PD-BAQ 735

OFFICIAL PROJECT DOCUMENT

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: A (A = Add, C = Change, D = Delete) — Amendment Number: _____

DOCUMENT CODE: 3

2. COUNTRY/ENTITY: ZAIRE

3. PROJECT NUMBER: 6[illegible]-0091

4. BUREAU/OFFICE: AFRICA — 06

5. PROJECT TITLE (maximum 40 characters): Applied Agricultural Research & Outreach

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 09 DD 30 YY 89

7. ESTIMATED DATE OF OBLIGATION (Under 'B.' below, enter 1, 2, 3, or 4)
A. Initial FY 83 B. Quarter 4 C. Final FY 88

8. COSTS ($000 OR EQUIVALENT $1 = 25 Zaires)

A. FUNDING SOURCE	FIRST FY B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total	1,988		1,988	10,000		10,000
(Grant)	(1,988)	( )	(1,988)	(10,000)	( )	(10,000)
(Loan)	( )	( )	( )	( )	( )	( )
Other U.S. 1.						
Other U.S. 2.						
Host Country		334	334		13,654	13,654 1/
Other Donor(s)						
TOTALS	1,988	334	2,322	10,000	13,654	23,654

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	2. Loan	D. OBLIGATIONS TO DATE 1. Grant	2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	2. Loan	F. LIFE OF PROJECT 1. Grant	2. Loan
(1) FX	141	080		0		10,000		10,000	
(2)									
(3)									
(4)									
TOTALS						10,000		10,000	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each): 012 | 020 | 070 | 079

11. SECONDARY PURPOSE CODE: 181

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code							
B. Amount							

13. PROJECT PURPOSE (maximum 480 characters)

To improve and expand the ability of the Department of Agriculture to undertake applied agricultural research activities and to transfer agricultural technology needed to increase village cultivators' production of food crops.

14. SCHEDULED EVALUATIONS
Interim MM 03 YY 86 | MM 09 YY 87 Final MM 03 YY 89

15. SOURCE/ORIGIN OF GOODS AND SERVICES
[X] 000 [ ] 941 [ ] Local [ ] Other (Specify) _____

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a _____ page PP Amendment.)

1/ Includes in-kind contribution; excludes inflation adjustment.

17. APPROVED BY
Signature: [illegible]
Title: Director, USAID/Zaire
Date Signed: MM 09 DD 26 YY 83

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION
MM DD YY

AID 1330-1 (8-79)

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ACRONYMS

AGCD	Administration Generale de la Cooperation au Developpement (Belgian)
ARD	Agriculture and Rural Development, AID/Kinshasa
BA	Budget Annexe
B/C	Project Benefit/Cost Ratio
BI	Budget Investissement
BO	Budget Ordinaire
CAPSA	Centre Agricole Permanent pour le Service de l'Agriculture
CDSS	Country Development Strategy Statement (AID Mission Strategy)
CEDECO	Centre de Développement Communautaire, Kimpese
CENACOF	Centre National de Coordination de la Formation au Développement.
CEPAS	Centre d'Etudes pour l'Action Sociale (correspondence agriculture course offered to farmers by the DOA Division of Research, Information and Training)
CEPSE	Centre d'Exécution des Programmes Sociaux et Economiques, Lubumbashi and Mangombo
CGIAR	Consultative Group for International Agricultural Research
CIAT	Centro International de Agricultura Tropical (Columbian)
CIF	Cost, Insurance and Freight
CIMMYT	Centro International de Mejoramiento de Maiz y Jaigo, Mexico
CODIAK	Compagnie de Développement Agro-Pastoral Intégré du Kwango-Kwilu, Kikwit, (a World Bank financed project)
COOPIBO	Cooperation Internationale au Développement des Compagnons Batisseurs, Mbuji-Mayi
COP	Chief of Party

CPU	Coordinating and Planning Unit for farming system research and extension
CREN-K	Centre de Recherche de l'Energie Nucléaire de Kinshasa
CRSP	Collaboration Research and Support Programs, AID
DAI	Development Alternatives, Inc.
DEO	Design and Evaluation Office, AID/Kinshasa
DHE	Department of Higher Education
DOA	Department of Agriculture, Republic of Zaire
DOE	Department of Education
DRF	Division des Recherches et Formation, DOA
DSR	Department of Scientific Research, Republic of Zaire
ECPR	Executive Committee Project Review
ERF	Economic Recovery Fund (Dept. of National Economy)
FAC	Fonds d'Assistance et de la Coopération (French)
FAO	Food and Agriculture Organization, Rome
FED	Fonds Européen de Développement
FSR	Farming System Research
FSR/E	Farming System Research and Extension
FSSP	Farming System Support Project. AID/S & T project for support of farming systems research, University of Florida
GDP	Gross Domestic Product
GER	Groupe d'Economie Rurale (ex-Belgian cattle project in Bas-Zaire)
GNP	Gross National Product
GOZ	Government of Zaire
HRD	Human Resources Development
IARCs	International Agricultural Research Centers
IBRD	International Bank for Reconstruction and Development

ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFA	Institut Facultaire d'Agronomie, Yangambi
IITA	International Institute for Tropical Agriculture, Ibadan, Nigeria
IMF	International Monetary Fund
INEAC	Institut National pour l'Etude Agronomique du Congo Belge
INERA	Institut National pour l'Etude et la Recherche Agronomique, Yangambi, successor of INEAC
IRAT	Institut de Recherches Agronomiques Tropicales, Paris
IRAZ	Instit t de Recherches Agronomiques et Zootechniques
ISNAR	International Service for National Agricultural Research, Amsterdam
ITD	International Training Division, OICD/USDA
JCC	Joint Career Corps (USAID)
MASI	Multi-national Agribusiness Systems, Inc.
OICD	Office of International Cooperation and Development, USDA
OXFAM	Oxford Famine Relief, Oxford, England
PACD	Project Agreement Completion Date (USAID)
PAM	Programme Agricole Minimum
PID	Project Identification Document
PIO	Project Implementation Order
PIO/C	Project Implementation Order/Commodities
PIO/P	Project Implementation Order/Participants
PIO/T	Project Implementation Order/Technicians
PL-480	U.S. Public Law 480 Authorization
PM	Person Months

PMKO	Projet Mais Kasai-Oriental, Mbuji-Mayi
PNE	Programme National Engrais
PNL	Programme National des Légumes
PNM	Programme National du Mais
PNR	Programme National du Riz
PNS	Projet Nord Shaba, Kongolo
PP	Project Paper
PSA	Procurement Services Agent
PVO	Private Voluntary Organization
PY	Person Years
PRONAM	Programme National Manioc
REDSO/WCA	Regional Development Support Office/West and Central Africa
SPE	Service Présidential d'Etude
S&T	Bureau of Science an[illegible]chnology, AID
TA	Technical Assistance
UNDP	United Nations Development Program
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
USG	United States Government
VPI	Virginia Polytechnic Institute
ZAIROM	Bas Zaire & Pl. Bateke Zaire - Rumania Agricultural Project

INTRODUCTORY NOTE

This project is conceived as a ten-year endeavor (1983-1993) divided into two phases of six and four years. The present project paper deals explicitly with the first phase. The first phase is not intended to complete the establishment of a self-sufficient institution. On the contrary, it is but the first step in a long-term process to build the institutional component capacities undergirding a national agricultural research program. Hence, this paper, building on commodity research achievements to date, sets forth a modest plan to gradually establish a national program management capacity with a farming systems research approach. The first year of the present plan (year "0") will serve as a transition from ongoing discrete research activities to the coordinated program direction envisaged in this project. Similarly, the last year of the first phase is designed to serve as a transition to the second phase of the project. The experience over the next five years will shape the subsequent planning for the second phase of the project. This approach is fully consonant with the CDSS for Zaire which sees development perspectives against a generational horizon.

I. BACKGROUND

Prior to independence, a highly developed agricultural research system, l'Institute National Pour l'Etude Agronomique du Congo Belge (INEAC), conducted extensive research--both basic and applied--for almost 30 years. Some 450 professionals with a large supporting technical staff were engaged in basic studies in botany and plant ecology, soil science, plant physiology, agrometeorology and genetics at a well-developed and well-equipped research station at Yangambi (in Haut-Zaire region). Applied research was carried out at 26 substations. These substations were located in several ecological settings, with the principal stations responsible for maintaining genetic materials related to their specific ecological conditions, (e.g., M'vuazi in Bas-Zaire region for cassava plus citrus and certain other tropical fruit species).

The substantial output from the research programs became the foundation for highly developed and productive agricultural enterprises including oil palm, coffee, cocoa, rubber, cinchona, cotton, rice and groundnuts. Moreover, production systems for maintaining soil fertility in annual cropping through crop rotations with fallow periods was developed and referred to as the "paysannat" system. Some 500 expatriate agents were employed in the extension service. To a large degree, recommended farm practices were imposed on the population. With independence and the succeeding civil disturbances, the expatriates departed, leaving a substantial infrastructure largely unmanned in terms of professional, scientific personnel. The organization, renamed Institute National pour l'Etude et la Recherche Agronomique (INERA) was maintained as a semi-autonomous structure under the Department (Ministry) of Agriculture (DOA). However, programs were limited to essentially caretaker operations. Physical infrastructure had been maintained in a minimal state of repair. Equipment has gradually dissipated. Research programs have been largely abandoned. INERA's principal activities have been the maintenance of genetic stocks of perennial crop species, some annual species, and, to a limited extent, multiplication of seed and plant materials.

During the past 10 to 12 years, several attempts have been made to rehabilitate and revitalize INERA as a prime agriculture research institution. Several donors have participated in these efforts. To date, no

substantial progress has been made toward placing INERA on a sound operational basis; it is not adequately staffed and adequately financed to be consistent with current realities in Zaire.

The failures of these efforts have been traced to four principal causes: (1) national pride in the institution which had acquired an international reputation for excellence has inhibited consideration of more modest approaches which could be realistically considered; (2) nostalgia on the part of the Belgian Cooperation has lead to proposals which seek to reestablish the institution as it once was; (3) attitudes of donors has given INERA the reputation as a bottomless pit capable of absorbing unlimited resources and having a limited outlook for eventual establishment of the institution as a sound, productive entity; and, (4) although there have been studies designed to define programs for external assistance to INERA, none has approached the problem in a manner which could lead to credible, specific propositions or recommendations for reorganization/organization of agricultural research/outreach in Zaire.

In the meantime, the Department of Agriculture has implemented crop research programs in response to critical needs arising from the failure of foodcrop production to keep pace with consumption: Programme National du Mais (PNM), Programme National du Manioc (PRONAM), Programme National du Riz (PNR), Program National Legumineuse (PNL) and Programme National Engrais (PNE). These programs, though generally operationally situated on INERA stations, are usually financially and managerially automonous of INERA. While some of these programs were started with substantial support from the Government of Zaire (GOZ), these resources have dwindled with the deterioration of the Zairian economy.

