected seeds provided by SAED is disputable. As a matter of fact, there is a potentially disastrous deterioration of the seed quality in the Fleuve region since the WARDA seeds farm in the Fleuve was closed in 1985.

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Table 11 summarizes the above information.

Table 11
Rice Yields: Different Scenarios: Fleuve region.
(in kg/ha)

Region	! Ordinary Seeds, ! No Fertilizer	! Ordinary Seeds, ! Fertilizer	! Selected Seeds, ! No Fertilizer	! Selected Seeds, ! Fertilizer
Fleuve	! 2500	! 4500	! 3000	! 6000

Table J.12 presents the benefit/cost ratios that can be deduced from table 11 with the assumptions detailed above.

Table J.12: Rice Benefit/Cost Ratios, Different Scenarios.

	! Ordinary Seeds, ! Fertilizer	! Selected Seeds, ! No Fertilizer	! Selected Seeds, ! Fertilizer
Fleuve region	! 5.00	! 2.5	! 5.83

Table J.F. 12 indicates clearly that it is in the farmer's interest to apply fertilizer and to buy selected seeds.

B. Benefit/Cost Analysis for the Project

The second aspect of this analysis measures foreign exchange benefits (the value of domestic production of cereals which would theoretically otherwise have to be imported) against foreign exchange costs (the cost of fertilizer, including domestically produced NPK, valued at the international CIF price). To answer the question whether for Senegal as a whole it is worth spending \$20 million on this project rather than on something else, we have to compute the internal rate of return of this project.

We can measure the impact on production of the project in relation to the seeds and credit components; but it would be wrong to do a benefit/cost analysis by project component because the components are highly interrelated.

- Selected seeds will generate an increase in production, if farmers use them, i.e., if they know about them (media component) and buy them.

- If selected seeds are sown without fertilizer, the impact on production will be very limited; hence the role of the credit component which should increase fertilizer consumption.

Consequently we will measure first the benefits generated by the project through the seeds and credit components (taking into account the inter-relationships and avoiding double count of some benefits); and we will compare them to the costs of the project. The costs of the credit component will require special attention since the credit component is not a sunk cost as are the other cost components.

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1. Benefits Generated by the Seeds Component

The seeds tables discussed below describe in detail computations undertaken to determine the project's role in seed production. A brief description of the methodology used follows.

The Cereals Plan, presented by the GOS to the donors in June 1986, indicated objectives of production and hectarage for the different crops of the country for the year 2000. Although this plan is clearly ambitious, it does not seem to be completely unrealistic. We took the hectarage figures and their evolution as proposed in the cereals plan as the basis of our computation. Knowing the hectarage by crop one can easily deduct the overall seeds requirement. Assuming that selected seeds have to be renewed every 3 years, we can deduct the total selected seeds requirement to cover the whole country's needs.

We know approximately the quantity of selected seeds utilized in 1986/87 - a pretty low level except for corn (German project) and for cowpeas (CB5).

On the basis of the production objectives set by the cereals plan, but also of what seems feasible from a practical point of view, we have made assumptions regarding the evolution of the use of certified seeds during the life of the project and for the following five years. We have also made assumptions regarding the percentage of these seed needs that the project will make it possible to meet. At this level we have put in modest figures (30 percent at the end of the project) that probably largely underestimate the potential impact of the project regarding cereals seeds.

Once we know the quantity of cereals seed the project has generated in terms of tonnage, we can deduce the potential increase in production the project could generate the following year if other conditions were satisfied. We have taken average increases in yields generated by selected seeds and fertilizer as presented in the first part of this analysis (see below for detailed assumptions crop by crop). We can then deduct the foreign exchange value of the additional potential production generated by the project. However, since we assume that fertilizer has been applied, we must deduct the foreign exchange cost of this fertilizer.

Tables 13 through 17 present the results obtained respectively for millet, maize, irrigated rice, rainfed rice, and cowpeas (considered as a cereal for this purpose).

However, if these tables give us an idea of the potential impact of the project crop by crop, it is unfortunately necessary to expect that farmers will not all behave the way we would like them to. The right type of fertilizer has to be put in place at the right time, weeding has to be done at a given date, etc. There is an important learning process which will have to take place, and which takes time. Furthermore, some other outside factors can intervene such as pests, which can possibly reduce the yields.

Table 18 presents the computation of the benefits generated by the seeds component. We have assumed that at the beginning of the project, only 60 percent of the potential benefits that could be generated by the project effectively occur. There is a learning process which appears and increases the percentage of realization of the potential to 75 percent in years 9 and 10.

Table 19 indicates the assumptions chosen for the seed component analysis.

2. Benefits Generated by the Credit Component

Credit to the rural world is clearly a major blocking factor of the agricultural production in Senegal. There are two recent pieces of evidence of this fact:

- In April 1985 the President of Senegal announced in his Independence Day speech that only those farmers who had marketed the previous peanut crop through official channels, and therefore repaid the previous year's credit through the retained earning procedure, would benefit from seed distribution. Only 60,000 tons of peanut seeds were distributed, but an additional 40,000 tons were available for cash sale. During the 1985/86 growing season only 607,000 hectares of peanuts have been planted, a drop of 30 percent compared to the previous year and 40 percent compared to the average. Of the 40,000 MT available for cash, only about 5,000 tons were purchased; the rest went to the oil crushing firms for transformation. Farmers claimed (a) that they had not kept seeds, and (b) that they were short of cash and therefore could not buy the seeds available.

- For the 1986/87 crop season, farmers had been advised long in advance that there would be no distribution of fertilizer on credit except for limited existing programs (SAED, SODEVA corn project, etc.). To avoid the problem of the short cash position of the farmers prior to the rainy season, fertilizer was made available in the field as early as January 1986. In addition the price of fertilizer sold for cash was subsidized, while fertilizer distributed on credit by the RDAs was not subsidized. The results of this new approach supported by USAID are not very encouraging: only about 7,000 tons of fertilizer have been sold for cash. Farmers again claimed that they were short of cash in June and July and that their priority was purchase of peanut seeds.

The credit program designed in this project is not direct credit to the farmer. It is directed towards the suppliers of input; but we know, and this is the reasoning behind this line of credit, that the suppliers will extend credit to those farmers who they are confident will repay. In addition we think that a large share of the credit distributed each year will go to fertilizer suppliers, in particular during the first few years.

Based on the above argumentation, we will measure the benefits of the credit component of this project as the increase in production generated by the additional fertilizer consumption that has been possible due to the line of credit. This is based on the following assumptions:

First, we will take into account only the economic benefits generated by the fertilizer credit, excluding the benefits generated by seed credit, farm implement credit, etc.

There are two major reasons which validate this assumption:

- First, indeed some of the credit will (through suppliers) help farmers purchase selected seeds, or help private entities produce these selected seeds, but most of the benefits to the economy generated by such credits have already been accounted for in the selected seeds analysis of the benefits of the project. We should not count them twice.

- Second, seeds and fertilizer credit will together represent the major utilization of the APS line of credit, particularly at the beginning. It is obviously very difficult to specify any percentage for the moment, but it is probable that at least in the first years 2/3 of the money will be for fertilizer credit, 1/4 for seed credit, the rest for farm implement, cereals marketing, etc. These percentages are going to evolve over time, and it is probable that the share of fertilizer credit will be reduced. However, the level of uncertainty is such and the measurement of the benefits of other types of credit so difficult that it seems reasonable to limit our analysis to fertilizer credit.

The second assumption is that only part of the fertilizer credit will generate additional fertilizer consumption. This can be explained by the following example:

Suppose the project credit permitted the purchase of 20,000 tons of fertilizer, and that the national fertilizer consumption was 50,000 tons. What would have been the national fertilizer consumption if the project had not existed? Let's suppose it would be 40,000 tons; this means that out of the 20,000 tons financed by the line of credit, only 10,000 represent additional consumption, i.e. 50%.

It is here again very difficult to determine any percentage; we have to make assumptions. We know that for the moment credit is a key bottleneck to fertilizer consumption; therefore, at least at the beginning the line of credit will generate an important additional consumption. This percentage should decrease over time since farmers, once they are convinced that fertilizer is useful and that the government is not prepared to give it away free, would be prepared to buy it for cash or with other sources of credit. Furthermore, some of the suppliers who will benefit from the project's line of credit would have obtained bank credit anyway, despite the banks' tight liquidity situation).

The combination of these two assumptions (that benefits are generated by fertilizer credit only and that only additional fertilizer use generates benefits) allows us to determine the percentage of credit that will generate economic benefits.

We selected the following percentages: 50% in year one of the project; 20% in year 10 with an important decrease in the first five years.

This is based on the hypothesis that in year 1, 2/3 of the credit will be for fertilizer, and 75% of this credit will generate additional consumption; while in year 10, 50% of the credit will go to fertilizer but only 40% will generate additional consumption (see table 20).

At this point, we have to be very careful about problems of overlapping. In order to compute the benefits generated by the seeds component of the project, we have assumed that the users of selected seeds generated by the project would apply fertilizer. But these fertilizer users could also benefit from fertilizer credit from the project. In which case, we would count the benefits twice. It is true that at the beginning when the project is small, the cases of overlapping might be rare, but when the project reaches its full size they may be much more frequent. In order to avoid completely this overlapping risk, we will assume that all the users of selected seeds generated by the project will also obtain fertilizer credit from the project. This is clearly an extreme case, which reduces the benefits of the project, but it guarantees us that no double counting has taken place.

In the computations, we should deduct from the additional fertilizer consumption generated by the credit component the fertilizer used on selected seeds generated by the project.

Table 20 line 4 shows how important this point is since under our assumptions, starting with year 7, all the benefits generated by the credit component have already been accounted for in the seed component.

Our next step is to evaluate what are the benefits for the economy of applying a dollar's worth of fertilizer. For this we have computed an average benefit/cost ratio for using fertilizer in Senegal. The detailed assumptions are presented in Table 22. This benefit/cost ratio is 2.4. This means that \$1.00 of fertilizer generates \$2.40 of foreign exchange, and therefore, the foreign exchange gain is \$1.40 (assuming that all the fertilizer is imported). This 1.4 coefficient has been used to compute the foreign exchange value of the additional production generated by the credit program. (See Table 20.)

Another important variable for the computation of the benefits generated by the credit component is the rate at which the dollar funds are disbursed, and therefore the level of the revolving fund. The project manager will need to strike a balance between (a) the enormous demand for credit and the various pressures generated by it and (b) the risk of loan defaults, particularly at the beginning. As indicated in other parts of the project paper, a relatively slow pace of disbursement has been retained. For this economic analysis, it is necessary to assess the evolution over time of the revolving fund. Whether we like it or not there will be loan defaults, which will reduce the revolving fund. We assume for the purpose of this economic analysis that for every \$100 lent, only \$90 will be reinjected in the revolving fund. Assuming an interest charged to the primary banks by the fiduciary bank of 5 percent, this corresponds to a rate of default of 16.67 percent. The first part of Table 21 presents the evolution of these funds over 10 years.

3. Project Costs

We should distinguish between two different costs, credit costs and other costs.

Regarding the cost of the credit component, it cannot be computed as the amount of dollars made available to Senegal since at the end of the project there will be money left in the revolving fund. The cost of the credit component can be computed as the difference between (a) the amount left in the revolving fund at a given time in the future if these funds are lent as proposed in the project paper and (b) the amount that would be in the fund if the money had been invested in a more profitable fashion. We assumed an interest rate of 7 percent, which corresponds to what the banks are offering in Senegal for good customers.

The other costs are those indicated in the budget section of the project paper, and we will use the yearly disbursements presented in Table 5, the Cost Estimate and Financial Plan, in Section V.

Table 21 presents the two aspects of this proposition.

4. Analysis of the Results

Table 23 summarizes the different elements of this analysis.

On the benefits side, the benefits generated by the selected seeds component become really important only at the end of the project and increase afterward. This means that it is essential for the project to set up mechanisms which are self perpetuating after the end of the project.

The benefits of the credit component seem to disappear two years after the end of the project. As explained earlier, this does not reflect the reality, since in practice, credit and seeds components are closely interrelated and those benefits from credit which seem to vanish are in fact accounted for in the seeds component.

The assumption that has the most impact on the benefits level is the one regarding the percentage of the potential benefits of the selected seeds component which will be effectively obtained (60 percent in year one, 75% percent in year ten). It is our perception, however, that this is a realistic assumption, based on a practical knowledge of Africa and Senegal in particular, where things very seldom go as planned, unexpected obstacles appear, etc.

On the cost side, almost half is due to the credit component over the 10-year period of the project.

The computation of the internal rate of return (IRR) gives us a figure of 16.1 percent, given all the assumptions made in this paper. This is pretty high, but we think it makes sense. This project focuses on the two key bottlenecks of Senegalese agriculture: lack of good quality seeds and lack of credit for inputs. If the project manages to remove those two bottlenecks, it will have a tremendous impact on production.