The United States Agency for International Development (USAID) has provided the primary source of financing for PRONAM and PNL since 1979-80. Support has included both foreign exchange costs and locals cost from PL-480 counterpart funds. Limited counterpart funds have also been provided to PNM. PNM, begun in 1972, was implemented with CIMMYT assistance until 1981. Each of these programs includes limited outreach/extension activities as well as crop improvement and agronomic research.

USAID support for PRONAM and PNL is scheduled to end in 1984-1985. Anticipating a need for continued external support to avoid collapse of these important national foodcrop applied research programs, USAID has, since 1981, maintained a continuing dialogue with the DOA. Discussions have focused on the need for a suitable formula for continuing support for foodcrop research and for assuring that such support would be operating within an effective and sustainable national agricultural research/outreach system.

This dialogue has included participation of other donors such as the World Bank, Canadian Cooperation, Italian Cooperation, FAO, UNDP, Belgian Cooperation, FAC and FED. While most donors concur that there is a need for continuing support for agricultural research, a suitable formula for joint donor participation has so far evaded the interested parties.

The sub-group on agriculture of the "Consultative Group for Zaire," meeting in Paris in June 1982, recognized the unlikelihood of obtaining multi-donor support for agricultural research given the present institutional setting. The group recommended that: (a) a course of action be defined by which a "project for reorganization of agricultural research in Zaire" would be developed; (b) the definition at an early stage of an "organizational structure of agricultural research"; and, (c) the provision for "sufficient financial autonomy and management flexibility to the research activity."

Anticipating the direction in which implementation of these recommendations appears to be headed, the DOA has adopted a course of action which would focus on continuation of the national foodcrop commodity programs (Programme National Sectoriale), the coordination of which is vested in a Division of Agronomic Research, Information and Training of the Service d'Etude et de Planification. Project 091 is to provide USAID support for this approach. In the meantime, the Department of Scientific Research and Technology (DSR) was created in early 1982. INERA is now under the Department of Scientific Research and Technology. It appears that INERA will continue in the semi-autonomous status it had under the Department of Agriculture.

The Department of Scientific Research is still in the process of organization. While the statute (decree) of November 1982 placed responsibility for all scientific research, including applied research, within

the DSR, the modalities by which this department will relate to other departments which traditionally exercised research responsibilities or which are prime users/transfer agents of the results of research, e.g., the Department of Agriculture, have yet to be clearly defined.

However, it is clear that the DSR is interested in getting ideas and suggestions on how to proceed in organizing effective research institutions and in defining relationships with other departments of the government and the private sector. The DOA is naturally reluctant to lose control of applied agricultural research and is pushing for the continuation of the national commodity programs under its control. The Executive Council has defined the role of the DSR as essentially one of general oversight of research and coordination and defense of research budgets originating in the respective technical departments, e.g., DOA. Implicit in the Council's action is the continuation of implementation of research programs in the respective technical departments.

Since 1981, the USAID mission and the GOZ have maintained a continuing dialogue on the development and management of Zairian agricultural research, a dialogue which has produced significant results. For example, the USAID proposal that each national commodity program be assigned distinct line budget items was accepted in the 1983 budget. Concurrently, USAID and the DOA have been able to implement manioc and legumes research and outreach projects using INERA land and buildings.

A set of regulations dealing with some aspects of this problem was agreed to by the interested departments--Agriculture, Education and Scientific Research--at a July 15, 1983, meeting of the Executive Council (Cabinet). Three of the regulations address USAID concerns in a satisfactory manner. Specifically, the Council described:

(1) That the national applied research programs be placed under common operative control and that they be integrated.

(2) That these programs have budget line items.

(3) That the research stations where the national programs carry on work be placed under the effective control of the applied research programs.

II. PROJECT RATIONALE AND DESCRIPTION:

A. Rational:

This project provides for USAID support to three national foodcrop commodity programs, two of which are continuing programs, (PRONAM for cassava and PNL for legumes), in cooperation with the DOA and an additional DOA program, (PNM for maize), which was started with CIMMYT assistance.

The essence of the project rationale was set forth in the January 1983 Country Development Strategy Statement (CDSS). The earlier strategy underlying the USAID program in Zaire focused primarily on contributing to achievement of economic and political stability. The new CDSS recognizes the need to continue stabilization programs. This, however, is seen as the principal role of the International Monetary Fund (IMF) with whose efforts USAID will continue to cooperate. The CDSS also recognizes the need for a solid institutional base as the underpinning of sustained economic development. Thus the general program goal for USAID assistance to Zaire is "to develop institutions, manpower capability and physical infrastructure that are essential to major development programs in food production, health, nutrition and family planning".

As part of the overall USAID assistance to Zaire it has, since 1978, supported research in basic food commodities--manioc and grain legumes. Some limited assistance has also been provided to a maize improvement program which has been operated by the GOZ with CIMMYT financial/technical assistance.

Assistance for improving the organization and management in INERA has been provided by the INERA Support Project, which incorporates the grain legume project (PNL).

Training at the M.Sc. and Ph.D. levels has been an important element of these projects. At the project accomplishment completion dates (PACDs) the number of returning participants, when complemented by personnel trained in other programs, will be sufficient in magnitude and diversity to form the nucleus of a technically sustainable agricultural research system.

Although the commodity oriented foodcrop research/outreach programs supported by USAID have produced useful results now finding application, and although these programs have provided training for a nucleus of research personnel, they each remain under independent direction, management and budgets within the DOA. Linkages at the management level, as well as at the technical level, are minimal.

These discrete programs do not provide a sound basis for the institutionalization of an applied research system that is responsive to the needs of the country. They do not provide suitable mechanisms for establishing priorities in research, for planning research programs, for allocating budgetary resources to be consistent with priorities, or for continuing evaluation and reprogramming. Separate technical, administrative and financial management makes coordination and control of the research programs difficult and results in the dispersion of scarce managerial and technical resources. Thus, there is a need for a thorough study of and proposal for reorganization of the agricultural research/outreach system in Zaire.

From the technical standpoint, the separate commodity oriented programs do not adequately deal with certain problems which cut across the spectrum of commodities, e.g., socio-economic problems, soil fertility problems, and outreach/extension approaches and methods. Nevertheless they do provide a vehicle for continuing research in the priority food crops area. Moreover, they provide an avenue for continuing assistance in crops research, while the institutional arrangements within the national agricultural research/outreach system are being sorted out. A rational reorganization of the national agricultural research/outreach system would provide the appropriate environment for viable institution building, which would in turn have a significant impact on production in the food crop sector.

The need for external assistance over an extended period stems from five principal considerations: (a) The precarious state of the Zairian economy precludes, at least in the near term, the level of financial support necessary to consolidate the research institution and to maintain the momentum of ongoing projects. (b) The newly trained personnel will need direction and technical and especially managerial support which only more experienced personnel can provide. (c) The need for continued training to upgrade personnel and to increase numbers is necessary for the eventual replacement of expatriate personnel. (d) The need for both managerial and technical integration of the separate commodity programs; managerial integration to make better use of scarce managerial capability and technical integration to fill certain inevitable voids in the vertically-organized, commodity-oriented

programs. (e) The need for an eventual consolidation of INERA and the national programs to create an agricultural research system which will be capable of defining priorities (i.e. the relationship between domestic and export crops, etc.), planning and programing research, defining personnel and material requirements, and directing and managing research programs consistent with the management, technical and financial capabilities of the GOZ.

While the last point (e) reflects a highly desired objective which should be pursued as vigorously as possible, it is not a sine qua non for carrying out effective crops research in the more restricted scope of project 091. The coordination and integration of the three foodcrops research programs--which currently represent most of the effective agricultural research being done in the country--as designed in project 091, can be considered a first step towards the objective, while being responsive to the more immediate needs cited above.

GEOGRAPHIC SETTING:

The geographic location of the project was selected against five criteria: (a) geographic representativeness, (b) relative need, (c) market infrastructure, (d) existance of sustainable change agencies, and (e) other infrastructure.

1. Agro-climatic representativeness:

The Zairian eco-political or administrative subdivisions, coincide quite closely with the country's agro-climatic zones. Hence it is valid to view national agricultural development in the regional context.

Kasai Oriental encompasses by far the largest and most uniform agricultural area in Zaire. The high level of uniformity of soils and climate makes it feasible to generalize widely from research conducted at one or more interior points. Haut-Zaire appears to be second among regions in agricultural potential followed by Equateur. Bandundu, though poor agriculturally, is also a large, uniform region. Both Shaba and Bas-Zaire are discrete agro-climatically. Kivu region, which was selected as a secondary work area, is representative of only a small agro-climatic zone.

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2. Relative need:

Although the relative need of the several regions may appear about equal, Kivu region is the most needy. The man to land ratio in Kivu is the highest in Zaire, and the nutritional status of the people appears to be the poorest in the country. The justification for locating legume research (Project 064) in Kivu was to develop bean production and to improve nutrition. This has not yet been achieved, and the purpose remains valid.

Bandundu region appears to be the second most needy region. The land is poor and the staple crop is manioc, the staple of Kinshasa. Manioc is also the dominant crop in Bas-Zaire.

3. Market infrastructure:

It was assumed that the absence of a market outlet for the target group would render the project economically infeasible. However, because of the apparent overriding need, it did not rule out the equally or even more isolated Kivu. Shaba rated high, due to the fact that it is a food deficit region and because it has comparatively good roads and railways. Bas-Zaire and Bandundu are linked to Kinshasa by a paved road, and Kasai Oriental and Kasai Occidental are linked to both Shaba and Kinshasa by railroad/river transport..

4. Existance of sustainable change agents:

Since this project seeks to "market" its outputs through other organizations, using agricultural extension systems, their very existance was a factor in project location. Both a pre-PID (Project Identification Document) survey and a reconnaissance during design of the Project Paper (PP) indicated adequate representation of non-government agricultural change agencies to justify the project in Shaba, Kasai Oriental, Bas-Zaire and Bandundu.

Kasai Oriental and Kasai Occidental are favored not only by high concentrations of agricultural missionary groups but by the region-wide, World Bank-financed Project Mais Kasai Oriental (PMKO).

5. Other Infrastructure:

The existance of comparatively better public infrastructure facilities influenced selection of project site locations. These include (a) national and international telecommunications facilities, (b) public air,

ground and water transportation and logistical support facilities, (c) elementary and secondary school systems, and (d) medical facilities.

Also taken into consideration were availability of infrastructure at station locations, such as (a) water, electrical, and sewage utilities, (b) physical structures (housing, office space, garages, warehousing, etc.) (c) research land, and (d) labor. Whenever possible, preference was given to station locations near larger urban centers for more ready access to shopping, entertainment and recreation (i.e., location not too isolated so as to maintain high morale of the research/outreach community).

Based on the above criteria, it was proposed that the project be headquartered in Kinshasa, with stations located in Kasai Oriental (Gandajika), Shaba, Kivu, Bas-Zaire and Bandundu. Kasai Oriental (Gandajika) was found to be the single most representative location in the country. Major efforts would be launched in Shaba and Bas-Zaire. Secondary research and outreach work would be conducted in Kivu and Bandundu.

B. Purpose:

The purpose of the project is to improve and expand the ability of the Department of Agriculture to undertake applied agricultural research activities and to transfer agricultural technology needed to increase village cultivators' production of food crops.

This dual purpose of strengthening institutional capacities for conducting research in development of new agricultural technology and for supporting outreach programs is cast within the goal of increasing the marginal productivity of labor of small farmers as a sub-sector goal of "national self-reliance for agricultural production."

The project will continue to support and expand the ongoing manioc (PRONAM), grain legumes (PNL), and maize (PNM) research and outreach programs. These, and rice in certain areas, are the principal food crops of both the rural and urban populations. This project will not provide direct financial assistance to the rice (PNR) program, even though the DOA has responsibility for PNR.

The project will involve six beneficiary-oriented activity areas:

(a) Genetic improvement of crops-- manioc, maize and grain legumes (beans, groundnuts, soybeans).

(b) Improvement of agronomic practices--cultural practices, rotations, intercropping, relay cropping, fallow.

(c) A farming systems research component which will integrate the biological and physical aspects of the research for improving the productivity of each of the principal crops individually and within different cropping systems with the socio-economic setting of the given area.

(d) Soil fertility research operating across the spectrum of crops, focusing on developing measures for maintaining natural fertility levels with an emphasis on the cost effectiveness and efficient measures.

(e) An outreach element which will develop strong working linkages with the agricultural extension programs of governmental, semi-governmental and private organizations acting as the change agents in direct contact with the farmer.

(f) Cooperation with International Service for National Agricultural Research (ISNAR) and possibly the World Bank in seriously studying an organizational and managerial structure for a national agricultural research/outreach system.

C. Research Orientation:

Crop improvement and production improvement research is the cornerstone of programs for improving theoretical production efficiency and thus output. It is necessary to continue research programs in Zaire to bring about additional improvements in the Zairian context to the yielding potential of crop varieties, to expand the range of localized adaptability of improved varieties, and to optimize stability in Zairian production practices through breadth of variety adaptability and through avoidance and control of plant pests and improvements in plant pest management. Moreover, as production systems change in response to new technology, a need for a continuing adaptation of Zairian varieties and production practices to the changing international conditions becomes necessary.

However, strict adherence to the crop or commodity orientation of research fails to provide strong and direct linkages to the farmer. The farming systems approach is introduced to correct this deficiency. The details of this approach are given in Annex E3. This activity will follow the generally accepted, four-step sequence--diagnosis, design, testing and

outreach. The first step will consist of developing methods applicable to the existing socio-economic conditions and to the production technology for implementing these steps, testing the methods and training Zairians in their use. The concept employs a mobile FSR team for carrying out field studies and interfacing between the crops and agronomic research units, the farmer and the extension entities with which the project will establish strong linkages.

Futhermore, in continuation of the crop production improvement activity, the participation of the research personnel will be more broadly defined than has been the case heretofore. Instead of having personnel assigned to specific crops, individuals will work across the board (with the exception of the plant breeder positions, which will remain crop specific). In this manner a more integrated approach to research will be achieved. The latter is more consistent with actual farming systems and practices in Zaire and is more efficient and effective.

Because of the importance played by the traditional system of soil fertility maintenance and soil management (the bush or grass-fallow system) in the labor productivity equation, special attention will be given to this problem in its broadest context, as distinguished from the more narrow context associated with the single crop approach. Experimentation with a wide range of options--rotations, intercropping, alley cropping, relay cropping, minimal tillage, managed fallow--will explore systems for maintaining natural fertility with a minimal requirement for chemical fertilizers.

In keeping with the principal of greater integration of the national commodity programs, an integrated approach to outreach/extension will replace the single crop orientation of outreach as currently practiced in the national programs. Project generated technology will be provided to numerous existing self-sustaining change agencies and training will be provided to key personnel in these agencies, who will in turn train lower echelon extension agents in their organizations. National and regional coordination of the outreach/extension programs will be established.

D. Project Components

a. Genetic improvements of crops:

Breeding programs for improving manioc, maize, beans and soybeans were initiated in the early to mid-seventies. The focus of the breeding programs was the selection of higher yielding, disease and insect

resistant varieties of acceptable quality. Varieties of maize for higher and lower elevations have been produced, multiplied and released with potential for increasing yields from less than one ton to over two tons per hectare without the use of fertilizers. The maintenance of foundation seed stocks of these varieties will be a continuing responsibility of the research program.

Two improved cassava varieties have been developed for the Bas-Zaire area. A number of advanced selections are being tested in several localities. Significant levels of insect and disease resistance have been found in a number of selections. The new varieties and selections have the potential for increasing yields by about 15 percent. The multiplication of basic stocks of the improved varieties is a continuing activity.

Some selection of higher yielding varieties from local bean cultivars have been made, multiplied and distributed. Varieties of soybeans have been introduced and studied for adaptability. Insect and disease problems are major concerns of the legume variety improvement program.

As they progress, these programs will focus on further increases in yield potential, on increasing the level of disease and insect resistance, and on extending the range of adaptability of varieties to the various ecological settings. The grain legume program will be expanded to include groundnuts.

b. Improvement of agronomic practices: Dates of planting, plant densities, weed control, rotations, use of fertilizers and cultivation practices have been the principal elements studied. Limited study of cropping systems have been initiated in the manioc program. These studies will continue to extend recommendations to wider geographical areas, to relate the practices to new varieties as they become available, and to provide information on disease and insect pest management, weed control and soil fertility maintenance.

c. The farming systems research (FSR) component: Except for a limited beginning in PRONAM, this element will be new to the research program. This component will involve socio-economic-agronomic studies of selected areas to obtain a better understanding of the farming/living conditions and constraints to more productive farming systems and practices. The findings of these studies will serve to guide research in directions most

relevant to the needs of the farmers. They will also identify elements of existing technology most appropriate for introduction and disemination under given conditions and will involve the farmer in decision-making and the research process through on-farm varietal and cultural practice trials. The FSR component will integrate the crop improvement and agronomic research programs on individual crops within a cropping systems approach. At the same time, the socio-economic aspects will be factored in the total system. The FSR activity will be conducted in selected areas in collaboration with outreach.

Initially, only one area will be involved for testing and verification of methods and for training. From the initial area, the program will extend to other principal project areas.

d. Soil fertility research: The maintenance of soil fertility is one of the more important elements in the labor productivity equation. The traditional bush-fallow and, in the savannah area, grass-fallow systems, while more or less effective in maintaining natural soil fertility, are very labor intensive. The establishment of continuous cropping systems involving inter-cropping, alley cropping, and managed fallow systems, could reduce the labor requirements while maintaining fertility at a reasonable level. The judicious use of low level fertilizer inputs could be important in such systems.

A soil mapping and classification unit will be established as a support service to the research and outreach activities of the project. This will be staffed by Zairian soil scientists. The INERA support project is staffed with one Zairian soil scientist. Three others are currently in M.Sc. degree programs in the U.S. Two will complete their programs in 1983 and one in 1984. In addition, two Zairian soil scientists are studying for Ph.D. degrees in Europe. They will complete their programs in 1984. Technical assistance to this unit will be provided on a consultant basis.

e. The outreach element: Although the DOA provides agricultural services at the region, zone, subzone and village levels, this structure, in many instances, does not constitute an effective vehicle for working with the farming population. There are numerous non-governmental entities--church groups, projects supported by various aid agencies and PVOs, local private and semi-private agricultural and agro-industrial entities--which are involved in

promoting agricultural production and in providing information and material services to the farmer. The principal emphasis of the outreach/extension activity will be to act as the intermediary or link between the research activity and these groups, including the DOA services where appropriate.

The first step in the outreach activity will be to identify appropriate entities with which to work. Methods will be developed to support these with technical inputs, training and limited material resources. Close integration of FSR activities will insure the backward and forward linkages to the crops and agronomic research elements. The outreach activity, as with the FSR activity, will be carried out in areas and in communities which fulfill certain minimal conditions necessary for successful extension. In many situations, because of the lack of even minimal transportation, marketing and supply facilities, the probability for the success of programs in increasing productivity may be very poor. The outreach activity will begin in a single area and expand to the other principal project regions as the effectiveness of the methods developed are verified. In a sense, even the outreach activity involves applied research into methods and approaches for using a wide range of existing and potential change agents in extension. This offers an opportunity for developing a low cost, self-sustaining system.

f. Organization: The implementation of a study of the organizational and management structure for an eventual national agricultural research institution, integrating the various entities now involved in research, will depend in part on the provision of guidance and advice which can be made with the participation of ISNAR and the World Bank. The need for such a study was identified at the 1982 Paris meeting of the sub-consultative group on agriculture. Such a study falls well within the mandate of an international agricultural research institution such as ISNAR and it is likely that ISNAR would be willing to undertake an advisory role in conducting the study. The history of unsuccessful efforts to come to grips with this problem, necessitates a neutral and dispassionate approach. Participation of representatives of the principal GOZ entities concerned--DOA, DSR, DOP, the Presidency and the office of the Prime Minister--in conducting the study, will be indispensable.

USAID involvement in the activity will include consultation with ISNAR and the World Bank about their interest, encouragement of the GOZ to request assistance, participation in the study if needed by assigning consultants, and support for implementation of a proposal if such should be accepted by the GOZ.

A central management structure will be established in the Agronomic Research, Information and Training Division of the DOA. This will involve an overall Zairian project coordinator and an expatriate project coordinator/advisor supported by deputies for management (one Zairian and one expatriate counterpart who will be responsible for administrative, clerical and logistics personnel.

A national extension coordinator (expatriate) with a Zairian coordinator will also be part of the central management unit.

The FSR unit will also be based in Kinshasa and attached to the Agronomic Research, Information and Training Division of the DOA. It will work with crop research teams at the stations and in selected field locations.

The crops and agronomic activities will be centered in three principal stations--M'Vuazi, Lubumbashi (Kaniameshi) and Gandajika--which will serve as the principal stations for manioc, maize and grain legumes (soybeans and groundnuts), respectively. Secondary stations--Kikwit (Kiyaka), Kaniama and Bukavi (Mulungu)--will be used for verification and seed multiplication of varieties uniquely suited to those areas. In addition, Mulungu will be the principal station for bean research because it represents the major ecological zone in which beans are produced. The research stations will work with the FSR and outreach units in carrying out farmers' fields trials.

Although each of the national foodcrop programs will be headquartered at a separate station, in keeping with the DOA policy of implementing research through vertically organized national programs, each of the stations will be a secondary station for one or more crops. The expatriate and Zairian personnel at each station will be concerned with all of the crops appropriate to that station. Obviously the plant breeders will remain crop specific.

The stations will be rehabilitated and equipped as necessary to carry out their research functions and to produce the foundation seed and planting material of improved foodcrops varieties identified or developed by the project.