TABLE J.13: Millet Potential Benefits Generated by the Seed Component
Years 1 - 10

	MILLET	1	2	3	4	5	6	7	8	9	10
1	Hectares cultivated ('000/ha)	1000	1005	1010	1020	1030	1040	1050	1050	1050	1050
2	Seed requirement (tons)	6000	6030	6060	6120	6180	6240	6300	6300	6300	6300
3	Turnover 1/3 (tons)	2000	2010	2020	2040	2060	2080	2100	2100	2100	2100
4	Use of certified seed (%)	10	15	20	25	30	40	50	55	60	60
5	Share of project in total certified seed (%)	10	15	20	25	30	40	50	50	50	50
6	Certified seed generated by the project (tons)	20	45	81	128	185	333	525	577	630	630
7	Potential increase in production generated by the project (tons)	-	1287	2895	5211	8235	11 902	21 423	33 775	37 121	40 530
8	Value of potential additional production generated by the project (\$'000)	-	129	289	521	823	1 190	2 142	3 377	3 712	4 053
9	Fertilizer [Area planted(ha)] requirements [Urea (tons)] to produce [NPK (tons)] additional tonnage	-	3333	7500	13 500	21 333	30 833	55 000	87 500	96 167	105 000
			167	375	675	1 067	1 542	2 775	4 375	4 808	5 250
			500	1125	2 025	3 200	4 625	8 325	13 125	14 425	15 750
10	Cost of fertilizer [Urea \$120] (\$'000) [NPK \$140] [Total]	-	20	45	81	128	185	333	525	577	630
			70	157	283	448	647	1 166	1 838	2020	2205
			90	202	364	576	832	1 499	2 363	2597	2835
11	Potential benefits generated by project (\$'000)	-	39	87	157	247	358	643	1 014	1115	1218

TABLE D.1 : Maize: Potential Benefits Generated by the Seed Component
Years 1 - 10

MAIZE	1	2	3	4	5	6	7	8	9	10
1 Hectares cultivated ('000/ha)	80	90	100	110	120	130	140	140	150	150
2 Seed requirement (tons)	1600	1800	2000	2200	2400	2600	2800	2800	3000	3000
3 Turnover 1/3 (tons)	534	600	667	734	800	867	934	934	1000	1000
4 Use of certified seed (%)	50	55	60	65	70	75	80	80	80	80
5 Share of project in total certified seed (%)	10	15	20	25	30	40	50	50	50	50
6 Certified seed generated by the project (tons)	27	50	80	120	168	260	374	374	400	400
7 Potential increase in production generated by the project (tons)	-	1482	2745	4392	6588	9 223	14 274	20 533	20 533	21 960
8 Value of potential additional production generated by the project (\$'000)	-	185	343	549	823	1 153	1 784	2 566	2 566	2 745
9 Fertilizer requirements [Area planted (ha)]	-	1350	2500	4 000	6 000	8 400	13 000	18 700	18 700	2 000
[Urea (tons)]		135	250	400	600	840	1 300	1 870	1 870	2 000
[NPK (tons)]		202	375	600	900	1 260	1 950	2 805	2 805	3 000
10 Cost of fertilizer [Urea \$120] (\$'000)	-	16	30	48	72	101	156	224	224	240
[NPK \$140]		28	52	84	126	176	273	393	393	420
[Total]		44	82	132	198	277	429	617	617	660
11 Potential benefits generated by project (\$'000)		141	261	417	625	876	1 355	1 949	1 949	2 085

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TABLE J.15: Irrigated Rice: Potential Benefits Generated by the Seed Component
Years 1 - 10

IRRIGATED RICE	1	2	3	4	5	6	7	8	9	10
1 Hectares cultivated ('000 ha)	20	25	30	35	40	45	50	55	60	65
2 Seed requirement (tons)	1600	2000	2400	2800	3200	3600	4000	4400	4800	5200
3 Turnover 1/3 (tons)	533	667	800	933	1067	1200	1333	1467	1600	1733
4 Use of certified seed (%)	20	30	40	50	60	70	80	80	80	80
5 Share of project in total certified seed (%)	10	15	20	25	30	40	50	50	50	50
6 Certified seed generated by the project (tons)	11	30	64	117	192	336	533	587	640	693
7 Potential increase in pro- duction generated by the project (tons)	-	385	1050	2240	4095	6720	11 760	18 655	20 545	22 400
8 Value of potential additional production generated by the project (\$'000)	-	41	111	236	432	709	1 242	1 970	2 188	2 386
9 Fertilizer [Area planted(ha)] requirements [Urea (tons)] to produce [NPK (tons)] additional tonnage		110	300	640	1 170	1 920	3 360	5 330	5 870	6 400
		22	50	128	234	384	672	1 066	1 174	1 280
		16	45	96	175	288	504	800	880	960
10 Cost of fertilizer [Urea \$120] (\$'000) [NPK \$250] [Total]		3	7	15	28	46	81	128	141	154
		4	11	24	44	72	126	200	220	240
		7	18	39	72	110	207	328	361	394
11 Potential benefits generated by project (\$'000)	-	34	93	197	360	591	1 035	1 642	1 827	1 992

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TABLE J.16: Rainfed Rice: Potential Benefits generated by the seed component - Rainfed Rice

	RAINFED RICE	1	2	3	4	5	6	7	8	9	10
1	Hectares cultivated ('000ha)	60	60	60	60	60	60	60	60	60	60
2	Seed requirement (tons)	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
3	Turnover 1/3 (tons)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
4	Use of certified seed(%)	10	15	20	25	30	40	50	55	60	60
5	Share of project in total certified seed (%)	10	15	20	25	30	40	50	50	50	50
6	Certified seed generated by the project (tons)	20	45	80	125	180	320	500	550	600	600
7	Potential increase in production generated by the project (tons)	-	273	613	1090	1704	2453	4 362	6 815	7480	8160
8	Value of potential additional production generated by the project (\$'000)	-	29	65	115	180	259	461	720	797	869
9	Fertilizer requirements [Area planted(ha)]		200	450	800	1 250	1 800	3 200	5 000	5500	6000
	[Urea (tons)]		30	67	120	188	270	480	750	825	900
	[NPK (tons)]		20	45	80	125	180	320	500	550	600
	additional tonnage										
10	Cost of fertilizer (\$'000)		4	8	14	23	32	58	90	99	108
	[NPK \$250]		5	11	20	31	45	80	125	137	150
	[Total]		9	19	34	54	77	138	215	236	258
11	Potential benefits generated by project (\$'000)	-	20	46	81	126	182	323	505	561	611

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TABLE J.17: Cowpeas: Potential Benefits Generated by the Seed Component
Years 1 - 10

	COWPEAS	1	2	3	4	5	6	7	8	9	10
1	Hectares cultivated (^{'000} ha)	80	85	90	95	100	110	120	125	130	135
2	Seed requirement (tons)	1,600	1,700	1,800	1,900	2,000	2,200	2,400	2500	2600	2700
3	Turnover 1/3 (tons)	533	567	600	633	667	733	800	833	867	900
4	Use of certified seed (%)	40	45	50	55	60	65	70	75	75	75
5	Share of project in total certified seed (%)	10	15	20	25	30	40	50	50	50	50
6	Certified seed generated by the project (tons)	21	38	60	87	120	191	280	312	325	337
7	Potential increase in pro- duction generated by the project (tons)	-	268	484	765	1,109	1,530	2,435	3,570	3978	4144
8	Value of potential additional production generated by the project (\$'000)	-	67	121	191	277	382	609	892	994	1036
9	Potential benefits generated by project (\$'000)	-	67	121	191	277	382	609	892	994	1036

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TABLE J.18: Total Benefits Generated by the Seed Component
Years 1 - 10

	1	2	3	4	5	6	7	9	10	
1 Potential increase in production generated by the seed component (\$'000 (1))	-	451	929	1,612	2,535	3,693	6,238	9,525	10,257	11,089
2 Assumptions regarding effective benefits generated by the seed component (%) and value of effective benefits (\$'000)	-	60%	60%	65%	65%	70%	70%	70%	75%	75%
	-	271	557	1,048	1,648	2,585	4,367	6,667	7,693	8,317
3 Less Cost of fertilizer (2) (\$'000)	-	150	321	569	900	1,304	2,273	3,523	3,811	4,147
4 Effective benefits generated by the seed component (\$'000)		121	236	479	748	1,281	2,094	3,144	3,882	4,170

(1) Sums of lines 8 of tables J.8 through 12
 (2) Sums of lines 10 of tables J.8 through 12.

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TABLE J.19: Benefits Generated by the Seed Component: Assumptions

	Millet	Maize	Irrigated Rice (paddy)	Rainfed Rice (paddy)	Cowpeas
Seed rate (kg/ha)	6	20	100	100	20
Average potential increase in production generated by using selected seeds and fertilizer	386	1 098	3 500	1 363	255
Fertilizer application (kg/ha)					
Urea	50 kg	100 kg	200 kg	150 kg	-
NPK	150 kg	150 kg	150 kg	100 kg	-
Type of NPK	0-15-20	0-15-20	18-48-0	8-18-27	
Crop price CIF Dakar	\$100	\$125	\$106.5*	\$106.5*	\$250

*Based on a CIF price of \$160 for broken rice from Thailand and a transformation coefficient rice/paddy of 66%.

Fertilizer prices (CIF Dakar):
 Urea: \$120
 0-15-20: \$140
 18-48-0: \$250
 8-18-27: \$250

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TABLE J.20: Benefits Generated by the Credit Component
Year - 10

	1	2	3	4	5	6	7	8	9	10	Total
1 Money available in Revolving Fund (\$'000) (see Table 21)	1000	2900	5610	8049	7244	6120	5868	5281	4753	4278	51 503
2 Additional fertilizer consumption generated by credit (%) and (\$'000)	50%	45%	40%	35%	30%	25%	20%	20%	20%	20%	
	500	1105	2244	2817	2173	1630	1172	1056	951	856	
3 Less fertilizer used on selected seeds generated by project	-	150	321	569	900	1304	2273	3523	3811	4147	
4 Fertilizer purchase generating benefits for credit component	500	1155	1923	2248	1273	326	-	-	-	-	-
5 Value of additional production generated (benefits of credit component) [(4) x 1.4]	700	1617	2692	3147	1782	456	-	-	-	-	10 394

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**TABLE J.21: Credit Revolving Fund and Cost of Credit
Years 1 - 10**

		\$ '000	1	2	3	4	5	6	7	8	9	10	Total
Hypothesis 1 10% decapitali- zation	Dollar funds	1,000	2,000	3,000	3,000	-	-	-	-	-	-	-	9,000
	Revolving fund (dollars equivalent of CFAF (1))	-	900	2,610	5,049	7,244	6,520	5,868	5,281	4,753	4,278	4,278	42,503
	Total A	1,000	2,900	5,610	8,049	7,244	6,520	5,868	5,281	4,753	4,278	4,278	51,503
Hypothesis 2 7% interest on the account	Dollar funds	1,000	2,000	3,000	3,000	-	-	-	-	-	-	-	9,000
	Revolving fund	-	1,070	3,285	6,725	10,406	11,134	11,914	12,747	13,639	14,594	14,594	85,514
	Total B	1,000	3,070	6,285	9,725	10,406	11,134	11,914	12,747	13,639	14,594	14,594	94,514

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**TABLE J.22: COMPUTATION OF A NATIONAL AVERAGE
BENEFIT/COST RATIO FOR FERTILIZER**

Assumptions:

- Reference year: Year 3 of project.
- Fertilizer is applied on 2/3 of the area planted with selected seeds as per recommendation (for irrigated rice 90%)
- Fertilizer is applied on 10% of the areas planted with ordinary seed as per recommendation (for irrigated rice 25%).
- Prices of fertilizer: \$/MT

Urea:	120	C.I.F. Dakar.
0-15-20	140	
18-48-0	250	
8-18-27	250	
- Prices of output:

Millet:	100	C.I.F. Dakar
Maize:	125	
Paddy:	106.5	

Yield Increases (kg/ha)	Millet	Maize	Irrigated Rice	Rainfed Rice
With selected seeds	460	1 098	3 500	1 363
With ordinary seeds	311	598	2 000	503

Fertilizer Application (kg/ha)	Millet	Maize	Irrigated Rice	Rainfed Rice
Urea	50	100	200	150
0-15-20	150	150	xx	xx
18-46-0	xx	xx	150	xx
8-18-27	xx	xx	xx	100

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Tables J.22: (Cont.) Computation of a National Average Benefit/Cost Ratio for Fertilizer

	Millet	Maize	Irrigated Rice	Rainfed Rice	Total
Hectarage ('000 ha) with selected seeds & fertilizer:	133	40	11	8	
Hectarage w/o selected seeds, with fertilizer	81	4	5	5	
Yield increases (MT):					
- With selected seed and fertilizer	61 180	43 920	38 500	10 904 _w	
- Without selected seeds, with fertilizer	25 191	2 392	10 000	2 815	
Total	86 371	46 312	48 500	13 719	
Value of additional production (\$'000)	8 637	5 789	5 165	1 461	21 052
Fertilizer used (tons):					
- Urea	10 700	4 400	3 200	1 950	
- NPK	32 100	6 600	2 400	1 300	
Cost of fertizer used (\$'000):					
- Urea	1 284	528	384	234	2 430
- NPK	4 494	924	600	325	(343
Total	5 778	1 452	984	559	8 773

Average benefit/cost ratio: $\frac{21\ 052}{8\ 773} = 2.40$

TABLE J. 23: Costs and Benefits of Project and IRR
 Years 1 - 10
 (\$'000)

COSTS AND BENEFITS	1	2	3	4	5	6	7	8	9	10
1. Effective benefits generated by the seeds component	-	121	236	479	478	1281	2094	3144	3882	4170
2. Benefits of credit component Table I.F.20, line 5	700	1617	2692	3147	1782	456	-	-	-	-
3. Total benefits [(2) + (3)]	700	1738	2928	3626	2530	1737	2094	3144	3882	4170
4. Cost of credit component	-	170	505	1001	1486	1452	1432	1420	1420	1430
5. Other Costs	2350	2540	2650	1910	1550	-	-	-	-	-
6. Total costs [(4) + (5)]	2350	2710	3155	2911	3036	1452	1432	1420	1420	1430
7. Benefits minus costs [(3) - (6)]	(1650)	(972)	(227)	715	(506)	285	662	1724	2462	2740

IRR: 16.1%

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ANNEX K

ENVIRONMENTAL ASSESSMENT

AGRICULTURAL PRODUCTION SUPPORT PROJECT (685-0269)

ENVIRONMENTAL ASSESSMENT

**ANALYSIS OF PESTICIDE USE IN THE SENEGAL/USAID
AGRICULTURAL PRODUCTION SUPPORT PROJECT
(685-0269)**

Prepared for: USAID/Senegal

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LIST OF ACRONYMS

ADO	Agriculture Development Officer
AID/S	Agency for International Development/Senegal
AID/W	Agency for International Development/Washington
APS	Agricultural Production Support
CFR	Code of Federal Regulations
CICP	Consortium for International Crop Protection
DPV	Direction de la Protection des Végétaux
EA	Environmental Assessment
EEC	European Economic Community
FAC	Food and Agriculture Organization
GOS	Government of Senegal
GTZ	German International Development Agency
IEE	Initial Environmental Examination
IPC	Integrated Pest Control
ISRA	Institut Sénégalais de Recherches Agricoles
ITA	Institut de Technologie Alimentaire - Dakar
MRD	Ministry of Rural Development
NAP	New Agricultural Policy
PID	Project Identification Document
PP	Project Paper
PVC	Private Voluntary Organization
RDA	Regional Development Agency
SAED	Société d'Aménagement et d'Exploitation des Terres du Delta et de la Vallée du Sénégal et de la Falémé
SODEVA	Société de Développement et de Vulgarisation Agricole
SOMIVAC	Société pour la mise en valeur de la Casamance
SS	Service Semencier
SSEPC	Société Sénégalaise d'Engrais et de Produits Chimiques
ST/AGR	Office of Agriculture of AID Bureau of Science and Technology
USEPA	United States Environmental Protection Agency
WHO	World Health Organization

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I. SUMMARY AND RECOMMENDATIONS

The goal of the Agricultural Production Support Project is to increase production and marketing of such crops as millet, sorghum, maize, rice and cowpea. The project facilitates the privatization of import distribution and cereals marketing by strengthening the system for producing certified seeds; expand the private sector through lines of credit, and improving the agricultural statistics base.

The project will not be purchasing or directly using pesticides. The project will be promoting the use of improved inputs, including pesticides, however. Specifically the project could support pesticide use through lines of credit to farmers, seed producers, and private pesticide distributors. Support will also be provided to the research and seed multiplication units of ISRA and the seed storage and distribution organization (S.S.). Both will be using plant protection and stored product protection chemicals. Because of a potential environmental impact of the chemicals, a detailed Pesticide Use Analysis is provided in accordance with AID regulation 216 (Section 216.3 (b) 1 (1)). Its purpose is to review the risks involved, to identify environmental consequences, and to suggest protective measures.

A list of requested pesticides is provided and their authorization for use within the project is indicated. Their accepted use patterns are discussed and special hazards are mentioned with recommendations towards their ameliorization. The report terminates (Section IX) with a list of seven specific actions needed to place the project in conformity with the intent of the regulations.

It is anticipated that only limited quantities of pesticides will be used during seed multiplication and storage. If only prescribed chemicals are used and are applied by trained individuals minimal risks will be involved. The goal of the project is to enhance production through improved inputs creates the potential for more serious environmental impacts. The tools for enhanced production include high yield cultivars, high fertility, irrigation, monocropping, continuous cropping, dense plant stands, etc. While these inputs result in increased yields, pest problems are frequently aggravated. The FAO estimated crop losses of 40-50 percent due to pest attacks may be increased under condition of intensified agriculture. Project participants should be alerted to the potential for greatly increased crop losses and that some cultural modifications may provide a first line of defence. Credit, increased crop values per hectare, better markets, and input promotion, along with possible increases in pest induced crop losses could lead to greatly increased pesticide usage (and misuse). In the opinion of the author, however, if the specific actions listed in Section IX are adhered to, the risks involved in pesticide use will be reduced to an acceptable level and are readily offset by the benefits from increased food production and an improved standard of living for the farmers.

Relative to the design of the Project the following recommendations are emphasized:

1. The chlorinated hydrocarbons including dieldrin and HCH have no approved uses in the APS project. It is recommended that, to the extent feasible, credit should not be issued where there exists evidence of their purchase or use.
2. The higher toxicity and restricted pesticides should be deleted from in-farm demonstration by RDA's and should not be promoted during the media campaign.
3. Pesticide formulators and distributors should be encouraged, or required where credit is involved, to provide adequate label information on toxicity, disposal, and environmental hazards including the toxicity.
4. Demonstration plots funded by GOS and conducted by various parastatal organizations should be conducted under controlled conditions and serve to demonstrate good IPC practices.
5. The media campaign should be utilized in a strategy to educate the public in the practice of good pesticide management. Short-term expertise should be utilized to review the appropriateness of the crop protection information disseminated.
6. IPC seminars and workshops on IPC and pesticide management for in-country personnel should receive strong consideration in the training component.
7. The proposed agricultural statistical service should be expanded to include information on pesticide use and crop loss. Possible changes in pesticide use patterns should be reviewed annually along with other project activities and impacts.
8. The establishment of a national or regional pesticide residue and analytical laboratory is strongly encouraged and the ITA should receive serious consideration for its operation.
9. Treated seeds should be marked with suitable dyes and the sacks should be so marked. Sacks should emphasize "not for human or animal consumption".

II. PROJECT DESCRIPTION

A. Purpose and Goals

Senegal, a food deficit country, seldom-exceeds 50 percent of its requirements in cereal production. The goal of the APS Project is to increase cereals production and marketing thus reducing the deficit. This is consistent with USAID's strategy to assist the GOS to reduce institutional and infrastructure impediments to the growth of agricultural production and income generating activities that contribute to both environmental protection and increased agriculture production.

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Under the New Agricultural Policy (NAP) the GOS is departing from its earlier overcontrol of the agriculture sector and is attempting to rely more on the private sector for input supply and marketing. The APS Project facilitates the privatization of input distribution and cereals marketing by strengthening the system for producing certified seeds; expand the private sector activity through lines of credit, and improving the agricultural statistics base.

A predominantly private seed multiplication and distribution system will be providing up to 2200 tons of certified seeds. This is sufficient to plant over 250,000 hectares of rice, corn, millet and sorghum. Through the use of improved seeds, fertilizer and other inputs including pesticides, cereals production is expected to increase by over 500,000 tons by the end of the project.

The APS project will be serving a broad range of farming enterprises in Senegal. They will be mainly in the central dryland farming zone ("Peanut Basin"), in the irrigated rice farms on the Senegal river and in the rice/maize and the millet/peanut farms of the Casamance.

B. The Environment Affected

Senegal covers an area of about 197,000 km² (76,042 mi²) (+/- the area of South Dakota). It is located in the Sahelian, Sub-Saharan and the Sudanian to the sub-Guinean zones. Historically, rainfall averages have ranged from 330 mm at Podor in the north to 1800 mm at Ziguinchor in the south, but precipitation and distribution can vary widely from year to year. In the 26 years since independence, Senegal's agriculture has been struck by drought no less than seven times.

Rainfed cropping areas are estimated at 2.5 million hectares (6 million acres). About 1 million are planted to Pearl millet and sorghum, and 1.1 million to peanuts. About 80,000 are planted to maize, 60,000 to rainfed rice paddy, and 80,000 to cowpeas. Other rainfed crops include cotton, fruit trees, and manioc (cassava). In addition, Senegal's irrigated crop production covers a total of 39,000 ha, including rice (20,000 ha), sugar cane (7,000 ha), fruits and vegetables (8,700 ha) and other food crops (3,300 ha).

C. Population

Senegal's population in mid-1985 was estimated at six million with a 2.9% growth rate per year. The rural population makes up 20% of the total and is increasing at about 2.1% per year in spite of considerable migration to urban areas. Nearly 60% of the population lives in the Peanut Basin which covers 35% of the country's area. This is the major rainfed millet and sorghum growing region.

Farm enterprises benefitting from the project are small; about two-thirds are less than 5 hectares and 90 percent of all farms are less than 10 hectares. It is these farmers who are the most intensive users of seed, fertilizer and other inputs in an attempt to gain higher yields.

D. Relationship to Other Activities

The Production Support Project is multifaceted and will have interaction with numerous activities of USAID, GOS and other donors. Of specific interest are two seed multiplication projects. The GOS/USAID Casamance Regional Development Project concentrates on rice production. Program components consist of extension activity, research, field testing, and seed multiplication activities. The project conforms to AID's Environmental Procedures and is in a transition stage. The GTZ Projet de Mais is involved in the production, testing and multiplication of maize seed. This project is not subject to AID's Environmental Procedures. Precaution must be taken to assure that adverse pesticide use practices associated with this project are not promoted as a result of the APS project.

III. ACTION LEADING TO ASSESSMENT OF PESTICIDE USE

The purpose of the Environmental Assessment is to examine the foreseeable positive and negative impacts of the proposed project on the human and natural environment, propose measures to reduce or eliminate any such negative impacts and assure that any recommended environmental protection subcomponents are adequately incorporated into the project. This analysis is done in conformance with AID's Environmental Procedures (22 CFR Part 216).

The APS project will be neither procuring nor directly using pesticides. The project will be promoting the use of improved production inputs including pesticides, however. Specifically the project will be supporting pesticide use through lines of credit to farmers, seed producers and private pesticide distributors. Support will also be provided to the GOS agricultural research and seed multiplication unit (ISRA) and the GOS seed storage and distribution unit (DPCS/SS). Both are within the Ministry of Agriculture (MRD) and will be utilizing plant protection and stored product chemicals. Consequently, the project is subject to the provisions of 22 CFR 216.3 regarding the use of pesticides.

This pesticide use analysis forms the bulk of the E.A. The PID and AID/W review called for an E.A. of the pesticide use aspects of this project to be carried out as an integral part of the PP development. The purpose of this analysis is to identify appropriate and safe pesticides which can be procured or used under the project, the integrated pest control research needs, needed GOS pesticide policy reforms, training requirements, technical assistance needs and procedures for packaging, distribution, storage and disposal of pesticides.

IV. PESTICIDE USE ASSESSMENT

A. Basis for Selection of Pesticides

The guiding principles underlying the selection of pesticides to be used in association with any AID project include: conformity with AID and Host

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Country regulations; effectiveness for demonstrated crop protection needs under prevailing environmental conditions; minimization of human and environmental hazards; and promotion of the IPC approach. These concerns are addressed in detail in the following sections of this E.A.

The approach taken for the purposes of this E.A. is to evaluate the acceptability of a number of pesticide products which are currently available and used in Senegal. Additional materials which may be requested in the future will also be authorized.

Information on pesticide availability and current and projected pest problems came primarily from interviews with agrochemicals retailers, wholesalers and formulators, (SSEPC), ISRA seed multiplication and seed processing, storage, and distribution (DPCS/SS) personnel, the Division of Crop Protection (DPV), Projet de Mais manager, and from the consultants earlier (1983) experience in conducting the E.A. on rice production in the Casamance.

The project will be concentrating on the major cereal crops, millet, sorghum, maize, rice, and cowpea or niebe. Pest problem on these crops may be many but those receiving treatment are few. Pest problems that were mentioned during the interview process include the following. General pests on all of the crops are grasshoppers and termites along with weaver birds and rodents. Stem borers (*Chilo* spp.), armyworm (*Spodoptera exempta*) and *Diopsis thoracica* are the major insect problems on the rice crop. Rice blast and leaf spot (*Cercospora*) are problems at least in the Casamance. The fuzzy catapillar (*Amsacta moloneyi*) attacks both millet and cowpea. Millet is also damaged by millipedes, nematodes, mildews and rusts. Major pests on sorghum and maize are the stem borers. Cowpea is susceptible to damage by aphids, thrips, bruchid weevils, and leaf spot. Seed storage pests are serious on all commodities as is damping off of the seedlings. Except for protection of seed crops pesticides have been seldom used for protection of the standing crops.

The principal products being used at this time to control cereal pests and diseases in Senegal include: Propoxur (Baygon), fenitrothion (Sumithion), malathion, cypermethrin, pirimiphos M. (Actellic), phostoxin, endosulfan (Thimul), bromophos (Nexion), deltamethrin (Decis), lindane (HCH), diazinon (Gramox), heptachlor, carbon tetrachloride (Trogocide), benomyl, maneb and captan fungicides. Herbicides tamariz and 2,4-D are occasionally used on rice as well as atrazine (Gesaprime) used in maize. Various anticoagulents are used in baits for rodent control.

B. Registration Status of Requested Pesticides

The pesticides listed in Table 1 are either available and used in Senegal at the present time or are judged by the consultant as likely to be requested over the course of this project. In accordance with AID Regulation 16, the table indicates whether each material is registered by the USEPA for General Use, Restricted Use by certified applicators, or cancelled for uses related to this project. The LD₅₀ and WHO toxicity classification is also provided for

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each product. Products approved for this project are indicated by a "+" and those not approved are indicated with a "-" in the column headed "Project Authorization".

The list of project approved pesticide materials which follows should be viewed as flexible, that is, to be modified as needed in response to conditions such as changes in AID or GOS regulations or policies, or the development of unforeseen pest problems. Requests for the authorization of additional chemicals may be made and will be evaluated on a case-by-case basis by USAID/Senegal, AID/AGR Bureau Environmental Officer and AID/W. Similarly, based on new information or regulations products may be removed from the authorized list.

Table 2 indicates the currently approved crop uses for products authorized in this project. The table may be updated as additional information becomes available and/or additional crops are added. Uses not authorized in Table 2 may be approvable if a special need is demonstrated. In such a case ST/AGR is prepared to advise and assist AID/Senegal in an effort to gain special need or minor use clearances. In most cases, however, it will be more cost effective to seek suitable alternative pesticides already registered for that use.

As a rule, pesticides should be used only on those crops for which residue tolerances have been established by the EPA or for which maximum residue limits (MRL) have been recommended by the WHO/FAO joint expert meeting on pesticide residues. For crops intended for domestic use (vs. for export), the existence of WHO/FAO recommended MRL's and/or registration for the same or similar use in selected other countries (such as EEC countries) may be considered sufficient.

Explanation and Specific Recommendations Accompanying Tables 1 and 2

The EPA has ruled that on the basis of environmental and human hazards, aldrin, dieldrin, chlordane, heptachlor and mirex cannot be used for agricultural purposes, therefore, they should not be funded by nor used in this project.

A number of products which are restricted to use by certified applicators are used in Senegal but cannot be used safely by untrained individuals who usually cannot be expected to follow label instructions calling for special application equipment and protective clothing, particularly in hot climates. These materials should be used in the project only for research and demonstration purposes or for seed multiplication and storage protection and they should be applied by or under the direct supervision of MRD personnel or the various parastatal organizations. They should not form the basis of crop protection methods intended to be extended via the media campaign, to farmers untrained in the safe use of such materials.

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Most formulations of carbofuran are currently restricted by the EPA to use by certified applicators. While the higher concentration of flowable and wettable powder formulations are considered significantly hazardous to the user, lower concentration granular formulations are restricted primarily on the basis of hazard to wildlife. Carbofuran is authorized for use in the project only as a granular formulation containing 5 percent or less of the active ingredient.

Captan is currently under special review by the EPA; its general use in this project is authorized at present, but this status may change if further regulatory action is taken by the EPA.

A number of other pesticides approved for use in this project including chlorpyrifos, endosulfan, and metam sodium are registered for general use by the EPA but possess a high acute toxicity and present significant hazards to untrained users. It is critical that label requirements regarding protective clothing and application practices be enforced when these products are used. The consultant also recommends that low-toxicity formulations of these products be used wherever possible. Seed treatments and granulars with low concentration of active ingredients are generally preferable to emulsifiable concentrates and are recommended whenever they can be used. However, great care should be taken to ensure that mixing and application are never done with bare hands.