A definitive agreement will be established between the DOA and INERA on the use of station facilities including housing, offices, other buildings, land, and services such as power and water. In this way project control of the essential facilities and services will be assured.

A National Seed Program (Programme National Semencier) is being developed by the GOZ with assistance from UNDP/FAO and the World Bank, which has important implications for the project. The program under development involves (a) establishment of a national seeds office (Bureau National Semencier) with assistance from FAO which will be responsible for planning, coordination and quantity control, (b) foundation seed production by the national commodity programs, (c) a seed farms unit involving two or more seed farms and Project North Shaba (PNS) (the World Bank is expected to finance the seed farms) and (d) commercial seed production by agricultural and rural development projects and private entities. The project will supply foundation seed and planting material for the crops involved in this program. Materials will also be made available to other organizations capable of seed multiplication.

An essential element for each of these many activities will be the training of Zairians. A wide spectrum of training programs will be followed, including degree programs at the M.Sc. and Ph.D. levels, short-term programs in the U.S. and at third country International Agricultural Research Centers(IARCs), and in-country training. Management training will be an important element in the many different programs as well as is specific management training programs. Possible participation in the ISNAR research management training programs, which are expected to be initiated within the next year or two, will be programmed when possible.

As more trained Zairians become available and as more GOZ financial and material support is allocated, it is anticipated that the project will be expanded to embrace other food crops and a larger geographic area.

C. Project Inputs:

The project is cast within an initial 6 year phase of a 10 year project. It is estimated that 10 years will be the minimal time required to place agricultural research and outreach/extension on a sound organizational and operational basis and to allow time for recovery of the country from its current economic crisis.

Project inputs for this 5 year project will require cash and in-kind contributions of $10 million and Z341.3 million. AID will provide $10.0 million to defray foreign exchange costs. Z120.5 million will come from PL-480 counterpart funds. The GOZ will provide approximately Z61 million through the budget, Z73.9 million in in-kind contributions (see Annex K) and Z85.8 million through other sources such as the Convention Development Fund (CDF).

1. Technical Assistance: Foreign exchange $4,369,147

Local currency Z39,653,000

AID will provide 45 person years of long term technical assistance and 50 person months of short term consulting service. The GOZ will provide a technical staff of 66 people, grades A3 or higher by FY85, and 93 by FY88. Their remuneration is Z39.7 million over the five years.

The intent in the initial years of this project is to maintain the same levels of technical assistance that were provided in USAID's cassava and legumes projects.

It is assumed that returned Zairian participants will take over many of the technical assistance (TA) positions in year five, but that phase two of this ten year project will provide selected TA as needed.

a. Long term	person years	$4,369,147
Program coordinator	4.5	
Deputy for Management	5.0	
Farm manager/equipment maint.	2.5	
Plant breeder (maize)	3.0	
Plant breeder (legumes)	3.0	
Agronomist (research)	5.0	
Agronomist (FSR)	2.0	
Agronomist (Soils)	3.5	
Production economist	2.0	
Rural Soc/Soc. Anthro	2.0	
Plant pathologist	2.0	
Entomologist	2.0	
Outreach (national)	4.5	
Outreach (regional 2)	4.0	
Total	45.0	

b. Short Term $291,667

Fifty person months of short term consulting services will be provided representing a wide range of disciplines--agronomy, soil fertility, and classification, plant pathology, entomology, research organization, management, farming systems research, maize, legume and cassava breeding, extension/communication, and project evaluation.

2. Training:

Estimated foreign exchange cost for participants
(See Annex Table K-3) $3,201,200

Local currency for foreign travel costs and in-country training
(See Annex Table K-6) Z25,441,000

Long term training for 20 participants for the M.Sc. and 14 for the Ph.D. level as follows:

Long Term Training

Fields of Study	Number of participants	
	M.Sc.	Ph.D.
Agronomy (general)	2	2
Agronomy (soils)	2	1
Agronomy (FSR)	3	2
Agricultural economics (FSR)	3	2
Rural sociology/Soc. anthropology	3	2
Entomology	2	2
Extension methods	1	0
Plant breeding	2	1
Plant pathology	2	2
Totals	20	14

Two of the M.Sc. degree participants will be provided approximately three months of practical training in research discipline and methods at IITA at the completion of their accademic programs.

Short term training of one to six months duration will be provided for 31 participants. The training programs will include managerial as well as technical training. Programs will be conducted at the IARCs(IITA, CIMMYT,

ICRISAT, CIAT), at the Management Institute in Lesotho, through the ISNAR research management training program, and at U.S. institutions including the University of Florida FSR methods program. Dollar per diem allowances are also included for Zairian staff attending seminars and conferences overseas.

In-country training will include formal (1-2 weeks) as well as informal (1-2) days field programs for 50 participants. Financing is entirely in local currency (See Table K-6). Note that this training program does not include the short term training proposals for years 4 and 5 that are discussed in Annex O-1. If this project is amended at a later date, this training could be included.

The management and FSR training is funded at $382,000. See Annex O-1 for details.

3. Commodities:

The estimated foreign exchange cost (Table K-4)	$1,102,900
Local currency for local procurement (See Table K-7)	Z59,155,000

4. Construction and Civil Works: Z9,692,000

Local funding will be used to convert a former plantation into a principle research station near Lubumbashi, to convert a building in Kinshasa into a suitable headquarters, and to provide needed repairs at five existing stations.

5. Summary of Funding in local currency:

In-kind contribution (land, buildings, vehicles)	Z 73,984,000
Allocated to the GOZ budget	Z 61,000,000
Other such as the Convention Development Fund	Z 85,838,500
Allocated to counterpart funds	Z120,534,000
Total	Z341,356,500

The GOZ will provide funding from the counterpart fund, and regular, ordinary and investment budget allocations for finance of salaries and related allowance for Zairian staff, rehabilitation of the physical facilities, operations and maintenance of vehicles and equipment, farm operations, salaries for local support personnel, travel and per diem for local travel of Zairian personnel, and a location allowance for Zairian employees at isolated posts. Substantial in-kind contribution will include housing, offices, shops, storage, buildings and land (See Table K-8).

D. Project Outputs

1. A coordinated and integrated foodcrop applied research program--manioc, maize, and grain legumes (soybeans, groundnuts, and beans)--involving the principal food crops with forward and backward linkages to extension and the farmer through the use of the farming systems approach.

2. An organizational and managerial structure study and proposal for a reorganization of the national agricultural research system developed and capable of defining, planning and implementing research programs, responsive to current and changing needs and within the capabilities of the GOZ to lend support. This output (study and proposal) assumes a leading role by ISNAR with USAID and other donor (e.g. World Bank) participation.

3. Personnel trained and methods established for conducting farming systems research and extension, integrating crops research with outreach linkages and the farm population.

4. Through FSR methods, the major constraints to increasing small farmer productivity in the project area identified and approaches designed for addressing these constraints. Vigorous implementation of suggestions will be pursued by project personnel.

5. A wide range of public, semi-public and private entities systematically receive technological support through the outreach linkages as project outputs provide feedback and evaluation data to researchers and research managers.

6. Zairian personnel trained in technical and managerial skills in sufficient number to manage and carry out applied/adaptive research on major food crops.

7. In cooperation with other public, semi-public and private entities, a capacity developed for maintaining and producing foundation seed and plant materials for the support of seed production.

8. Improved seed, planting materials and cultural practices tested under farm conditions, demonstrated and employed by at least 29,800 farm families in four major regions by year 11.

E. End of Project Status

The major outputs will have contributed to significant accomplishments by the end of the project.

1. A trained cadre of Zairian research personnel will be in place, and will be capable of carrying out applied research in most of the important agricultural disciplines and for most food crops.

2. An organizational and managerial structure defined within which agricultural research can be carried out in a rationale manner and consistent with needs and with supporting resources. This includes: definition of priorities, planning, programming, budgeting, implementation, and evaluation.

3. The FSR perspective and methods established and personnel trained.

4. Through the interaction between crops research, FSR and outreach/extension, a reiterative process initiated and leading to research activities more relevant to the conditions and needs of the farmer.

5. Methods deployed for working through governmental, semiprivate and private entities for providing services to the farm population.

III. COST ESTIMATES AND FINANCIAL PLAN:

The total project cost, including allowances for contingencies, inflation, but excluding in-kind GOZ contributions, is estimated to be $10.0 million in foreign exchange and Z267,372,500 in local currency.

Table I summarizes the costs estimates by category. Annex Table K-1 shows the costs distribution over time.

TABLE 1 SUMMARY COSTS AND FINANCIAL PLAN

	USAID FX(US$1,000)	GOZ LC'Z1,000)	Equiv (US$1,000)*	TOTAL (US$1,000)
Tech Assist.Pers.	4,369.0	(39,653.1)	1,586.1	5,955.1
Training	3,201.2	(25,441.0)	1,017.7	4,218.9
Commodities	1,102.9	(59,155.0)	2,366.2	3,469.1
Renovation		(9,692.0)	387.7	387.7
Support/Other		(31,090.0)	1,243.6	1,243.6
Cont./Inflation	1,327.0	(102,341.4)	4,093.7	5,420.7
TOTAL	10,000.1	267,372.5	10,695.0	20,695.1

*Estimated shadow exchange rate: US$1.0 = Z25.0

The financial plan is programmed over 6 years. Year 0 is designed to overlap the final year of activities under the existing projects--077 (Manioc Outreach) and 064 (INERA Support-grain legumes). During year 0 initial financing will be made for participant training, commodity procurement and contracts for technical services.

This will permit participant training to begin well before project implementation on the ground begins, allowing participants to complete their training early in the project period. Most of the participants will have completed their training by the fourth year.

Commodity procurement will be concentrated in years 0 and 1.

Year 0 financing will permit contracting for technical services and will provide time for recruiting contract personnel and language training, where needed, to be ready for posting in year 1.

The largest commitment of foreign exchange will be in years 1 through 3. Only a minimum of foreign exchange is proposed for year 5 as plans are finalized for the second phase of the project.

Minimal local currency financing will be required in year 0, as on-going projects will not terminate until the end of FY 84. Local currency financing will come from three sources: the GOZ budget; U.S. PL-480 generated counterpart funds; and an as yet undetermined third source such as the Convention Development Fund (CDF).

Table 2 summarizes the sources of revenues on an annual basis for the local currency (Zaires) budget.

TABLE 2 SUMMARY OF LOCAL REVENUES (Z1,000)

Source	FY1984	FY1985	FY1986	FY1987	FY1988	FY1989	TOTAL
GOZ Budget	1,150.0	13,122.3	12,672.3	12,798.6	12,950.0	8,306.8	61,000.0
PL-480	3,200.0	20,500.0	21,000.0	23,000.0	26,000.0	26,834.0	20,534.0
Other (CDF)	9,566.2	15,402.4	17,191.2	15,284.2	12,348.9	16,055.6	85,838.5
TOTAL	13,906.2	49,024.7	50,863.5	51,082.8	51,298.9	51,196.4	267,372.5

The GOZ contribution from its budget is expected to cover salaries for its personnel, and a significant in-kind contribution--housing, offices, stores, shops and other buildings and land. These two items will account for about Z39.7 million for personnel and Z73.9 million for in-kind in the local currency cost of the project.