2,4-D is registered for general use in the U.S. and is approved for use in this project, but its use is not recommended. A number of countries have taken legislative action against the compound, and in general there is no need for its use in this project.

Clearly, the hazards involved in the use of the fumigants, methyl bromide, carbon tetrachloride and phostoxin limit their use only to highly trained and reliable applicators. Special precautions are needed to restrict the treatment area, for protective clothing and masks, and proper ventilation following application. It should be understood that some of these treatment affect seed germination and it is necessary to control dosage and exposure time very carefully.

C. Relationships of Proposed Uses to Integrated Pest Control

The project paper does not lay out specific research plans and research does not represent a major component of the project. However, IPC strategies may develop fortuitously during various project activities. For example, during variety trials, records should be noted concerning differences in pest susceptibility. Rice varieties are being grown in the Casamance with resistance to rice blast and rice weevil and to some species of corn borer. Resistance is extremely useful where fungicide use is not cost-effective, such as with rice blast in upland rice and with Helminthosporium blight in corn and sorghum.

Pesticides are not widely used on growing crops in Senegal. This is due to a variety of factors including that of limited economic resources and to limited benefits under condition of overall low productivity. The economic threshold concept has not been utilized under these conditions. However, with the potential for greatly increased yields with improved varieties and seeds as well as more inputs, the use of the economic threshold becomes of much greater significance. Under such conditions, pesticide treatment may become cost effective in fields where it was not previously so.

While some efforts have been undertaken to survey the pest species on cereals, the natural enemy complex is poorly understood. More information in this area is needed in order to anticipate such problems as the whitefly outbreak in rice following the use of carbaryl in Burkina Faso. Pesticides should be selected and used where there is the least likelihood of affecting natural enemies. For example, carbofuran applied as a granular system will have less of an impact on parasites than several applications of a foliar pesticide.

Cultural control methods offer the most promise in an Integrated Pest Control program, since they require minimal diversion from traditional production methods. There exist potential hazards when there is a shift from traditional methods as is proposed in the APS project. For example varieties with susceptibility to previously minor pests may inadvertently be introduced. Further some rice varieties increase in susceptibility to blast and sheath blight when nitrogen is added. Any change in the farming system such as failure to destroy stubble, continuous cropping, time of planting, spacing, early harvest etc. can have serious impacts on pest populations.

In the case of seed storage it is essential that warehouse and grading area sanitation be practiced in addition to pesticide use. The stores should be thoroughly cleaned and sprayed prior to use and untreated seed likely to be infested should not be stored with healthy treated seed. The stored seeds should be inspected regularly and fumigated where necessary. Pesticide alternatives include the use of microbial insecticides such as dipel against such pests as Indian Meal Moth. Non-chemical methods currently practised in Senegal include storage in hermetically sealed drums and cold storage of valuable seed lines. Improved pesticides of low mammalian toxicity such as chlorpyrifos methyl (Reldan) should be tested in Senegal.

D. Proposed Methods of Application and Availability of Equipment and Protective Clothing

One objective of the APS project is to phase out treatment of farmer fields by DPV personnel and by various parastatal organizations. Application will gradually be assumed completely by the farmer. ISRA and DPCS/SS staff will continue to be responsible for treatment during seed multiplication and storage and distribution activities.

Application of pesticides to standing crops is done almost exclusively with small hand operated 15 liter tank back pack sprayers. Where spraying activities were observed there was adequate protective clothing in evidence and use.

Seed treatment equipment is modern and effective among various project components. The regional seed handling center at Diourbel had pesticide (bromophos) and fungicide (Benomyl-Maneb) application as an integral part of the grading and bagging operations. A self metering device for treating seed with liquid malathion is in operation for rice seed treatment in the Casamance. A large portable unit was observed which is available for application and venting of methyl bromide to large storage areas under plastic.

Pesticide storage was well provided for at most locations visited. Usually a dry, concrete, well-ventilated structure, separate from other facilities was available for pesticide storage.

E. Acute and Long-Term Toxicological Hazards

Whenever pesticides are used there is the risk of excessive exposure resulting in toxicological effects, both to individuals directly involved in their use and to the general public through residues on foods and contamination of drinking water.

The acute toxicity ratings of the proposed pesticides are listed in Table 1. The toxicity values and categories are derived from the WHO recommended classification of pesticides (FAO Pl. Prot. Bul. 28(1), 1980). This classification is based largely on acute oral toxicity, i.e. effects of swallowing a single dose of liquid formulation. Adjustments have been made for some compounds. Ingestion of a teaspoon or less of those materials in Category I may be fatal to one out of two 68kg men. Category II would require a tablespoon, III more than a tablespoon, and those in IV are considered unlikely to produce acute hazards in normal use. Hazard is greatly influenced by formulation and is considered in evaluating the product. For example, low percentage granular formulations are considerably less hazardous than concentrated liquids.

Of the pesticides authorized for use in the project, (except for fumigants) only carbofuran is classified as highly hazardous. As discussed in Section IVB, however, this hazard is appreciably reduced when using low-percentage granular formulation.

Generally, acute toxicity is more of a constraint among the insecticides and nematocides than among the fungicides or herbicides. However, a conscious effort to reduce toxicological hazards in every use pattern should be adhered to. If the authorized pesticides are used in the manner prescribed on the manufacturer's label, including shipping, storage, application, pre-harvest restriction, and safe disposal of pesticide containers, an unacceptable risk will not occur.

Fumigants authorized for use in the APS project represent a special toxicological hazard. The hazard is not based on oral toxicity, but on inhalation. The applicator should be able to vacate the area immediately following release of the toxicant, since this is the period of greatest risk. The applicant should never be without assistance and ventilation procedures should be immediately available.

The long-term toxicological hazards to the APS project are particularly difficult to assess. With an attempt to transfer crop protection responsibilities to the private sector it is possible that a greatly increased use may result. The long-term effects of this use pattern will require extensive monitoring (See Section IV L).

F. Effectiveness of the Selected Pesticides for the Proposed Use

The pesticides were selected after consultation with DPV, ISRA, DPCS/SS and SS EPC personnel and are presumed effective under the various conditions of Senegal. All are widely used, non-experimental pesticides with recognized efficacy against specific pests. Some adaptive research by ISRA and others may be required to determine optimal dosages, however.

Pesticide efficacy relative to termite control as well as seed treatment require special consideration. BHC and dieldrin used in Senegal for termite control have had their uses cancelled in the U.S. Such cancellation was based on their effects on non-target organisms and accumulation in the body tissues of most animals. Alternative materials to be evaluated include chlorpyrifos, fenitrothion, and Orthene.

There have been some indications that stored product pests may be developing resistance to malathion. Alternative effective materials include pirimiphos and bromophos. Chlorpyrifos-methy (Reldan) produced by Dow Chemical Co. has recently been approved for use on stored grain in the U.S. It has a low acute oral toxicity in the area of malathion and pirimiphos. Environmentally, the compound is toxic to aquatic organisms, of low toxicity to mammals and birds, and does not appear to have chronic toxicity potential.

The simplicity of use and effectiveness of phostoxin has made it the first choice over such materials as methyl bromide or carbon tetrachloride for fumigation of stored seeds. However, resistance is reported from several countries. Should a reduction in effectiveness occur, it is recommended that the Tropical Development and Research Institute in London be contacted for advice.

A number of fungicides, including captan, benomyl and maneb are being requested for seed treatment. The materials are used to control a complex of root rot and damping-off diseases. All are registered for use in the U.S. without restriction, and are of a low mammalian toxicity.

G. Compatibility of Pesticides with Target and Non-Target Ecosystems

Many of the pesticides authorized for use in this project were selected on the basis of their low mammalian toxicity. However, some present significant potential hazards to non-target organisms. Of particular concern is their effects on beneficial insects and on fish and other aquatic organisms.

Where an aquatic environment dominates, such as La Basse Casamance it may be necessary to impose restrictive measures on pesticide use. A number of materials authorized for use on rice are highly toxic to fish and shrimp, e.g.

carbofuran, endosulfan and chlorpyrifos (see Table 1). These materials would present an unacceptable risk to wildlife if used near natural waterways. Because of low productivity, pesticides are not currently used in mangrove rice systems. Their use can only be economically justified for valley or irrigated lowland rice, some distance from river estuaries.

The APS project may result in changes in productivity and pesticide use patterns, however. It is essential that MRD personnel and other applicators be thoroughly educated to the hazards of waterways contamination. Parameters delineating areas which should remain free of specific hazardous pesticides must be determined. Further, applicators should be alerted to the hazards associated with filling sprayers, washing equipment, protective clothing or themselves in waterways or other water resources.

Currently marketed pesticides have information provided concerning toxicity to bees. Pesticides should not be applied during periods of bee activity and those indicated to be hazardous in Table 1 should not be used around bees at any time.

While a number of beneficial insect species have been identified by ISRA, there is little information available concerning their relative importance as natural enemies of insect pests in Senegal. It is thus important that pesticide users be alerted to the possibility of pest insect resurgence as the use of non-selective, broad-spectrum, pesticides increases.

Finally, if pesticides are not applied in a careless and indifferent manner nearly all impacts on non-target ecosystems can be avoided. None of the authorized materials are especially persistent or bioaccumulative and build-up is not anticipated in non-target ecosystems.

H. Conditions Under Which The Pesticides are to be Used

Pesticides are not widely used on cereals in Senegal, and because of costs are not likely to be used in quantity. Pesticides are made available and/or applied without charge by DPV agents. More commonly, farmers are buying their own sprayers and DPV is supplying the pesticide. With the goals of the NAP it is expected that GOS pesticide provision will be gradually phased out.

Within the APS project, pesticides will be used by ISRA personnel during seed multiplication, by their contracting farmers, and by DPCS/SS personnel during seed processing and storage. In most instances the applicators are familiar with the precautions required.

Demonstration plots utilizing pesticides will be established by various parastatal organizations utilizing GOS funds. These trials should be conducted under controlled conditions and serve to demonstrate good Integrated Crop Protection concepts.

I. Availability and Effectiveness of Other Pesticides or Control Methods

There exist at least two pesticide formulators and wholesalers in Senegal. A wide variety of pesticides, some highly toxic and some with uses

cancelled in the U.S., are readily available on the open market in Senegal. Many of these possess acute toxicological characteristics which result in unacceptable risks to the untrained user. Pesticides are repackaged in small lots, often with inadequate labels and precautionary statements. For the most part they are being purchased for its control of household pests or by farmers for protection of vegetables. The APS project can make a significant contribution to good pesticide management practices by focused education through its mass media program.

There exist national and international varietal improvement programs for the pertinent cereal crops. Insect and disease resistance in a major component in the programs. In time it is expected that varieties suitable to Senegal will be available and useful in reduction of pesticide needs.

Alternative control methods are of limited value if significant increases in yield are to be realized. The use of Neem, smoke, or wood ashes may be of some on-farm value but are ineffective when facing serious crop losses.

J. Ability of Senegal to Regulate the Distribution, Storage, Use and Disposal of Pesticides

Pesticide legislation in Senegal is based on two Decrees: previously Number. 8322 and currently Decree Number 84-14 that requires that only pesticides registered in Senegal may be sold or distributed. Decree No.4747 regulates various aspects of packaging. As is the case in many developing countries, however, the Ministry of Agriculture lacks the necessary manpower to enforce the regulation.

Because in the past pesticide use was largely limited to MRD staff there was some degree of control of their use. With the NAP and the privatization of pesticide use there is a real potential for serious misuse. Under this threat it becomes essential to review crop protection procedures, establish regulations and guidelines for the safe storage of pesticides and equipment, and to develop train-the-trainer programs so farmers can be educated in the safe use of crop protection chemicals. Finally, plans should be formalized to provide for proper disposal of surplus pesticides and pesticide containers.

K. Provisions Made for Training Users and Applicators

In the area of training and extension linkages between public activities and the farmers there will be demonstration trials with improved seeds and publication of the results. They will also demonstrate the benefits of pesticides. The information will be made available to the farmers through extension agents and on rural radio broadcasts.

The media campaign, as a major APS project component, can serve as an effective pesticide management training strategy. The campaign will include training and production of local media materials involving TV, radio, films, articles and posters and instructional brochures and fliers. Various

objectives of the campaign relate well to pesticide training. Specifically these include demonstrating the benefits of appropriate pesticide use and dissemination of instructional and 'how to' information on the use of crop protection chemicals. While the farmers are the primary target, it is expected that the program will also positively influence school children, teachers, private sector businessmen and key officials. Because of the importance of this campaign, it is recommended that short-term expertise be utilized to review the appropriateness of the crop protection information to be disseminated.

Unfortunately the Integrated Pest Management Training Center Project in Senegal has terminated at the end of the Project. The APS project identifies a estimated total training effort valued at \$800,000. Specific training programs are not fully elucidated but training of in-country personnel and the presentation of IPC seminars and workshops should receive strong consideration.

L. Provisions Made for Monitoring the Use and Effectiveness of the Pesticides

Until now the DPV provided pesticides, equipment and sometimes the actual application for the farmers. Under such a system it was possible to closely monitor pesticide use to govern pesticide selection and to determine effectiveness. As the NAP phases in and the responsibility shifts to the farmer, the advantage of pesticide control is lost and monitoring its use becomes more difficult.

As noted in the PID, the PP design team was obligated to devise a monitoring system that will monitor the environmental issues raised in the IEE. There exists a real potential for increased pesticide use in cereals as a result of this project. It is essential that surveys on changes in pesticide use practices be incorporated into the annual review of project activity and the annual project impact assessment.

An improved agricultural statistical service is a strong component in the APS project. The system should be able to provide rapid and reliable reports on the planted area, periodic reports during the growing season on crop conditions and estimates of yield. It is strongly recommended that the survey be expanded to include information on pesticide use and crop loss estimates, thus providing a quasi-monitoring for changes in pesticide use patterns.

Finally, there are no facilities in Senegal suited to the monitoring of pesticide residues or pesticide exposure to the applicator. This represents a serious constraint in pesticide monitoring. Of the institutions visited, the Food Technology Institute (Institute Technologie Alimentaire or ITA) should receive strong consideration if funding should become available for the creation of a pesticide residues monitoring facility.

V. REASONABLY FORESEEABLE IMPACT OF ACTION ON THE HUMAN ENVIRONMENT

Any pesticide added to the environment will have at least a marginally

disruptive impact on that environment. Pesticides are not extensively used on cereals and except for protection of seed crops no great increase is expected as a result of this project. However, it may be reasonably expected that background levels of pesticides will increase in the human environment. The pesticides selected for use in cereal protection are of low mammalian toxicity and are not known to be bioaccumulative. Increases in background levels and potentially disruptive impacts on the human environment will be minimized if selected, low risk pesticides are used on a sound, as-needed basis, alternative management strategies are utilized where feasible and education on the safe use of pesticides is provided.

VI. ALTERNATIVES TO THE PROPOSED ACTION

If the APS project is to reach its projected goal of a 500,000 ton increase in cereal production by the end of the project, it is clear that some level of chemical crop protection must be utilized. While traditional, non-chemical methods of crop protection may be utilized in specific crop pest situations, there remains no satisfactory alternatives to the use of chemicals in the pest control program.

VII. UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Unavoidable effects of pesticide use include increased risks for accidental human exposure, effects on non-target organisms, and an increase in background levels of pesticides in the environment. As discussed previously, it is essential to avoid excessive and indiscriminate use of pesticides. The selective use of pesticides only when and where needed is the surest way to reduce these disruptive effects to an acceptable level in the risk/benefit ratio.

VIII. RELATIONSHIP BETWEEN SHORT-TERM AND LONG-TERM EFFECTS OF PROPOSED ACTION

Pesticide use involves risks including environmental impacts caused by routine use as well as accidental release. As discussed above, such impacts will be minimized within the project as a result of mass media education on good pesticide management and through the selection of low hazard pesticides. There is not expected to be a great increase in pesticide use on cereals as a result of the APS project. Thus, the long-term effects are not likely to be seriously adverse ones. However, a monitoring of pesticide use patterns for the life of the project and beyond would provide an opportunity to avoid potential long-term adversities.

Among the tangible long-term benefits of the project in a more than 500,000 ton increase in cereal production at an estimated current value of \$100 million, a low volume of imported rice, additional income for the farmers, increased off-farm employment, and a generally increased standard of living. The intangible benefits include; reestablishing a viable private sector trading system, increased reliability of the information base from improved statistic gathering and the "spread-effect" of farmers following their neighbors use of improved seeds, fertilizer, crop protection, and other

innovations. Such long-term effects of the project would appear to adequately offset the short-term and largely manageable risks involved in the use of pesticides within an integrated pest control mode.

IX. SPECIFIC ACTIONS NEEDED TO PLACE THE AGRICULTURAL PRODUCTION SUPPORT PROJECT IN CONFORMITY WITH THE INTENT OF AID REGULATION 16

The following action will be incorporated into the proposed project as the designated Environmental Protection Component:

- A. Only those pesticides positively designated as "authorized" in Table 1 may be used in the seed multiplication or be recommended for use in mass media components of the project. To the extent manageable pesticide use in the demonstration plot activities are pesticide activities in the loan credit sector should be limited to only authorized chemicals.
- B. Only those uses approved by US/EPA and/or FAO/MRL as indicated in Table 2 are authorized for funding by and use in the project.
- C. A covenant should be executed which projects a plan to meet Reg.16 requirements for pesticides not presently authorized. Thus, pesticides identified for use subsequent to the preparation of the PP and E.A. will require an amendment of the E.A. and are subject to procedures dictated according to the regulatory status of the compound. Approval to purchase with project funds must be approved in writing by the Mission Director and the AID/W. African Bureau Environmental Officer.
- D. Pesticides, particularly labeled as highly toxic to aquatic life in Table 1, should not be used in a manner which will lead to contamination of the surface water of Senegal.
- E. Technical assistance should be obtained for review of any crop protection material to be used in the Project's mass media campaign.
- F. Provisions to monitor pesticide use practises should be incorporated into the crop statistic component. Data obtained should be reviewed annually by crop protection specialists.
- G. Seed treatment:
 1. All seed treated with pesticides must be marked with suitable dyes (21 CFR, Chapter 1, Section 225).
 2. Sacks of treated seed should be so marked and with the precaution they are not to be used for human or animal consumption. Where feasible, tribal languages should be used.
 3. Protective clothing should be worn by personnel during pesticide handling.
 4. Personnel should be supervised during pesticide handling.

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TABLE 1: Toxicity and Hazards of Pesticides Requested in Senegal Agriculture Production Support Project

Common name and (brand name)	Authorization for use <u>3/</u>	EPA Reg. Status	Acute toxicity		Signal word <u>4/</u>	WHO toxicity category <u>5/</u>	Toxicity to bees	Special environmental hazards
			Oral LD ₅₀ (rat)	Dermal LD ₅₀ (rabbit)				
I. INSECTICIDES								
Bromophos (Nexion)	+	G	3,750-8,000		Danger	III	Hazardous	
B.T. (Dipel)	+	G	nil	nil	Caution	-		
Carbaryl (Sevin)	+	G	500		Caution	II	Hazardous	
Carbofuran (Furadan) ^{2/}	+	R	11	11,200	Danger (llq.) Warning (gr.)	1a 1b	Hazardous (llq.)	Toxic to fish, birds, and other wildlife.
Carbon Tet. (Trogocide)	?		7,500		Warning	-		
Chlorpyrifos (Dursban)	+	G	135	1,000	Warning	II	Hazardous	Toxic to fish, birds, and other wildlife.
Chlorpyrifos methyl (Reldan)	+	G	2-3,000	1,000	Warning	III	Hazardous	As above.
Cypermethrin (Cymbush)	+	R	4,123		Caution	III	Highly toxic	Toxic to fish.
Deltamethrin (Decis) ^{1/}	+	-	129	1,000	Warning	II	Highly toxic	Toxic to fish.
Diazinon (Basudin)	+	G	300	1,600	Caution or Warning	II	Hazardous	Toxic to fish, birds, and other wildlife.
Dieldrin	-	G						
Endosulfan (Thiul)	+	G	80	359	Danger	II	Hazardous	Toxic to fish.
Fenitrothion (Sumithion)	+	-	503	1,300	Warning	II		
Heptachlor	-	C						
Lindane (NCH)	-	R						
Orthene (Acephate)	+	G	945	1,000	Caution	II	Hazardous	Do not contaminate water.
Phostoxin	+	R	High short-term toxicity		Danger	-		
Pirimiphos-methyl (Actellic)	+	G	2,000	1,592	Caution	III		Toxic to fish.
Propoxur (Baygon)	+	G	95		Caution	II	Hazardous	Toxic to birds and fish.
Malathion (Zithiol)	+	G	1,375	1,100	Caution	III		
Methyl Bromide	+	R	High short-term toxicity		Danger	-		
II. FUNGICIDES								
Benomyl (Benlate)	+	G	10,000	11,000	Caution	III		Toxic to fish.
Captan ^{6/}	+	G	10,000		Caution	IV		
Maneb (Manesan)	+	G	8,000		Caution	III		Toxic to fish.
Thiram (Thirasan)	+	G	780		Caution	III		Toxic to fish.
III. NEMATOCIDES								
Dazomet (Basamid G)	+	G	640		Caution	III		Toxic to fish.
Metam Sodium (Vapam)	+	G	285		Caution	II		Toxic to fish.

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TABLE 1: Toxicity and Hazards of Pesticides Requested in Senegal Agriculture Production Support Project (Contd)

Common name and (brand name)	Authorization for use ^{3/}	EPA Reg. Status	Acute toxicity		Signal word ^{4/}	WHO toxicity category ^{5/}	Toxicity to bees	Special environmental hazards
			Oral LD ₅₀ (rat)	Dermal LD ₅₀ (rabbit)				
IV. HERBICIDES								
2,4 D	-	G	375		See tables			
Alachlor (Lasso)	-	G	1,800		Danger	III		
Atrazine (Gesaprim)	-	G	1,780		Caution	IV		
Bentazon (Basagran)	-	G	2,063		Warning			
Glyphosate (Round-up)	-	G	4,300					
Metolachlor (Dual)	-	G	2,780	10,000	Warning	III		
Oxadiazon (Ronstar)	-	G	8,000		Danger (E.C.)	IV		
Paraquat (gramoxone)	-	R	150					
Pendimethalin (Stomp)	-	G	1,250	5,000	Warning			
Propanil (Stam)	-	G	1,384	4,830	Warning	IV		
Thiobencarb (Saturno)	-	G	1,903	2,000	Danger			
Trifluralin (Treflan) ^{6/}	-	G	10,000		Warning	IV		

^{1/} No permanent US/EPA registration or FAO maximum residue limits established.

^{2/} Granular formulations for use on rice under evaluation.

^{3/} + = Authorized for use, - = not authorized for use.

^{4/} Probable Lethal Oral Dose 68 kg person. Drops to 1 tsp. = high toxicity (Danger), 1tsp. to 1 tblsp. = moderate (Warning), 16 tblsp. or 1 pound = low (Caution), more = slight toxicity (Caution).

^{5/} Ia = extremely hazardous, Ib = highly hazardous, II = moderately hazardous, III = slightly hazardous, IV = not likely to cause harm.

^{6/} Captan and Trifluralin are under RPE status but are sold over-the-counter in the U.S. without restriction.

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TABLE 2: Authorized Crop Uses of Approved Pesticides Based on US/EPA Registration and/or FAO Maximum Residue Limits

PESTICIDE	RICE	CORN	MILLET	SORGHUM	COWPEA
I. <u>INSECTICIDES</u>					
Bromophos 1/		X	X	X	X
B.T.	----- Exempt -----				
Carbaryl	X	X	X	X	X
Carbofuran	X	X	X	X	
Carbon Tet. 1/	----- Fumigant -----				
Chlorpyrifos	X	X		X	X
Chlorpyrifos methyl 1/	X	X	X	X	X
Cypermethrin					
Deltamethrin					
Diazinon	X	X		X	
Endosulfan	X	X			
Fenitrothion	X	X	X	X	X
Malathion	X	X	X	X	X
Methyl Bromide	----- Fumigant -----				
Orthene	X	X			
Phostoxin	----- Fumigant -----				
Pirimiphos-M. 1/	X	X	X	X	X
Propoxur 1/	X		X	X	
II. <u>FUNGICIDES</u> 1/					
Benomyl	X				X
Captan		X			
Maneb		X			
Thiram					
III. <u>NEMATICIDES</u>					
Dazomet		Soil	Fumigant		
Metam Sodium		Soil	Fumigant		
IV. <u>HERBICIDES</u>					
2,4-D	X	X		X	
Alachlor		X		X	
Atrazine		X		X	
Bentazon					
Glyphosate		pre-plant			
Metolachlor	P?	X	P?	X	
Oxadiazon	X				
Paraquat	Non	Crop uses			
Pendamehalin	X	X		X	
Propanil	X				
Trifluralin		X		X	
Thiobencarb					

1/ Seed Treatments Authorized

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ENVIRONMENTAL ASSESSMENT

The goal of the APS project is consistent with AID's strategy to assist GOS in reducing impediments that will both contribute to environmental protection and increase agricultural production. Following completion of the IEE, it was determined that while the project will neither be purchasing or directly using pesticides there could be potential adverse impacts. The project will be promoting the use of improved inputs including pesticides. Specifically support will be provided through lines of credit to farmers, seed producers, and private pesticide distributors. Support will also be provided to the research and seed multiplication unit (ISRA) and the seed storage and distribution unit (SS). Both are within the Ministry of Agriculture (MRD) and will be utilizing plant protection and stored product chemicals. Because of the proposed use and promotion of pesticides leading to the preparation of an Environmental Assessment, a detailed Pesticide Use Analysis is provided, in accordance with AID regulation (Section 216.3 (b)1 (i)). The Environmental Assessment is attached as Annex M.

The Environmental Assessment begins with an overview of the project purpose and goals, a brief description of the environment and population affected, and the relationship of the project to other activities in Senegal. Other aspects which are covered include the pesticides approved for use in the project, their Environmental Protection Agency registration status and their effectiveness for the proposed use; the availability of alternative crop protection methods, the relationship of the project plan to an integrated pest control approach, anticipated application methods and conditions of use, acute and long-term toxicological hazards and need for monitoring human and environmental exposure to pesticides, effects on non-target organisms, requirements for protective clothing, training needs for users and applicators, measures for controlling distribution and provision for monitoring pesticide use and effectiveness. The Environmental Assessment concludes with a listing of specific actions needed to place the project in conformity with the interest of AID regulations on pesticide use.

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ANNEX L

SOCIAL SOUNDNESS ANALYSIS

ANNEX L

SOCIAL SOUNDNESS ANALYSIS

- A. Population Profile**
- B. Socio-cultural Feasibility of the Project**
- C. Project Impact**
 - 1. The private suppliers and traders
 - 2. The commercial banks
 - 3. The farmers

ANNEX L
SOCIAL SOUNDNESS ANALYSIS

A. Population Profile

The areas of Senegal lying south of the 800 mm (rainfall) isohyet line (MBour - Bakel axis) and along the Senegal River are regarded as most suited for intensified agriculture. These areas contain representatives of several different ethnic groups. The dominant Wolof account for 34% of the population, Serer (19%), Diola (14%), Balant, Bassari, Bédik, Bainouk, Mandjak - Mankagn, Toucouleur (together 13%), Peul (8%) and Soninke, Diankhanké, Bambara, Dialonké, Mandinka (together 6%). Each of these groups speak Wolof, the language of the largest group.

The Wolof and Serer dominate in the Peanut Basin, Mandinka and Peul are the majority in Senegal Oriental, Peul in the Upper Casamance, Mandinka in the Middle Casamance, and Diola in the Lower Casamance. The Senegal River Basin is largely populated with Peul, Soninke and Toucouleur in the middle and upper valley. Routine migration and intermarriage have had the effect of mixing the groups together in all regions and reducing cultural differences.

Population densities vary considerably, running from about 46 to 100/km² in the southern and western Peanut Basin, to 10 to 20/km² in the western part of Senegal Oriental, under 10/km² in most of the rest of that zone, and ranging from 24 to 50/km² in the Casamance. There has been a movement in recent years out of the more densely settled part of the Peanut Basin toward Senegal Oriental, though settlement there (especially in the more eastern parts) is impeded by poor roads and communications as well as high risk of disease. With the completion of the two major dams on the Senegal River, migration into the River Basin will also increase.

Thirty-eight percent of Senegal's population is urban and 45% of that urban population lives in greater Dakar. While Dakar is the principal center of attraction for an important rural exodus, secondary towns, such as Kaolak, Tambacounda, Kolda, and Ziguinchor are also growing rapidly.