Counterpart funds will be provided for housing for expatriates, station rehabilitiation, some personnel costs, and some commodities. The estimate for these costs is Z120.5 million.

The detailed basis for the cost estimates are given in Annex K.

Recurrent Costs

Zaire's budgetary problems and the various recurrent financial demands placed upon the GOZ's budget requires the examination of the additional funding requirements resulting from this project. When USAID's financing is terminated after year 10 of the project, the project's recurrent costs will include annual expenses in local currency and periodic expenses in foreign exchange.

Recurrent costs (RC) for project phase 1 (6 years) total about Z132 million and are utilized as follows:

	million zaires	% total RC
commodities	59.1	45%
salaries/benefits	39.7	30%
operation/maintenance	18.8	14%
transport (domestic)	10.9	8%
travel allowances	3.3	3%
total recurrent costs	131.8	100%

The project is exploring purchase of vehicles in local currency to save a scarce foreign exchange, which , if realized, would increase the transport/travel percentage of total recurrent costs from 11% to 23% of a total recurrent costs of Z152 million.

An acceptable internal rate of return for this project indicates that the project should be able to generate an adequate flow of output relative to its inputs to attract resources in the market. The increased agricultural production will result in an increased tax base. However, the existing system of public finance does not guarantee that these revenues will be applied to the recurrent cost needs of the project. The research stations will be able to generate some income from the sale of seeds and cuttings. The revenue generated will be insignificant because:

1) Seed multiplication will not be part of the project;
2) Farmers are not yet willing to pay high prices for seeds;
3) The nature of research requires subsidies.

The uncertainty in obtaining adequate revenues to pay for services provided by the GOZ implies that the project is vulnerable to budget contractions.

In order to handle recurrent costs both during and at the end of this 10 year project, Zaire has at least one innovative way of providing financing. Annual project costs average about Z45 million (Z51.2 million in year 5 including 20% inflation). It is reasonable to assume that regular budgetary channels of the GOZ can provide an annual average of Z10.2 million and the U.S. generated Counterpart Fund can provide Z24 million. The balance, which is equal to the inflation factor, could be provided from the "Fonds de Convention de Developpement." (the Convention Development Fund). This Fund contains monies generated from taxes on imports and business operations. The Fund is to be used for local production of primary materials that are used by the firms who generate the monies (e.g., rubber production for Goodyear). for example, according to the Department of National Economy, the Fund has the income necessary to cover the entire Z51.2 million zaires needed in Year 5 of this project. To obtain these funds, the Department of Agriculture must assert that agricultural research will aid in the production of the food which those businesses who generate the monies of the Fund provide to their workers or that it will aid in increasing agricultural production in that particular region or area. The major impediments to reaching this "Convention" are the politics involved in the use of the monies and the inter-departmental bureaucratic procedures. To date, this is the only alternate funding source that has been discussed with the GOZ. No one is in a position to investigate other tax sources until the IMF program and debt rescheduling arrangements are established.

The GOZ recurrent costs contributions required in this project actually account for a small percentage of the agriculture budget and an even smaller part of the total GOZ budget. The chart below indicates that even the total project costs, which includes recurrent and investment costs, represents at most only 0.2 percent of the total GOZ budget and 5.8 percent of the agriculture budgets at the end of the project, recurrent costs will amount to about Z28.5 million in 1989 prices, or less than one percent of the agriculture budget.

There is a substantial increase in project investment and recurrent costs between FY 1984 and 1985. This is due both to the usual lag involved in starting a project, and the one year overlap of Project 091 with the two crop-specific research programs 064 and 077 that it will replace. The annual 1983 operating costs for project 064 amount to about Z1.9 million, and Z6.4 million for project 077. The combined level of expenditures can be expected to rise to almost Z12 million for 1984. In 1985 prices, this is about 30 percent of the total 1985 projected costs for project 091 and almost 50 percent of recurrent costs. The remaining increase in expenditure between 1984 and 1985 reflects the introduction of new stations and programs that constitute Project 091.

PROJECTED COSTS - PROJECT 091

in current prices (Z1,000)

1	2	3	4	5	6	7
1984	17,858,703	600,138	13,906	1,808	0.08%	2.32%
1985	24,466,423	846,194	49,025	42,012	0.20%	5.79%
1986	33,518,999	1,193,134	50,864	35,874	0.15%	4.26%
1987	45,921,029	1,682,319	51,083	33,071	0.11%	3.04%
1988	62,911,809	2,372,070	51,299	30,538	0.08%	2.16%
1989	86,189,178	3,344,618	51,196	28,453	0.06%	1.53%

1. Year
2. Goz Budget (base period: 1977-82; growth rate = 37%)
3. Dep of Agriculture, Rural Development, and Environment Budget (base period: 1976-81; growth rate: 41%).
4. Total Project 091 costs including 10% contingency and 20% inflation.
5. Project 091 recurrent costs.
6. Project 091 costs as a % of GOZ Budget.
7. Project 091 costs as a % of Dept. of Agr., Rural Development, and Environment Budget.

IV. IMPLEMENTATION PLAN:

The technical services, which constitute almost 50 percent of the foreign exchange cost, will be contracted from IITA. It is expected IITA will subcontract (interpreted in broad sense as including memorandums of agreement, etc.) some of the services to other IARCs -- CIMMYT, CIAT, ICRISAT, U.S. universities, and/or U.S. consulting firms. Other technical support will be provided from several centrally funded projects (S and T) and CRSPs projects.

Participant training for long-term, degree programs will be arranged with U.S. universities through the services of the USDA/OICD. Short term training in the U.S., International Agricultural Research Centers (IARCs), or third countries will be arranged primarily by IITA and USDA/OICD. The Farming Systems Support Project (S and T) will participate in arrangements for some short-term training in FSR.

Short-term, in-country training will be arranged by project personnel. The facilities of CENACOF, as well as the training center at M'Vuazi, will be used for the more formal courses. Much of the in-country training will be of short duration and will be carried out locally.

Commodity Procurement arrangements are described in Annex L, Procurement Plan.

V. MONITORING PLAN:

There are two associated elements of the USAID monitoring plan. A direct hire project officer will be responsible for over-all monitoring, while a university JCC officer will monitor technical aspects of the project.

A. Over-all:

The project officer will perform the overall monitoring functions, using the implementation plan as his guide.

1. Scope:

Beginning with the final signature of the grant agreement, the project officer would do what is proper and feasible in his role to keep the project advancing on schedule. This would include but not be limited to the following:

a. Covenants: Assist in clarifying requirements.

b. Technical assistance contract: Assist the responsible USAID contracts officer where appropriate, including providing technical specifications, receiving contractors nominees and facilitating the implementation of the contract(s).

c. Participants: Arrange for language tests and language courses, draft PIO/P's, assist in call-forward's, brief participants, monitor their progress in school, debrief them upon their return, and assist them in reassimilating.

d. Finance: Monitor the financial requirements and status of the project, alerting the USAID to anticipated requirements, excessive pipelines, and other financial concerns.

e. Procurement: Monitor procurement of commodities, procedures, delivery, marking and utilization.

f. Work plans: Monitor contractors' work plans for relationship to project outputs, timeliness and utility.

g. Use of project funds: Check appropriateness through regular reports and periodic audits in concert with the USAID Controller.

2. Procedure:

a. Relations with host government: Frequent visits to the office of the GOZ project coordinator.

b. Site trips: Visits to the project sites sufficiently often to be fully aware of the work, progress and problems of the project.

c. Review meetings: Conduct reasonably frequent project review meetings, with appropriate GOZ and USAID participation.

d. Evaluation: Conduct internal and external project evaluations at selected intervals in connection with the USAID Evaluation Officer.

e. Reports: Receive progress reports from contractors at scheduled intervals; report to the USAID Director and AID/Washington at appropriate intervals.

f. Documentation: Carefully document the project events and the USAID/GOZ thinking and planning underlying the events.

B. Technical Monitoring:

An agricultural research/outreach specialist (Joint Career Corps) would monitor the technical aspects of the project. Using a unified, scientific perspective, he would be of assistance to USAID by providing technical monitoring and reporting.

1. Scope:

a. The Project Paper: to verify the continued validity of the PP and its technical assumptions.

b. Purpose: Review of the project purpose with contractors to assure appropriate understanding and pursuit.

c. Orientation: of newly arrived scientists.

d. Professional consultation: On specific research and outreach problems, including the integration of the multi-disciplinary activities.

e. Participants: Orientation of participants following scientific curriculum.

VI. SUMMARIES OF ANALYSES:

A. Technical Analysis:

Agriculture is the heart of the Zairian economy. An estimated 75 percent of the country's population earns it livelihood from agriculture. Agriculture's share of gross domestic product (GDP) and export earnings during the period 1979-81 were 30 percent and 14 percent respectively. Moreover, the manufacturing sector of the economy is dominated by agro-industries.

The stagnation of agricultural output (decline in per capita output) during the past two decades, especially since 1972-74, is one of the principal consequences of the economic crisis facing the country, being attributable in large part to the near-collapse of the transport network, the flight of expatriates from the countryside (except for missionaries), attempts to impose price controls and state marketing agencies, and the acute shortage of foreign exchange for agricultural inputs, trucks and fuel.

The choice of the elements on which to focus this project stems from analyses of existing research and outreach structures, earlier projects, relationships and linkages between the research programs and the outreach/extension entities, alternative approaches for reaching the farmer and obtaining his participation in the process of developing a more productive agriculture, and requirements for establishing a sound, sustainable institution and program for applied agricultural research and for outreach/extension. Consideration was given to a number of technical as well as organizational and management options in terms of adaptability to local organizational and management norms as well as the capabilities of the GOZ.

The element of the project dealing with a study of existing research structures and developing and recommending a suitable structure is an essential part of establishing a national agricultural research/outreach system within which the institution building purpose of the project may be achieved. While progress can continue to be made in improving agricultural technology through the present, loosely-organized structure, the establishment of a sound institutional base for agricultural research will require reorganization of these structures. A sound national institutional base will in turn provide the appropriate environment to establish realistic agricultural priorities and conduct effective research.

From information presented earlier in this Project Paper we conclude that the project design is appropriate to the current state of institutional organization and farming conditions in Zaire. The most significant aspect of the design is the provision, through the several elements, for integration of separate crop research activities into an overall foodcrops improvement program, the introduction of an FSR approach, incorporating socio-economic considerations to assure that the outputs from crops research are relevant to farmers' needs, provision for close linkages between research, outreach/extension and the farmers, and linkage to the numerous existing outreach/extension organizations in development of efficient, effective working arrangements with the outreach/extension organizations in Zaire.