Senegal's population is young (54% are under the age of twenty) and the growth rate is estimated at around 3% per year. It is primarily the youth who are leaving the countryside and the impact on agricultural production appears to vary among ethnic groups. Among the Diola and Mandinka, for example, migration is more seasonal than among the Peul, but still affects the available labor supply at the beginning and end of the growing season. Large numbers of Senegalese migrate to France for periods of 2 to 5 years to work and send back remittances to their families. This is particularly true of the Soninké, for whom this has become a significant part of their economic livelihood.

A majority (approximately 85%) of the people are Muslim. The remaining 15% are Christian or adhere to their traditional religions. Particularly important are the roles played by three Muslim brotherhoods, to which the majority of Senegalese Muslims belong. The oldest of these is known as the

Qadiriya (Qadir) and was founded in the 15th century by a Moor. In the 19th and 20th centuries it spread from the Senegal River Valley to the Casamance and Upper Gambia, where more than half the Mandinka took up the faith. An offshoot of the Qadir, the Tidjaniya (Tidjanés), was founded by a Toucouleur in the 19th century who brought the teaching from Morocco. The Tidjanés were prominent in the resistance to the French. A second offshoot of the Qadir, the Muridiya (Mourides) was founded in the late 19th century. The leaders of these Muslim religious groups, known as marabouts, exercise varying control over the economic and political activities of hundreds of thousands of their followers. The dominant role played by the Mourides in the production of peanuts in the Peanut Basin is a prime example of this. Once associated exclusively with the Wolof people, the Mourides have attracted other ethnic groups to their following in a recent period of dynamic growth.

Peanuts, cotton, fruits and vegetables are Senegal's primary cash crops, whereas the cereals (millet, sorghum, corn, cowpeas and rice) are considered subsistence crops. However, rice, corn and cowpeas are being cultivated increasingly as cash crops. The relative importance of a crop varies with ecological conditions and traditional preferences, as well as economic priorities. Many Diola in the Lower Casamance are traditional growers of rainfed paddy rice. They have moved to higher lands in the region to cultivate peanuts, not only because low rainfall has led to increased salinization of river basin paddy fields, but to generate extra income.

Ownership of cattle and goats is very popular (as well as pigs in non-Muslim areas), but nomadic pastoralism is not practiced in the area below the 800 mm isohyet except for a narrow fringe north of Tambacounda. Cattle serve as a form of savings as well as a sign of prestige and are sold in the market place to generate cash to serve culturally determined obligations (marriage payments, funerals, etc.) rather than as sources of income. Commonly, Peul serve as herders not only for their own animals, but for those of other ethnic groups as well.

The sexual division of labor, though specific forms vary traditionally from group to group, is usually quite marked. For example, in Soninke villages the number of women is twice the number of men in irrigated fields. In Toucouleur villages near Faleme, women do not work in the irrigated perimeters but in rainfed cereals fields; in Diery they work on small plots of vegetables outside the perimeters. Men tend to dominate commercial crops, though there may be some division of tasks with respect to specific crops. Although these social patterns are subject to change in response to the changing importance of crops in the village economy, generally the burden of women is heavier, since they must do the housework and care for the children, in addition to their frequently large share of the fieldwork specially during the sowing and weeding periods.

While peanuts and vegetables are a significant source of cash income, in some areas a variety of non-agricultural income generating sources may be more important. In one Lower Casamance village, for example, nearly 80% of the cash income was generated from such sources as fishing, wage labor, and migrant remittances.

General factors of significance for development are the low national French literacy rate of 27.8% (many are literate in Arabic though this is not now relevant to agricultural production) and the incidence of endemic diseases, particularly in the Casamance, where wetter conditions favor the spread of disease.

B. Socio-Cultural Feasibility of the Project

The achievement of the project's objectives of increased production through the privatization of inputs and marketing is dependent on the existence of adequate demand among the producers for these services. At present, data indicates that a reasonable demand for seeds, fertilizer, equipment and crop protection products exists, but that resources are lacking at the producer level to purchase them.

Earlier, higher levels of fertilizer usage, encouraged by subsidized prices and credit under production systems, were linked to peanut production organized by the GOS. Today, prices have risen, the fertilizer formulas provided by the Senegalese fertilizer plant are different, and the former credit and "retenu" systems of paying for fertilizer have been abandoned. The government, once committed to increasing production by keeping input prices low, has shifted strategy. With the removal of subsidies input prices are going up. Farmgate prices for crops have increased to compensate and greater profitability is the key factor pointing towards increased input use. Also important is the dissemination of knowledge about the value of inputs through field demonstration plots or field days during the growing season. Though it is impossible to draw up a fixed rank ordering of priorities, production inputs like improved seeds (both peanuts and cereals, particularly short cycle ones), insecticides and herbicides and animal traction equipment are important. Social obligations play an important role in stimulating a demand for increased production. Young men who want to marry earn the bride gift, which often amounts to large sums of money, by working every season as farm labourers. They are offered farming land on which to grow cash crops in exchange for their services. They earn the money necessary for marriage from the sale of their produce. Perhaps the greatest incentive lies in the fact that for the majority agricultural production is the only readily available means of making money.

One cannot necessarily assume at the present time that farmers will purchase agricultural inputs for cash. Money earned at harvests is spent as necessary for food and other basic needs and as the year progresses little may be left when it is time to buy agricultural inputs for the new season. Therefore the importance of putting the delivery of agricultural inputs in the hands of the private sector is that, as they have in the past, they may stimulate increased production by providing credit in exchange for agricultural produce. Private sector businessmen have been known to provide credit to farmers to insure direct access to farm goods during the harvest. Although this has been viewed with a jaundiced eye, providing them with the means of extending credit for agricultural inputs as well may very well bridge the gap between the necessity for increased cash and the necessity to increase yields.

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Farmers have shown an interest in increasing yields through traditional means. Increased yields are not simply a matter of improved seed varieties, fertilization and other inputs. Improved cultivation techniques, organic fertilizers, crop rotations, and fallow land all contribute to the achievement of significant crop yield increases at economic costs.

Manure tends to be applied by pasturing on the most important traditional fields. Likewise, residual vegetation may be gathered into piles and burnt on these fields. Pilot efforts at stabling animals and composting manure have begun. A small number of farmers have animal traction plowing equipment and trained oxen. Not all those who do have such equipment can maintain or replace it as needed. The application of these measures to improve and maintain the soil conditions necessary for maximum yields will require increased labor and the attentive work of information and extension services.

The organization of village farmers for crop production varies between ethnic groups and according to crops produced, both with respect to the sexual division of labor and the size of the units of production. There seems to be a trend, however, toward production by individual nuclear families and individuals and away from the patriarchal control of extended families. In addition, fields may be cultivated by youth groups for their mutual benefit and by groups of women, particularly with respect to vegetables in the dry season.

Theoretically, Senegalese law grants ownership of all land to the State. In practice, however, traditional village usufructuary rights have been held while the land remains in use, including reasonable periods of lying fallow. Control of land has been in the hands of village chiefs with respect to common lands, and family heads with respect to the rest. Although most farms range from 2-5 ha in size and 90% of families hold 3-10 ha, access to land has become an increasing problem, leading to the lending of fields. Recent surveys in the Serer areas show 25-30% of land under cultivation is share-cropped, primarily within the village. These loans tend to be for one season only out of fear of loss of usufructuary rights by the holder. Disputes over land tend to occur between villages, which have no clearly defined boundaries, and these are settled by the Communautés Rurales. Therefore, land tenure problems should not affect purchases of seasonal inputs such as fertilizer and seeds. It must also be noted that the growing scarcity of land will soon become one of the greatest incentives to the development of intensive high yield agriculture rather than the present land extensive agriculture.

The project assumes that the use of improved seeds, fertilizer, and other inputs including animal traction equipment, depends, in part, on convincing people through village-level demonstrations of their economic advantage. The project also assumes that credit will be available from a variety of sources to enable the farmers to purchase them until increased earnings permit direct payment. There have been serious problems of non-repayment of loans in the past, due to a considerable extent to the success or failure of crops, but also to a general attitude that it is not necessary to pay back loans from the government.

Most importantly it was assumed that farmers would use the loans to invest in inputs that would increase agricultural production. With the sale of agricultural products, guaranteed by the state, the farmer would pay off his debts. Unfortunately farmers did not use the credit they obtained to invest in inputs. They sold the inputs and used the money quite often to send their children to school in urban centers. At that time people with some education were able to earn higher salaries as petty bureaucrats than the most productive farmers. Government employees would often send money regularly to their relatives in rural areas. The job market in Senegal has changed radically in the last decade. Unemployment among the educated and skilled workers is at its highest. High school students have difficulty obtaining jobs as house maids in urban centers. Investment in the schooling of the young is no longer an attractive alternative. Farmers may now be more willing to take another look at farming as an investment for the future of their children.

Those farmers who had regularly reimbursed their debt now want the government to extract payment from those who have not and the government has now begun to pursue legally delinquent loans. A good part of the problem seems to be that insufficient care was taken to secure the engagement of each member of a borrowing group in advance or to select participants on the basis of their presumed ability and willingness to repay. Banks and agencies now lending in the agricultural sector are operating according to strict criteria including the requirement that all previous credit received be fully reimbursed before new loans can be made. Initial success in high repayment rates has been recorded and the project assumes high repayment rates will continue.

The question can be raised as to whether farmers will go into debt annually for the amounts required for seeds, fertilizer and farming equipment. There is already a considerable amount of informal borrowing by farmers from a variety of sources. According to one survey, borrowing is done most commonly for food and somewhat over half of such loans are in cash. The order of priorities appears to be:

- food
- social needs
- seeds
- fertilizer
- farm equipment

Most informal loans made during the rainy season (May-November) averaged around 12,000 CFA and were outstanding for periods ranging from about 3 to 10 months. Sixty-seven percent of the households informally borrowed an average of 23,000 CFA during the year. People in the Diourbel region borrowed the most and those in the Casamance the least. The largest loans came from merchants, followed by fellow villagers and family members. Rates of interest, where charged, tended to be lowest among merchants (57.8%), followed by villagers (94.9%) and family (148.5%).

Farmers are thus by no means isolated from the money economy. Substantially higher yields will successfully demonstrate that over a succession of harvests increased use of production inputs can generate increased crop yields that can be sold to generate more income.

The extent to which farmers are willing to shift from peanuts to cereal crops will depend on a variety of factors. Indeed, Senegalese farmers are quite sensitive to price signals. The key to assisting the farmer to take advantage of these opportunities is to expand and strengthen the farm input production and supply structures as well as to provide an efficient marketing system. The present government structures are understaffed, inefficient and underskilled. Previous policies and centralized GOS structures which failed to deliver needed inputs at the appropriate times have prevented farmers from responding quickly to higher prices. Senegalese farmers demonstrated their awareness of price policy in the years 1967-74 by increasing their output of millet and sorghum when the GOS lowered the price of peanuts. However, in any individual case a farmer would have to consider the availability of land and its condition, the availability of labor, the risk due to pests and/or crop diseases prevalent in his area, the availability of seeds (whether he has his own or must purchase them) and fertilizer, whether or not he can, or wants to, pay cash or borrow for these inputs, whether or not he feels assured of a good market for the crop, and so forth. Senegalese farmers in the past have opted to cover their basic food subsistence needs first. Cash crops are important as a source of income but take second place. The recent liberalization and floor prices for cereals now makes their production doubly attractive, returning both income generation and subsistence dividends. The importance of focusing on production of food crops is that even if the cash market becomes flooded and prices fall, there will be food available for the country, thus helping to reduce Senegal's debilitating dependency on imported food, which was dramatized last year with rice shortages and the beginnings of public disturbances.

C. Project Impact

The potential positive effects of this project are impressive. If private business succeeds in taking over the input and marketing sectors and does so on a reasonably efficient and competitive basis, farmers will be better able to take advantage of higher prices for their crops. Rural incomes would be raised for the farming population and jobs created in agriculture-related services. One would expect to see improved nutrition and health as a result of increased production.

The ultimate beneficiaries of the APS project will be the 70 percent of Senegal's population which depends on agriculture for its livelihood. These are principally farmers who stand to benefit from production increases and greater income. The immediate beneficiaries are the private suppliers and traders engaged in the agricultural sector, and the commercial banks providing credit to the agricultural sector. The importance of focusing on this group is that they have intimate contact with farmers. They know the market and are likely to make shrewd investments. It is assumed that making more credit available to them may have the effect of liberalizing their own credit

policies thus permitting them to extend credit in rural areas. Increased production and sale of agricultural goods will benefit the urban populations who are increasingly burdened with food shortages and high food prices.

1. The private suppliers and traders

Traditional Islamic attitudes and precepts are often cited as a source of restraint to people wishing to enter business activities. There exists, nonetheless, a vibrant private sector in Senegal motivated by profit. More than Islam, the legal and policy context has, until recently, been unfavorable to the expansion of the Senegalese private sector. The NAP and other policy changes have largely eliminated this constraint. Indeed, numerous private concerns have already initiated exploration of the agricultural market and are establishing new businesses to exploit emerging opportunities.

Senegal's private sector is currently satisfying consumer product demands. The capacity and energy to meet demand for agricultural input and marketing services also exists and will be gradually expanded as the private sector is assured that the GOS will not reenter the market.⁴ The credit program will attract private sector agricultural investments because lending and reimbursement terms will provide important incentives missing from previous and current credit programs. The media campaign will support private sector marketing efforts and the collection of relevant timely statistics will facilitate planning and decision making.

2. The commercial banks

The commercial banks have been reluctant to extend credit to the agricultural sector due to (1) WAMU banking regulations which restrict credit margins and lead banks to low-risk ventures, (2) a tight cap on credit expansion causing the banks, able to make only a restricted number of loans, to lend to the safest of ventures, (3) the collapse of ONCAD in 1981 which severely threatened bank liquidity, and (4) the GOS forgiveness of farmer debt four times since 1970. The withdrawal of government from the credit market, the reduced discount rate provided under this project and the exclusion of this credit from expansion limitations has made the banks reconsider their position. Discussions with major banking institutions have confirmed that under these conditions the banks will accept the full risk inherent in lending to the agricultural sector.

3. The farmers

Highly centralized governmental structures have provided services to farmers since Independence at a high cost and with unsatisfactory results. Production has fallen behind population growth and farmers have not improved their ability to manage their farm enterprises.