The World Bank has sent two missions to Zaire during the past six months to identify a seed industry project. There has been no agreement so far on site(s) selection. It appears that the World Bank will insist on a number of conditions, including a more exact definition of the organizational structure and operational procedures of the National Seed Program before funds will be committed for financing a seed industry project. It will probably be one or two years before operations could begin.

In the meantime, arrangements have been made with seven existing development projects, which are receiving external support, as potential producers of seed for the next agricultural cycle. The amounts of foundation seed of acceptable quality which will be available for the 1983-84 agriculture cycle remains unknown.

The national programs will be the source of foundation seed and plant materials for the national seed program.

As an interim measure, Project 091 will provide initial seed and plant materials and training in village level seed production through the outreach program. This is the only means currently planned for disseminating the project's improved manioc varieties. As for maize and grain legumes, both precarious transportation and quality control dictates that for the near term, a village seed production activity be pursued through the outreach/extension program.

B. Environmental Concerns:

The mission made an initial environmental examination for the PID. It was updated and included as Annex F.

The construction, to be financed by the GOZ, will be limited largely to rehabilitating present structures. Minimal quantities of insecticides may be used by or under the control of project research personnel who are technically trained to properly handle and store the material. All pesticides purchased for the project will have the prior approval of the USAID Director and the GOZ. It is not expected that such project chemicals will have any adverse effect on the environment.

The more likely source of environmental degradation will be the additional land clearing stimulated by research-provided improved technologies. This has proven the case elsewhere in Zaire (e.g. in northern Shaba Region where farmers responded to market access and improved corn seeds with substantial land clearing for increased cultivation). While research results are only one of several contributing factors to this phenomenon, their role cannot be discounted. These kinds of environmental problems, deriving from extensive (slash and burn) agriculture, have not yet become a significant threat to Zaire, and the country has yet to develop any systematic approach to their resolution or reduction.

C. Social Soundness Analysis:

The social soundness analysis, the technical feasibility analysis of farming systems research and the technical feasibility analysis of outreach services were all drawn in part from a single reconnaissance made by a multidisciplinary team. See Annex E-4, Appendix A. Social feasibility was addressed in part in Annexes E-4 and G.

1. Socio-cultural context: The project is justifiable on the conclusion that a wide segment of the participatory farm population (small-scale farmers) are facing severe economic conditions and are ready for change for betterment. There are blocks of the farm population which cannot at the present benefit from the project, due to the lack of market infrastructure (roads), terms of trade and, in a few cases, strained relations between the farming population and the local government services, (that of DOA in particular). However, there appears to be a sufficient number of regions having favorable socio-economic structure and infrastructure to fully justify the project.

2. Beneficiaries: Project outputs (technology and improved germ plasm) would pass directly through government and private voluntary organization (PVO) change agencies in place to small-scale farmers, for the most part. The implementation of farming systems research should enhance the diffusion of the outputs. Large scale farmers would benefit on a

cash-and-carry-basis. That is, they would be able to get technology and germ plasm by going to the project center.

Participation by the beneficiaries is built into the project through farming systems research/extension, where the farm people would participate in the diagnosis of their own problems and in finding solutions. It is also built in with a recommended package of procedures that an extension organization sponsored farm group would follow in receiving project outputs.

3. Socio-cultural feasibility: The project is designed to "wholesale" its outputs to outreach/extension organizations, who will in turn operate through intermediate change agents in village-level, group "packages". Success requires a commoness of purpose and a high level of internal, social cohesion. The reconnaissance (Annex E-4) indicated sufficiently large numbers of village level groups closely associated spacially and within areas of responsibility of outreach/extension organizations in at least five regions to fully justify beginning the project. Criteria for enrolling village groups (which will be done by participating missions and other outreach agents) were also identified: (1) social cohesion, (2) common goals and objectives, (3) access to markets and (4) government relations. Government relations have been a problem in some subregional zones, where forced cultivation of minimum areas of given crops is still practiced. The project cannot easily succeed in its technology linkages with outreach/extension organizations under such conditions.

4. Impact: The project and its predecessors are apt to have nearly a geometric impact on manioc production as the planting material is spread to the villages and from farm to farm. The impact of the maize and seed legume activities will depend on the success of the project in getting seed produced in the villages. This would mean introducing a higher level of sophistication to its farming system, wherein a farmer would produce seed of higher quality than market-run grain and be paid for the effort. Village level seed production is designed into the project.

The project aims to provide technological assistance (farming systems research and outreach) and technology to in-place, government-sponsored and PVO organizations which are established institutions. The institutionalization of the support mechanism, as envisaged in the project,

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should perpetuate the program beyond the life of the project. The strategy of a low-cost service for self-sustaining local institutions should make the effort replicable and sustainable.

5. Women in the project:

Women are likely to play a near equal role with men in Kasai Oriental region, thanks in part to a well-established religious order of women. But in Bandungu region, where women are in the majority among farmers, they do not enjoy equal representation in mixed assemblies, for example. The situation appears to be similar in Bas-Zaire. From the information gained in the reconnaissance, for women to have equal access to the project's outputs, more women agronomists and encadreurs (lowest level of change agent) are required. However, at the present fewer than five percent of the students of the Faculty of Agriculture, Yangambi and at the technical agricultural institutes are women.

The FSR diagnostic surveys will more precisely define the role of women as farmers in given areas and in designing approaches in extension for responding to the needs of women as heads of families. Technical services are to be provided at the beginning of the project to fully analyze the problem, make recommendations for addressing it and to begin pilot testing to eventually rectify the situation. It is proposed that the analysis be reviewed and that the project be modified accordingly.

D. Economic Analysis

Ex-post analysis of the economic impact of both human capital development (education and training) and knowledge, information and technology capital development (research) in agriculture has generally shown high rates of return. The following examples are drawn from National and International Research and Extension Programs, Agricultural Development Council, 1975, by James Boyce and Robert Evenson:

Studies of Agricultural Research Productivity (Direct Cost/Benefit)

Study	Country	Commodity	Time	Internal R.R.
Griliches (1958)	U.S.A.	Hybrid corn	1940-55	35-40
Ardido-Barleta	Mexico	Maize	1943-63	35
Himes	Peru	Maize	1954-67	35-50
Ardido-Barleta	N. Mexico	Crops	1943-63	45-93

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It cannot be expected that Zaire will produce scientific breakthroughs such as are responsible for some of the returns shown in the above table. The current organizational, social and economic setting in Zaire will limit the rate of return to investments in Zaire. Nevertheless, this Project should improve administration and management with the emphasis on training. This type of non-expendable capital is perhaps the most effective current approach that can eventually lead to reasonable development momentum in Zaire.

Economic analysis of a research project is particularly troublesom because a majority of the potential benefits are neither predictable or quantifiable (research results). The problem increases when among the goals and benefits include such intangibles as institution-building and human capital development. Therefore, the normal procedure for quantifying benefits and estimating the economic feasibility of the project requires modification.

I. Macroeconomic Overview

1. The economic sector

Since 1975, Zaire has been experiencing serious economic difficulties: sharp contraction of GDP, large budgetary deficits, high inflation rate, important balance of payments deficits, and considerable external debt arrears. These difficulties originate in many respects from developments that occurred in earlier years. Among these are: the progressive accentuation of the country's dependence on the mining sector; the relative neglect of the agriculture sector; the massive foreign borrowings during 1973-74, mostly for non-productive infrastructure projects; and, the Zairianization and Radicalization measures of 1973-74.

Zaire's economic picture was very somber during 1975-1978. Indeed, in 1978, the worst year of that period, GDP fell by nearly 6 percent in real terms. The overall budgetary deficit reached a record level of about Z530 million, or around 12 percent of GDP; the inflation rate averaged 80 percent; the overall balance of payment deficit was U.S. $330 million, financed primarily by further accumulation of arrears. Total arrears increased from about U.S. $880 million at the end of 1977 to more than U.S. $1.3 billion at the end of 1978.

Since 1975, Zaire has tried a succession of programs in order to slow down the degradation of the economic situation and to prepare the ground for recovery. Two stabilization programs were adopted with IMF support in March 1976 and April 1977, respectively. Zaire's performance under these programs was, however, very poor.

The deepening of the crisis was mainly due to inadequate, timid, and uncoordinated measures to control the crisis during the period 1975-78. Towards the end of that period, Zaire and its major partners began better focused and more coherent efforts to arrest the crisis. The third stabilization program, from July 1979 to December 1980, was coupled with other undertakings such as: the "Programme de Relance Economique" known as the "Plan Mobutu", a three-year (1979-81) public investment program focusing largely on the rehabilitation needs in priority sectors (e.g., agriculture and transportation); the debt rescheduling agreements with the private banks and the Paris Club; and the technical assistance provided to key GOZ institutions (e.g. the Bank of Zaire, the Ministry of Finance) in order to enhance their managerial capacity.

These new directions permitted an improvement of the economic situation in 1979-80, evidenced by some performance indicators: in 1980, Government Finance showed improvements in certain areas (e.g. tax collection); the external current account balance recorded a small surplus; the inflation rate was lowered to about 44 percent; the GDP increased by 2.4 percent in real value. These developments and other achievements resulting from the IMF stabilization programs of 1980, the debt rescheduling agreements, and the institutional reforms, generated optimism for the future of Zaire's economy. This led to the formulation of a second "Programme de Relance Economique", a three-year program (1981-83) of economic and financial adjustment supported by an "extended facility" from IMF in an amount of U.S. $ 1 billion. Zaire also negotiated with the Paris Club the rescheduling of maturities falling due in 1981 and 1982, including the postponement of some of the already rescheduled maturities. The basic targets of the program are: achievement of an average annual growth rate of real GDP of 3 percent; reduction of inflation to 25 percent by 1983; and, reduction in the level of external current account deficit in 1983 to 5 percent of nominal GDP. Measures adopted in order to

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achieve these targets include: improvement of commodity supply through price decontrol; an up-dated public investment program and affirmed intention to pursue prudent demand management and incomes policies over the medium term; strengthening of budgetary controls, reinforcement of the tax system and its administration; adjustment of interest rates so as to induce savings; and implementation of a flexible exchange rate policy (Zaire's currency was devalued by 40 percent in terms of SDR on June 19, 1981; however, the exchange rates are still too low).

The implementation of the program was jeopardized in the second semester of 1981 due to the weakening of copper, cobalt and coffee markets. The decline of export receipts and the deficiency in the management of public finances contributed to GOZ non-adherence to most of the performance criteria agreed upon with IMF under the extended arrangement. That situation resulted in the loss of access to IMF resources, the accumulation of debt arrears, and somber outlook for the future of Zaire's economy.

The economic situation in 1982 was characterized by the persistence of difficulties that had appeared in the second half of 1981: world prices of Zaire exports continued to decline in 1982, the public finance picture deteriorated further than in 1981, and debt arrears were estimated to approach U.S. $800 million at the end of the year. Consequently, the economic activity was marked by stagnation and even deterioration. In 1983, the situation has not greatly changed. Therefore, the continuation of the economic recovery effort requires an improvement of public finance and management of public sector, the negotiation of a new program with IMF, and the rescheduling of external debts. In this regard, there are on-going negotiations for a new IMF agreement, and an imminent adjustment of Zaire currency in keeping with the flexible exchange rate policy adopted in 1981.

2. The agriculture sector

The agriculture sector provides employment to approximately 75 percent of Zaire's active population. During the period 1979-81, agriculture contributed about 20 percent of the GNP and 14 percent of total product exports. Zaire's agriculture sector is composed of traditional and modern sub-sectors. The traditional sub-sector consists mainly of small farmers cultivating an average of 1.5 hectares and producing essentially food crops. The modern sub-sector

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consists of medium and large scale plantations producing cash crops mainly for exports.

At the time of independence in 1960, food production exceeded domestic demand in such a way that the surplus was exported, and commercial crops generated approximately 40 percent of export earnings. After independence, however, the agriculture sector was severely disrupted. Domestic production has become unable to meet the population's needs. That situation is evidenced by the rise of food imports and the decline in the standards of health and nutrition in the country.

The weakening of the agriculture sector results from a number of developments that have taken place since independence. The political disturbances of the 1960's led to a breakdown of order and security and inflicted a serious injury on the agriculture sector. The lack of maintenance and failure of road, river, and rail transport systems that service the majority of rural areas has disrupted the marketing and distribution sytems, thus creating a disincentive for small farmers to produce above subsistence levels. The pricing system based on government-established floor farmgate prices in force before the liberalization measure of May 1982 was often applied as ceiling prices and contributed to the weak performance of the agriculture sector. Agronomic research has been insufficient for Zaire's needs. Very little applied research of any consequence has been done since colonial times, except in one or two crop-specific programs managed with external assistance. In addition, the Belgian colonial administration did not leave trained Zairians to run what had been one of the best agricultural research systems in Africa.

Other factors that brought about the stagnation of the agriculture sector included: the concentration of GOZ on the development of other sectors, notably mining; the weakness of the agricultural institution to carry out agricultural policy and to provide efficient extension services; insufficient budgetary allocations; lack of foreign exchange for basic agriculture inputs and spare parts; absence of appropriate agricultural credit mechanisms; and, problems stemming from the take-over of agricultural enterprises in 1973 and 1974.

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In the late 1970's, the GOZ recognized the gravity of the problem, and in response to the deteriorating agricultural situation, it has undertaken a number of efforts to revive the sector. Agriculture has frequently been named as the "priority of priorities" and several recovery programs have been established. In January 1978, the GOZ published a document entitled "Programme de Relance Agricole 1978-1980," that indicated the medium and long-term objectives and the measures to be taken to stimulate the agriculture sector. The main objectives to be achieved are: self-sufficiency in basic foodstuffs; rehabilitation of agricultural production for local agro-industries; promotion of agricultural production for exports; and, improvement of living conditions of the rural population. To reach these objectives, investment in the agriculture sector and participation of the private sector were emphasized.

In order to stimulate private sector participation in national economic development, the Government established a system of Economic Recovery Funds (ERF) in 1978. Under this system, private companies enter into an agreement to manage development activities in rural areas utilizing surcharges added to the retail price of their products. The surcharge may not exceed 10 percent of the retail value of each unit produced or sold. The types of projects which may be undertaken by private companies and financed by ERF are those which: (i) produce raw materials and goods utilized by local industry or traded in the domestic market; (ii) improve social and physical infrastructure in rural areas, (e.g., roads, schools, health dispensaries, and village stores); and, (iii) contribute to the training and upgrading of local technical staff. These funds represent a sizeable public investment in agricultural and rural development activities.

In 1980, the GOZ launched the "Programmme Agricole Minimum" (PAM). The aim of the program was to stimulate the production of the major food crops, particularly maize, manioc, and rice. The implementation of the PAM, however, suffered from the lack of proper coordination of activities and insufficient financing means. In general, the program was a failure.

The current GOZ program of action for agriculture development is the "Plan de Relance Agricole 1982-1984" that was reviewed with the IBRD in June 1982. The objectives of the Plan are: to increase food production to attain self-sufficiency; to increase production of agriculture inputs to local industry; and to increase production of export crops to generate foreign exchange resources. The basic activities for achieving agriculture recovery are described in the Plan: to remove the bottlenecks impeding production (e.g., inappropriate policies and shortage of financing means); improve the functioning of on-going projects; encourage small farmers and private companies to produce and market food and cash crops; strengthen the institutional base in order to permit the definition of clear and effective agricultural policies, and improve planning and project preparation.

The Government of Zaire has already taken measures in the context of the 1982-1984 agricultural recovery plan. The Ministry of Agriculture and Rural Development has been reorganized in order to strengthen the government institutional framework in the area of agriculture. The private sector is being encouraged to participate in agricultural development through the use of Economic Recovery Funds, the effort to limit government participation in direct management of production, marketing and processing activities; and the move towards decontrol of agricultural prices. To channel more resources to the agriculture sector a national agriculture bank has recently been created. Emphasis has also been put on the reorganization of applied research institutions, since the recovery of agricultural production requires appropriate applied research and links between research results and extension.

II. Alternatives to the Project

One recommended method of economic analysis is to choose the best amongst alternative projects. In examining other options to this project, the most viable alternative is one that would simply continue AID funding to crop specific research with the addition of maize research. This alternative has the merit of being simple in design and acceptable to the GOZ as it does not propose a new approach. However, since food crop production in Zaire is handled primarily through

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inter-cropping, AID/Zaire decided that the Farming Systems Research approach is more appropriate. It is a development gamble that Zaire will make available the resources necessary for the success of the FSR approach to agricultural research and extension.

III. Benefit Cost Analysis

1. Summary and Conclusions

Given the difficulty of projecting actual output from project inputs, the benefit cost analysis has been primarily used to determine the minimum amount of increased agricultural production necessary for benefits to equal costs at a given cost of capital. The addition of other benefits accruing from the project, such as human resource development and institution building, serves to "push" the project beyond the merely acceptable benefit/cost (B/C) ratio of 1. The projections of the rate of application of technology developed from earlier projects and those which will likely emerge from continuing the activities, suggest that the increase in output necessary to provide a B/C ratio of at least 1 could be obtained in this project.

This approach is a modification of the approach suggested in AID Handbook 3, Appendices 3D and 3E.

The analysis conducted indicates that the necessary increase in production and the numbers of hectares to be planted to new varieties is a feasible target. Even though relatively low yields were assumed (i.e. yield levels from already existing technology), the medium range yield level estimates indicated that less than 1 percent of the present area planted to cassava, 2.2 percent of the area in maize and 4.3 percent of the present area devoted to legumes needs to be shifted to the new varieties by the end of the 20 year planning period. Even with the low range yield level estimates, percentage increase requires only 1.5 percent for cassava, 4.4 percent for maize, and 7 percent for legumes. As these percentage changes are quite modest given a 20 year time span, the economic analysis appears favorable for 091. Also, as technology develops and the individual farm production levels shift upward, fewer hectares will be needed to produce the same level of output.

In addition to this analysis pertaining to increased production, a separate benefit/cost analysis was conducted on the training component of the project. The internal rate of return was 29 percent. At the social cost of capital of 20 percent, the benefit cost ratio was 1.45. On the basis of these indications, this project component is economically feasible.

It should be stressed that training and the agricultural research and extension aspects of the project are closely connected. Without the one, the results of the other will be diminished. Therefore, the disaggregation of the cost/benefit streams should only be viewed as a limited tool for examining more closely the components of the project.

2. Other Considerations:

Income Distribution

The target clientele of the project is primarily the small scale farmer. As new technology is developed and adopted, the income level of the small farmer should increase relative to what the income would have been without the project. However, the research results will not necessarily be limited to the small farmer but can also be applied to larger scale farmers. Improved seeds will be profitable to plantation farmers as well as to small farmers. Therefore, although the income position of the small farmer may improve in absolute terms, the small farmers income position relative to the large scale farmer may not change.

The project will not necessarily re-distribute income from the consumers (urban sector) to the producers (rural sector) even if output expands. Total gross farm revenue (consumer expenditures on farm goods) could either rise or fall depending on the price elasticity of demand and supply. The fact that total gross farm income could fall does not mean that net farm income will fall. If farm costs fall faster than gross revenues, farmers' profits increase. However, gross farm revenue (price x quantity) may not increase as a result of new technology. Given the limited information on demand and supply elasticity parameters in Zaire, no definite conclusions can be drawn.

Foreign Exchange Savings

Foreign exchange savings will be of substantial benefit if the rate of adoption of the new varieties remains consistent with that assumed by the benefit stream. It must be remembered that the benefit stream was assumed such that the B/C is 1 at a social discount rate of 20 percent. This procedure establishes a minimum adoption rate, and not a maximum if seed multiplication and extension activities are successful.

Price Incentives

The importance of price incentives to farmers is now an integral part of discussions between the GOZ and USAID. In 1982, the GOZ issued a law that removed governmental controls on the prices of basic foodcrops. The central government, however, is not able to assure that regional governments cease controlling farmgate prices. In the North Shaba area, for example, the regional government chose only to pay lip service to the national law because high food costs for urban consumers is the major concern in the short run. Despite this, the government and the major purchasers of corn were unable to hold down the farmgate price. With the improvements of roads and other conditions in the project area, competition has increased among the maize purchasers. The law of supply and demand served to increase the farmgate price once the corn purchasers' monopsony broke down. Extrapolating from this experience, we can conclude that price disincentives do inhibit production, but the best way to counter this is to promote competition.

3. Assumptions

Before describing the actual methodology used to conduct the benefit cost analysis for this project, it is important to present the following set of assumptions, upon which the project is based.

a). Time horizon- The economic analysis is carried out for a period of 20 years. It is assumed that benefits will lag behind costs at the beginning of the project.

b). Social discount rate- The opportunity cost of capital is valued at 20 percent. This rate is derived from the interest rate of officially rationed capital (10-12 percent) and the interest rate on the black market (30-50 percent) .

c). Project costs- The Zaire contribution is valued at a shadow exchange rate of Z25/$1. From year 6 to 10, costs are assumed to repeat the pattern of the first 5 years. After year 10, the annual recurrent costs will remain at a level equal to the GOZ contribution for personnel, commodities and support/other costs of year 5.

d). Without project analysis- In the calculation of an internal rate of return for a project, the analysis that should be used is "with/without" as opposed to "before/after". In our analysis, the "without project" analysis has been made indirectly by using only net increases in physical output resulting from Project 091. Costs and benefits are calculated on an incremental basis, thus yielding only the net costs and benefits due to the project.

e). Prices- Prices are in constant 1983 dollars. Zaire values are converted at a shadow exchange rate of Z25/$1, based on the parallel market rate of Z30/$1 weighted by an estimate of the percentage of GDP at the offical rate of Z6/$1. Inflation is excluded from the analysis since it is assumed that inflation will affect all costs and benefits at the same rate.

f). Labor- The analysis quantifies only the project components, "genetic improvements of crops", and "participant training". Zaire's agricultural labor force is widely observed to be underemployed. Real returns to such labor have appeared to remain steady or have even declined. The project will introduce and propagate numerous labor-using techniques, for example, in land preparation, seeding, intercropping, rotations, weeding, seed processing, etc. However, the design team has not developed estimates of the value of unskilled agricultural labor in Zaire (through an opportunity cost analysis, for example) due to the pressures of time. (No such estimates can be located in the literature.)

g). Land under cultivation- It is assumed that the project will not affect the farmers' decision to change the amount of land under cultivation. Some farmers may be so impressed with the higher yielding varieties that they decide that their returns to labor have increased sufficiently to cultivate more land. However, others may value leisure more than work. In addition there are marketing constraints that may affect the farmers decision to increase production.