Revisions of the agricultural policies were announced in 1984. Farmers, already indifferent to the government-dominated cooperative system and frustrated by RDA performance, were granted the legal right to form independent productivity-related organizations (groupement d'intérêt économique) and to operate without recourse to the cooperatives. Scaling back

of RDAs frees farmers to secure inputs and market production according to their own needs and preferences. Abolition of fixed prices and establishment of a floor price mechanism largely guarantee farmers a market for their products at a remunerative price. Renewed credit flows, following years of unavailability, will release demand for goods and services farmers need but have been unable to obtain. The media campaign will provide vital information that farmers need to improve farm management and improved seed will increase yields. The overall privatization effort should provide timely, efficient access to goods and services.

Senegal's annual per capita income is approximately \$450. This figure reflects higher incomes earned in the urban modern sector; rural per capita incomes are considerably lower. Increases in income from this project as a result of increased production and competitive prices are another potential benefit.

Benefits to women as a separate target group are difficult to isolate. However, women would benefit more than other groups from farming intensive methods. Women are expected to maintain a certain degree of economic independence from their husbands' family. As such their first means of earning an independent income is through the cultivation of small plots destined for local markets. These small plots and gardens are often created in poorer soil than is used for the family fields. Thus they have a greater incentive to invest in agricultural inputs than most. Women are accepted as members of the various producer groups and thereby share in the legal status and access to credit now available. Project benefits flowing to women should not be inhibited.

Changes in attitude and behavior constitute the main spread effect of this project. Farmers will be motivated to use improved seeds and fertilizers when they see that those who do so get better results. They will be encouraged to repay their loans when they learn it is required to get additional credit. Similarly, participation of the private sector and commercial banks will spread if projected benefits gained from entering the agricultural sector are realized. Overall, the project will also contribute to the change of Senegalese attitudes towards privatization in a general sense and encourage more Senegalese to consider private initiative. This could be significant with respect to unemployed school and university graduates.

There are two potentially negative effects of this project. First, given the increased cost of inputs due to the withdrawal of price supports, (even though more efficient application of fertilizer could significantly reduce the quantities currently recommended), it may well be that well-to-do-farmers and large-scale operations would be in a better position to maximize their income generation. Their participation will certainly have a positive demonstration effect on poorer farmers, but if poorer farmers cannot participate due to a lack of resources (money, land or ability to organize labor) the demonstrations would be ineffective toward generating a substantially increased demand for production inputs. In conjunction with the project, a sustained effort by the GOS must be made to involve the mass of farmers and small-scale entrepreneurs. An exacerbation of currently benign class differences could result without necessarily leading to the desired overall increases in production.

Secondly, although agricultural land cannot be bought and sold, significant agricultural gains could increase concentration of holdings in the hands of the most successful and influential farmers through lending, allocation of communal land, clearing of new land, and the occupation of land abandoned by people leaving for the cities. This could have the effect of increasing the rate of rural exodus and/or creating a class of farm laborers without access to land.

ANNEX M
PROCUREMENT PLAN

PROCUREMENT PLAN FOR THE DIRECTORATE OF PRODUCTION
AND CONTROL OF SEEDS (DPCS)

COMMODITIES

Description	Quantity,	App. Price \$	Origin Sce Code	Delivery Date	Responsibility
<hr/>					
<u>1. Vehicles/Accessories</u>					
- 2 Passenger cars, 2 Four-wheel drive and 1 Ton-Truck (initial purchase)	5	75,000	935	March 87	USAID/SMO
- 2 Passenger cars, and 1 Ton Truck (Replacement)	3	45,000	935	March 90	U.S contractor
- Gas		70,400	935	-	U.S contractor
- Repairs		35,000	935	-	U.S contractor
<u>2. Equipment/Supplies</u>					
- Seed Lab equipment for treatment, control; supplies. (Initial purchase)		91,000	000	June 87	U.S contractor
- Following purchases		115,000	000	June 88	U.S contractor
<u>3. Office equipment/Supplies</u>					
- Typewriters, office desks, supplies, calculators, photocopiers, miscellaneous (initial)		75,000	935	March 87	USAID/SMO
- Replacement and supplies		160,000	000	June 88	U.S contractor
<u>4. House furniture and appliances</u>					
(for 2 I.T.TA)		40,000	000	April 87	USAID/CSS

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PROCUREMENT PLAN FOR THE DIVISION
OF AGRICULTURAL STATISTICS (DSA)

COMMODITIES

Description	Quantity,	App. Price \$	Origin Sce Code	Delivery Date	Responsibility
<hr/>					
1. <u>Vehicles/Accessories</u>					
- 1 Four-wheel drive veh. (initial purchase)	1	15,000	935	March 87	USAID/SMO
- 1 Four wheel drive (Replacement)	1	15,000	935	March 90	U.S contractor
- Motorbikes (less than 125 cc) (initial purchase)	35	35,000	935	June 87	U.S contractor
- Motorbikes (less than 125 cc) (Replacement)	35	35,000	935	June 89	U.S contractor
- Gas	-	17,600	935		U.S contractor
- Repairs		8,500	935		U.S contractor
2. <u>Computer equipment</u>					
Microcomputer, (accessories, supplies, spare parts etc.) init.		170,000	000	June 87	U.S contractor
Following purchases		65,000	000	June 89	U.S contractor
3. <u>Office equipment/supplies/ field survey equipment</u>					
- Typewriters, photo- copiers, engravers, air conditioners, office supplies, desks, shelves, calculators, medical kits, camp cots, insulated coolers, misc (initial purchase)		150,000	000	March 87	USAID/SMO
- Replacement for following years		150,000	000	June 88	U.S contractor
4. <u>House furniture and appliances</u> (for 1 LT. TA					
		20,000	000	April 87	USAID/CSS

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PROCUREMENT PLAN FOR THE PROJECT ADMINISTRATIVE UNIT (A.U)

COMMODITIES

Description	Quantity,	App. Price \$	Origin Sce Code	Delivery Date	Responsibility
<hr/>					
<u>1. Vehicles/Accessories</u>					
- 2 Passenger cars (initial purchase)	2	30,000	935	March 87	USAID/SMO
- 1 Passenger car (replacement)	1	15,000	935	March 90	U.S contractor
- Gas		26,400	935		U.S contractor
- Repairs		13,000	935	-	U.S contractor
<u>2. Equipment/supplies</u>					
IBM PC (+ accessories supplies, parts) (initial)	1	30,000	000	June 87	U.S contractor
- Following purchases		20,000	000	June 88	U.S contractor
<u>3. Office equipment/ supplies</u>					
- Office space/ utilities (initial)		153,000 9,000	000	April 87 April 87	USAID/CSS USAID/CSS
- utilities (following purchases)		48,000	000	April 88	USAID/CSS
- Office equipment supplies (Typewriters, photocopiers, office desks, filing cabinets, air conditioners, calculator, office supplies, miscellaneous) (initial)		40,000	935	March 87	USAID/SMO
Replacement, repairs and new purchases		38,000	935	March 88	U.S contractor
<u>4. House furniture and appliances</u>					
utilities (for 1LT-TA)		20,000	000	April 87	USAID/CSS

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PROCUREMENT PLAN FOR THE SENEGALESE AGRICULTURAL
RESEARCH INSTITUTE (ISRA)

COMMODITIES

Description	Quantity,	App. Price \$	Origin Sce Code	Delivery Date	Responsibility
<u>1. Vehicles/Accessories</u>					
- 1 passenger car (initial purchase)	1	15,000	935	March 87	USAID/SMO
- 1 passenger car (Repl.)	1	15,000	935	March 90	U.S contractor
- Motorbikes (less than 125 cc) (initial purchase)	5	5,000	935	June 87	U.S contractor
- Motorbikes (replacement)	5	5,000	935	June 89	U.S contractor
- Gas		17,600	935	-	U.S contractor
- Repairs		8,500	935		U.S contractor
<u>2. Equipment/Supplies</u>					
- Seed variety supplies and materials (initial purchase)		40,000	000	June 87	U.S contractor
- Seed variety and materials (following purchases)		90,000	000	June 88	U.S contractor
<u>3. Office equipment/supplies</u>					
- typewriters, desks, calculators, photo- copier, office supplies, miscellaneous (initial purchase)		50,000	935	March 87	USAID/SMO
- Replacement and following purchases		101,000	935	June 88	U.S contractor
<u>4. Housing furniture and appliances</u>					
(for 1LT.TA)		20,000	000	April 87	USAID/CSS

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LOP PROCUREMENT PLAN: MASTER PLAN

I COMMODITIES

Description	Quantity	App. Price \$	Origin Sce Code	Delivery Date	Responsibility
<hr/>					
1. <u>Vehicles/Accessories</u>					
- 5 Passenger cars, 3 Four-wheel drives, 1 Ton truck (initial purchases)	9	135,000	935	March 87	USAID/SMO
- 4 Passenger cars, 2 Four-wheel drives and 1 Ton truck (Replacement)	6	90,000	935	March 90	U.S contractor
- Motorbikes (less than 125 cc) (initial purchases)	40	40,000	935	June 87	U.S contractor
- Motorbikes (less than 125 cc) (Replacement)	40	40,000	935	June 89	U.S contractor
- Gas		132,000	935	-	U.S contractor
- Repairs		65,000	935	-	U.S contractor
2. <u>Equipment/Accessories/ Supplies</u>					
- Microcomputers (accessories, supplies):					
- initial purchases	3	200,000	000	June 87	U.S contractor
- following purchases		85,000	000	June 88	U.S contractor
- Seed varieties and equipment, supplies					
- initial purchases		40,000	000	June 87	U.S contractor
- following purchases		90,000	000	June 88	U.S contractor
- Seed lab equipment, for control, treatment; supplies.					
- initial purchases		91,000	000	June 87	U.S contractor
- following purchases		115,000	000	June 88	U.S contractor

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3. Office Equipment/
supplies

- Typewriters, photocopiers, engravers, air conditioners, desks, filing cabinets, miscellaneous:

- initial purchases	280,000	935	March 87	USAID/SMO
- following purchases	484,000	935	June 38	U.S contractor

4. House furniture
and appl. (for 5 LT-TA)

100,000	000	April 87	USAID/CSS
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5. Office Rent

- Rent	153,000	April 87	USAID/CSS
- Utilities			
- Initial purchases	9,000	April 87	USAID/CSS
- Following purchases	48,000	April 88	USAID/CSS

II AUTHORIZING DOCUMENTS

Quantities and specifications will be provided in PIO/Cs.

III WAIVERS REQUESTED

All necessary waivers approved with project paper.

* Vehicles will be used by both the TA and the Senegalese staff.

ANNEX N

WAIVERS

ACTION MEMORANDUM FOR THE DIRECTOR, USAID/SENEGAL

FROM Joel Schlesinger, PDO
SUBJECT: Senegal Agricultural Production Support Project (685-0269) --
Justification for a Sole Source Procurement Waiver: Host Country
Procurement of Services for the Management of the Project Credit
Component.

PROBLEM: Your approval is requested for other than full and open competition for host country procurement of the services of Citibank to undertake the role of a fiduciary bank in the management of the credit program of the subject project.

FACTS:

- A. Cooperating Country: Senegal
- B. Project: Agricultural Production Support Project (685-0269)
- C. Nature of Funding: Grant
- D. Source of Funding: USAID
- E. Description of Services: Management of a \$9,000,000 revolving credit fund.
- F. Approximate Value of Contract: \$650,000
- G. Probable nationality: Geographic Code (000).

DISCUSSION:

1. Background: The Agricultural Production Support Project includes a credit fund of \$9,000,000 which is devised to provide credit to the Senegalese agricultural sector. The financing will ultimately benefit farmer groups by providing credit through commercial banks to fertilizer, cereal seeds and agricultural equipment importers, producers, distributors and traders. The management, monitoring and related activities of the credit program require the services of a fiduciary bank.

2. The Proposed Services:

The fiduciary bank will manage the revolving credit fund under a GOS host country contract. It will loan funds to lending banks for their use as a funding source for loans to producers, traders and merchants active in the agricultural sector. The fiduciary bank will also provide training to the personnel of the participating banks in such disciplines as risk analysis, loan monitoring and credit collection and assist the banks to develop adequate management and tracking systems.

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3. The Proposed Contractor:

The proposed fiduciary bank is Citibank, based in New York with a regional headquarters in Dakar.

4. The Availability of Other Services:

The expertise and conditions required to manage the credit program are unavailable among the local banks and other financial institutions. Studies conducted during project paper preparation concluded that the fiduciary bank should meet the following selection criteria:

- be a U.S financial institution with a lending window in Senegal.
- have a sound knowledge of both local and U.S banking systems and procedures and be familiar with AID accounting standards and regulations.
- have a positive liquidity position.
- not to be a potential competitor in the area of agricultural credit operations.
- be able to provide training to staff of the participating local lending banks.

There are 14 banks and five non-bank financial institutions operating in Senegal. Of these, Citibank is the only bank that satisfies the geographic code (000) requirement, has a lending window in Senegal and a positive liquidity position. The Citibank is also experienced in the handling and accounting of U.S assistance funds. It is not involved in agricultural lending activities and has the technical and professional capabilities to provide the training required in this program.

5. Justification:

Handbook 11, Chapter 1, Section 2.4.2. sets forth two applicable criteria upon which this request is based. These are:

- that special design or operational requirements require services available from only one source;
- one firm can be demonstrated to have the unique capability by reason of special experience or facilities, or specialized personnel who are recognized experts in the particular field to perform the services required for the project.

We believe and submit that Citibank, Senegal, is the only banking institution in Senegal that fulfills the foregoing criteria in light of the requirements for this particular procurement.

AUTHORITY:

Handbook 11, Chapter 1 Section 2.4.2 sets forth the authority and the criteria for the procurement of goods and services under other than full and open competitive procedures.

You are authorized under Africa Bureau Delegation of Authority No. 140 and by Handbook 11, Chapter 1, Section 2.4.2a, 2 and 3, and subject to the clearance of this request by the members of the Mission Non-competitive Review Board, to approve non-competitive host country contract actions up to \$1,000,000.

CERTIFICATION:

The technical and requirements personnel requesting this action certify to the accuracy of the facts and rationale of the justification.

RECOMMENDATION:

It is recommended that you approve, in accordance with the provisions of Handbook 11, Chapter 1, Section 2.4.2, other than full and open competitive procedures for the procurement of services required for the management of the credit program of the Agricultural Production Support Project.

Approved George Carner

Disapproved _____

Date 11/22/82

Clearances:

- ADO :RHarvey
- PRM :CMCClusky
- RLA :EDragon
- RCON:Jito
- EXO :SWallace
- DDIR:GCarner
- HPNO:MAMicka

ACTION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR FOR AFRICA

FROM: Sarah Jane Littlefield, Director.

SUBJECT: Senegal Agricultural Production Support Project 685-0269
Justification for a procurement Source/Origin Waiver for Motor
Vehicles.

PROBLEM:

Your approval is requested for a procurement source and origin waiver from Geographic Code 000 (U.S only) to Geographic Code 935 (Special Free World) and a waiver of section 636 (i) of the Foreign Assistance Act of 1961 (as amended) for the purchase of certain motor vehicles for the subject project.

FACTS:

- A. Cooperating Country: Senegal
- B. Project: Agricultural Production Support Project (685-0269)
- C. Nature of Funding: Grant.
- D. Source of Funding: Sahel Development Program.
- E. Description of Goods: Two One-Ton Trucks, four (4) four Wheel Drive Vehicles, nine (9) Passenger Vehicles and spare parts.
- F. Approximate Value of Contract: \$225,000.
- G. Probable Source: Senegal.
- H. Probable Origin: Code 935 Special Free World.

DISCUSSION:

A procurement source/origin waiver to Code 935 is requested to permit the purchase of two (2) One-Ton trucks, four (4) four wheel drive vehicles and nine (9) four-door-passenger vehicles needed for the life of this project at an estimated total delivered cost of \$225,000 tax free. These vehicles will be used to meet the field transportation requirements of the TA and local staff in (1) the Division of Production and Control of Seeds (DPCS), (2) the Senegalese Agricultural Research Institute (ISRA) (3) the Division of Agricultural Statistics (DSA) and (4) the Project Administrative Unit (U.S Chief of Party and Senegalese Counterpart).

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The allocation of the vehicles is as follows:

DPCS: 2 one-ton trucks, 4 passenger vehicles, 2 four wheel drive vehicles.
 ISRA: 2 passenger vehicles.
 DSA: 2 four wheel drive vehicles.
 Project Administrative Unit: 3 passenger vehicles.

TA members and local staff will be based in Dakar but will be operating in all regions of Senegal. Consequently, each vehicle must withstand intensive use on unpaved, poorly-maintained rural roads. This in turn requires availability of service and spare parts for vehicles in the areas of operations. Maintenance and service facilities for American vehicles are virtually non-existent in Senegal and spare parts are not readily available. Vehicles of Code 935 origin are well represented and supported throughout Senegal and spare parts are available with minimum delays from local dealers.

The justification for this waiver therefore lies in that suitable U.S. manufactured vehicles are not imported to meet general demand, nor are there adequate support and maintenance facilities for such vehicles in Senegal.

This justification is consistent with the special waiver requirement in Handbook 1B, chapter 4C2D (1) to the general source/origin limitations on the procurement of commodities for the subject project which identifies "present and projected lack of adequate service facilities and supply of spare parts for U.S. manufactured vehicles" as one circumstance for the granting of a waiver. It is also consistent with the special circumstances under which provisions of section 636 (i) of the FAA can be waived.

AUTHORITY

Handbook 1B, chapter 5B4a(2) sets forth the authority and the specific criteria for this procurement source/origin waiver to Code 935. Under its provisions and A.I.D. delegation of authority No.40, you are authorized to approve procurement waivers up to \$5,000,000. The estimated cost of this procurement does not exceed your authority.

RECOMMENDATIONS

For the reasons discussed above, it is recommended that you (1) approve a source and origin waiver from AID Geographic Code 000 to Code 935 to procure non-U.S manufactured vehicles needed during the entire life of this project ; (2) conclude that special circumstances exist to justify a waiver of the requirements of section 636 (i) of the FAA as amended and (3) certify that exclusion of procurement of free world countries other than the cooperating country and countries included in Code 935 would seriously impede attainment of U.S foreign policy objections and the objectives of the foreign assistance program.

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ACTION MEMORANDUM FOR THE ASSISTANT
ADMINISTRATOR FOR AFRICA

From: Sarah Jane Littlefield, Director

Subject: Agricultural Production Support Project 685-0269 - Justification
for a blanket procurement Source/Origin Waiver for commodities
to be financed under the Project Credit Line.

PROBLEM: Your approval is requested for a blanket procurement source and origin waiver from Geographic Code 000 (U.S. only) to Geographic Code 935 with respect to commodities which will be financed under the credit line of the subject project.

FACTS:

A: Cooperating Country : Senegal
B: Project : Agricultural Production Support (685-0269)
C: Nature of Funding : Grant
D: Source of Funding : Sahel Development Program
E: Description of Goods: Approximately Five Thousand Tons of Urea, Three Thousand Tons of fertilizer; Ten Thousand Liters of Pesticides; Agricultural equipment, Motor Vehicles.
F: Approximate Value: \$4,203,615
G: Probable source : Senegal
H: Probable Origin : Geographic Code 935

DISCUSSION:

A blanket procurement source/origin waiver from Geographic Code 000 to Geographic Code 935 is requested to permit the purchase of up to five thousand tons (5,000t) of imported urea, three thousand tons (3,000 t) of imported fertilizer, ten thousand liters of pesticides (10,000 l) and various agricultural equipment including movers, harrows, sowers, animal and animal traction equipment, and trucks for the transportation of agriculture and agriculture related items at an estimated total delivered cost of \$4,203,615. The balance of the \$9 million credit line will finance goods and services of local source and origin.

Approximate breakdown costs are as follows:

- Urea \$230.41/t X 5000 t	=	\$1,152,410
- Fertilizer \$346.385/t X 3000	=	\$1,039,157
- Pesticides \$1.2048/l X 10,000 l	=	\$ 12,048
- Agricultural equipment worth	=	\$ 2,000,000

These commodities will be purchased by private individual and group subborrowers of the intermediate credit institutions through which the credit line of the project is operated. A more realistic working assumption of this project is that the near future elimination of the subsidies on agricultural inputs and the lowering of tariffs on imports will favor market prices resulting in a greater volume of these items and other agricultural and agricultural related commodities such as pesticides and agricultural equipment, at competitive prices in the local markets.

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The current and projected situation in Senegal indicates that the entire urea and the supplements of fertilizer, pesticide and agricultural equipment are almost entirely imported from Code 935 countries. Information provided by the SENCHIM, the marketing branch of the private firm Industries Chimiques du Senegal and the major importer of urea and fertilizer supplement indicates that imports of Code 935 source and origin are quicker and cheaper than imports from the U.S. which has higher cost of shipment.

The success of the credit component of the project depends upon use of the credit to finance locally available commodities. We believe strongly that the credit component would not work if our normal procurement service origin rules, i.e. U.S. procurement, were to be applied strictly to the credit line because credit users would not buy products to be imported from the U.S.

Concerning motor vehicles, maintenance and service facilities for American vehicles are virtually non-existent in Senegal and spare parts are not readily available. Vehicles and equipment of Code 935 origin are well represented and supported throughout Senegal and spare parts are available with minimum delays from local dealers. Agricultural equipment is locally manufactured by Senegalese private firms, the exception being harvesters which are shelf items imported from Code 935 countries.

The justification for this blanket waiver therefore lies in the current and projected existence of circumstances which are determined to be critical to the successful attainment of the project objectives.

The justification is consistent with the special waiver requirements in (1) Handbook 1B, chapter 4C2d(1), and the special circumstances under which provisions of section 636 (i) of the FAA can be waived with regards to the procurement of motor vehicles under AID-funds; and (2) Handbook 1B, chapter 4CBa(1) with respect to local currency purchases of fertilizer. It is also consistent with the conditions for imported shelf items in Handbook 1B, chapter 19, section 19A3C(2). Agricultural equipment is under this category.

AUTHORITY

Handbook 1B, Chapter 5B4a(7) and Chapter 19D2 set forth the authority and the criteria for the procurement source/origin waiver to Code 935. Under these provisions and A.I.D. Delegation of Authority No. 40, you are authorized to approve waiver actions up to \$5,000,000. The estimated cost of this procurement does not exceed your authority.

RECOMMENDATIONS

For the reasons discussed above, it is recommended that you (1) approve a blanket source and origin waiver from Geographic Code 000 to Geographic Code 935 with respect to the credit line financing of the above mentioned commodities estimated to be needed during the entire life of this project; (2) conclude that special circumstances exist to justify a waiver of the provisions of Section 636(i) of the Foreign Assistance Act of 1961, as amended, and (3) certify that exclusion of procurement from free world countries other than the cooperating country and countries included in Code 941 would seriously impede attainment of U.S. foreign policy objectives and the objectives of the foreign assistance program.

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ANNEX O

PROJECT AUTHORIZATION

PROJECT AUTHORIZATION

COUNTRY : SENEGAL

PROJECT NAME : AGRICULTURAL PRODUCTION SUPPORT

PROJECT NUMBER: 685-0269

1. Pursuant to Section 121 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the Agricultural Production Support project for Senegal (the Cooperating Country) involving planned obligations of not to exceed twenty million dollars (\$20,000,000) in grant funds over a two year period from date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the project. The planned life of the project is five years from the date of initial obligation.

2. The project provides financial support to Senegal in the implementation of Senegal's New Agricultural Policy. The project is designed to assist Senegal in the transition of agricultural input distribution and cereals marketing activities from the public to the private sector.

The project consists of four principal components, as follows:

(1) Privatization of input supply and seed multiplication: facilitate entry of the private sector into all aspects of the agricultural market, improve seed selection, production, multiplication, distribution and certification.

(2) Extension of commercial agricultural credit: provide credit through the commercial banking system to private sector importers, manufacturers, distributors, transporters and marketers involved in input supply.

(3) Collection of agricultural statistics: establish an efficient statistics service capable of providing timely and reliable statistics for planted areas, crop yields, crop production and production inputs for government and private use.

(4) Implementation of an educational media campaign: to provide information concerning improved yields and financial returns achievable through the use of improved seeds, cost effective fertilizers, appropriate equipment and effective crop protection production and how these benefit individuals, families, communities and the nation.

In order to achieve the purposes of the project, A.I.D. will finance technical assistance, training, commodities and other costs and will provide funds for commercial credit.

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3. The Project Agreement which may be negotiated and executed by the officer(s) to whom such authority is delegated in accordance with A.I.D. regulations and Delegations of Authority shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

4. A. Source and Origin of Commodities, Nationality of Services

Commodities, except for motor vehicles, financed by A.I.D. under the project shall have their source and origin in the United States or in Senegal except as A.I.D. may otherwise agree in writing. Motor vehicles shall have their source and origin in the United States, except as authorized herein or except as A.I.D. may agree otherwise in writing.

Except for ocean shipping, the suppliers of commodities or services shall have the United States or Senegal as their place of nationality, except as A.I.D. may otherwise agree in writing.

Ocean shipping financed by A.I.D. under the project shall, except as A.I.D. may otherwise agree in writing, be financed only on flag vessels of the United States.

B. Conditions Precedent

1. First Disbursement

Prior to any disbursement, or the issuance of any commitment documents under the Project Agreement, the cooperating Country shall furnish in form and substance satisfactory to A.I.D., the following:

a. An agreement (1) that cereal seeds will be sold or distributed by governmental organizations at real costs including overhead and interest, and (2) that it will not subsidize cereal seed production or distribution.

b. An agreement that no new credit programs will be established by any governmental organizations and that existing governmental credit programs will be amended to reflect the real costs of operating the particular credit program.

c. A directive or agreement by the Ministry of Finance that the credit facility established under the project is exempt from credit quotas ("Hors encadrement") imposed by the BCEAO on Senegalese banks.

2. Additional Disbursement

Prior to any disbursement, or the issuance of any commitment documents to finance the privatization of the input supply component, the Cooperating Country will in form and substance satisfactory to A.I.D., reorganize the Directorate of Production and Control of Seed, in which the seed production and the seed certification functions will be separate.

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C. Covenants

The Project Agreement will contain in substance, the following Cooperating Country covenants:

1. Agreement to undertake good faith negotiations with the BCEAO and the WAMU to provide broad discretion to the Cooperating Country in the setting of lending interest rates, particularly with respect to the agricultural sector.
2. Agreement to revise the several rules and regulations applicable to seed production, certification, nomenclature of grades and other related aspects so as to conform to generally accepted international seed standards.
3. Agreement to undertake good faith efforts to transfer the seed multiplication function to the private sector within three years after signature of the Project Agreement.
4. Agreement that it will undertake good faith efforts to assist credit institutions to collect current credit indebtednesses.
5. Agreement that it will not take any actions which may undermine or impede the credit component of the project, such as requesting cancellation or rescheduling of loan repayments.
6. Agreement that the disposition of the credit fund upon completion of the project will be subject to the mutual agreement of the parties.
7. Agreement that (a) financing of pesticides will be restricted to those pesticides listed as "authorized" in the Pesticide Analysis, and that (b) the financing of any other or additional pesticides will be subject to the procedures of A.I.D. Regulation 16.

D. Waivers

The following procurement source/origin waivers are approved:

1. A waiver from geographic code 000 to code 935 to permit the procurement from countries included in code 935 of certain motor vehicles and spare parts, as specified in Annex N, in the approximate value of \$225,000. It is determined and certified that (1) exclusion of procurement from Free World countries other than the Cooperating Country and countries included in code 941 would seriously impede attainment of United States foreign policy objectives and the objectives of the foreign assistance program, and (2) special circumstances exist which justify a waiver of the requirements of Section 636 (i) of the Foreign Assistance Act of 1961 as amended.
2. A waiver from geographic code 000 to code 935 to permit the procurement from countries included in code 935 of the commodities that will be financed under the project credit line, as specified in Annex N, in the approximate value of \$4,203,615. It is determined and certified that

(1) exclusion of procurement from Free World countries other than the Cooperating Country and countries included in code 941 would seriously impede attainment of United States foreign policy objectives and the objectives of the foreign assistance program, and (2) special circumstances exist which justify a waiver of the requirements of Section 636 (i) of the Foreign Assistance Act of 1961, as amended.

Mark Edelman
Assistant Administrator for Africa

Date: _____

Clearances: As listed on
the Action Memorandum.

ANNEX P

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