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h). Quantifiable benefits- The quantifiable benefits to this project consist of two components, the physical increase in crop production and the economic value of trained human capital.

Increases in production are a result of adaptations of existing crop varieties, increased seed supplies of improved varieties, increased adoption rate of new varieties by the farmers due to extension activities and new technology. For the present analysis, only the marginal output changes in maize, legumes and cassava will be considered. The economic value of the agricultural commodities are based on their international price (CIF) converted to zaires at the shadow exchange rate of Z25/$1, minus the in-country transportation cost to the farmgate. Corn is valued at $277/metric ton ($300/m.t.; 575Z/m.t. transport). Manioc is valued at $101/m.t. ($181/m.t.; 2000Z/m.t. transport). Beans are valued at $340/m.t. ($480/m.t.; 3500Z/m.t. transport). The prices used, then, are farm gate shadow prices based on present world market prices.

The value of human capital development is also quantified as per AID/W request in State 122609. The benefits from the education component were estimated using a shadow price to represent the value to Zaire of having trained personnel. Since most of the people trained will not be replacing expatriates, the total cost of hiring expatriates was not used as the shadow price in all cases. Likewise, the present salary scale in the GOZ was not used, as it usually does not represent the economic value of the work being performed. In the case where a returning graduate will replace an expatriate, their economic worth to society is valued at the full amount of compensation paid to the expatriate. For the additional Zairians who receive training but do not replace an expatriate technical advisor, the base salary alone of expatriates in their respective disciplines is used as a guide to economic valuation. The increased economic value for the training was calculated as the difference between the economic value of the human-capital before and after training.

The increased economic value of a person with a Master's degree above a Bachelor's degree or a Ph.D. degree over a Master's was estimated at $5,000 a year. An individual following a six to nine month short term or CPU team training course was assumed to have an increased economic

value of $1,500 a year. Those acquiring other technical skills were assumed to have an increased economic value of $1000 per year. For each year, the number of graduate and technical degree holders were multiplied by their respective economic valuation, and added together to obtain the annual benefits accruing to the project from the training component. After the fifth year of the project, we assume that the training cycle will begin over again, as does the technical assistance. Therefore, when new students return after the seventh year, the pattern of replacing technical assistance is repeated.

i) Secondary Benefits and Costs

No attempt was made to quantify secondary benefits or costs. The benefits include increased nutritional levels, the multiplier effect of increased economic activity due to increased farm income and marketing activity, and increased levels of education due to income to allow children to go to school. Secondary costs would be less labor due to children in school and loss of manpower due to training.

In addition to benefits that can be quantified, there are a number of non-quantifiable benefits that can accrue from a research and institution building project. For example, increased knowledge and human capital are generated by the results of research. This capital is an essential ingredient to development. Under the right conditions, development can proceed very quickly. Under the worst conditions, the potential for knowledge and human capital can remain latent, only capable of being exploited once conditions become favorable.

4. Methodology of Analysis

The assumed benefit stream of increased agricultural output for the benefit cost analysis initially increases at an increasing rate, slows to increasing at a decreasing rate, and reaches a maximum by year 18 (a classic airplane tailed production function). This benefit stream is quite feasible given existing technology, only requiring adoption of existing improved varieties and a sufficient supply of the new seeds. The implicit assumption is that no new varieties will be developed during the first five years of the project and that any adoption of new

varieties would be the result of past project efforts. It should be noted that without this project, few of the direct benefits of the earlier projects (Cassava Outreach and, INERA Support-legumes) could develop. Yet, it is inappropriate to attribute the benefits of previous projects to this project. If such an approach were taken, USAID would be double counting the benefits, first in earlier projects, then in this project.

All tables for the economic analysis are found in Annex H. Table 19 presents the cost and benefit stream and the benefit-cost ratio for the total project.

A discounted benefit stream was created to equal the given discounted cost stream to produce a benefit/cost ratio of 1. Then the question was posed, "How many tons of cassava, beans, and maize can generate this benefit stream?" The assumption was made that 65% of the benefits would come from cassava (a major staple in the diet), 25% of the benefits would come from maize (another staple) and that 10% would come from legumes. (The area planted in Zaire is given as 2.5 million hectares for cassava, 743,000 hectares for maize, and 250,000 hectares for legumes.) The benefit stream (expressed in zaires) was broken down into tons of each commodity needed to generate the stream by multiplying the percentage of each commodity's contribution to the total value of net benefits per year and dividing this by the shadow price of each crop to give the annual tonnage for each crop. The results of this analysis show that by year 20, 115,842 m.t. of cassava, 16,245 m.t. of maize, and 5,294 m.t. of legumes a year are needed to generate the assumed benefit stream. (See Table 7).

The question was then posed, "Given the required net tonnage increases for each commodity, what are the number of hectares needed to be put under improved seeds and/or planting practices?" The tonnage of each crop is divided by a range of net increases in yield that would result from adopting the new seeds to give the number of hectares necessary to produce those tonnages. Three different yield increase estimates were used for each crop, and are listed in Table 1. The hectarage required for the project is given in Tables 8-10.

From these results, we can determine the amount of land the project will require by year 20, as a percentage of the total land area cultivated for each crop. This is presented in Table 2.

To estimate the number of farm families, the hectares were then divided by the average production area cultivated per farm family to give the number of farm families required to adopt the new seeds to give the assumed benefit stream. It was assumed that farm families cultivate an average of .7 hectares of manioc per farm family, 1 hectare of maize and .2 hectare of legumes. The number of farm families which are required to be affected by the project under the varying assumptions are presented in Tables 11-13.

Over the next 10 years, the training component proposes to train 40 people from the bachelors level to the M.S. level, 32 people from the Master's to the Ph.D. level, provide short term training to 80 people and technical training to 540 people over the next 10 years (the training component for the second phase of this project, years 5-10, will handle the same numbers of trainees as in the first phase). It was assumed that the first group of participants would return in year 2 of the project and that all participants would have returned by year 11. The attrition rate (those not returning to Zaire) is assumed to be 10 percent for the degree recipients. Tables 14-18 presents the benefit and cost calculations for the training component of the project.

Sensitivity analysis was performed on the increased agricultural production resulting from the project to ascertain how the benefit/cost ratio would change, given 5 and 10 percent changes in total benefits and/or costs. As we can see in Table 3, if benefits are reduced by 5 and 10 percent with costs held constant, the benefit/cost ratio will fall by 5 and 10 percent respectively. However, if benefits are held constant while costs are increased by 5 and 10 percent, the benefit/cost ratio will not fall by as much as the rise in costs. These results indicate that the project may be slightly more sensitive to a decrease in benefits than it is to an increase in costs.

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A sensitivity analysis was also performed to determine the effect of error on the benefit/cost ratio for training. The results as presented in Table 4 show that, like the previous analysis, the training component is slightly more sensitive to a decrease in benefits than an increase in costs.

E. Administrative Arrangements

The DOA Division of Agronomic Research, Information and Training of the Service d'Etude et de Planification will be the cooperating entity responsible for project implementation. This division, established in 1971, has remained largely non-operational insofar as its research function is concerned, but is now being activated to coordinate and oversee the research, training and information activities of the DOA. At present the staffing consists of a Chef de Division and a secretary. The former participated in the project design. Assurance was given that adequate numbers and kinds of personnel would be added to the division to satisfy the requirements of the project. A Zairian project coordinator, with a counterpart contract project coordinator, who would also be chief of party of the contract team, will be responsible for overall direction, management and coordination of the several elements of the project. They will be supported by a management unit consisting of co-deputies (Zairian and contract counterpart) responsible for development and direction of project management units including adminstrative, clerical and personnel unit, public relations and information unit, financial management and accounting services unit, procurement and logistics support unit, training coordination unit, and support services (housing, transportation, etc.) unit.

Zairian and contract technical field units consisting of crop improvement specialists and agronomists will be assigned to each of three main stations. Zairian personnel will be assigned to the secondary stations.

A Zairian director will be named for each station. For the three main stations the director will also be director of the corresponding national program (example: maize, manioc, legumes).

Supporting expatriate technical personnel--entomology, plant pathology and agronomy/soil fertility--will be assigned to one or the other of the main stations as a function of the work load of the station in the particular discipline, e.g., entomologist at M'Vuasi. The supporting technical specialists will work across commodity lines and stations as needed. Zairian personnel representing these fields will be assigned to each of the principal stations and secondary stations.

The work of the field units will be directed and coordinated by the project coordinator.

An FSR unit will be posted in the office of the project coordinator. This unit will work with the station personnel in carrying out the four steps described for the FSR program. Close liaison with the outreach/extension unit will be maintained by selecting common areas for field activities. The FSR unit will be composed of three expatriates and six Zairians.

A senior expatriate specialist in extension, along with Zairian extension specialists, will also be posted in the office of the project coordinator. This headquarters outreach/extension unit will direct, coordinate and support outreach/extension activities in each of the targeted regions as the programs develop. Close working linkages will be maintained with the FSR and field technical units.

A project planning and coordinating committee composed of the project coordinator, the deputy for management, the senior extension officer, the senior FSR officer and the research station/national program directors will be established to facilitate preparation of annual work plans, allocation of budgets to the different activities, and review and evaluation of project progress.

USAID financed technical services will be provided through a contract arrangement with IITA which, at its option, may sub-contract with other suitable institutions--IARCs, U.S. universities, U.S. consulting firms, or joint contracting may be elected. IITA as the

primary contractor will be responsible for rendering or having rendered the services specified.

The Chief of the Division of Agronomic Research, Information and training assured the design team that Zairian personnel are available and will be recruited to adequately staff the project and to provide the required numbers for training throughout the life of the project. Approximately 66 Zairian research workers at the A3 level or higher, including participants in training, will be needed to adequately staff the project by FY85.

Experience with the Cassava Outreach and INERA Support (legume research) projects justifies the conclusion that project implementation would progress satifactorily with such an arrangement.

F. Other Donors:

This project proposes to achieve its goal by supporting other donors who are operating at the farmer contact level. This approach was tested by PRONAM (Project 077) and proved successful.

1. Public agencies:

The project will support the efforts of the World Bank in its present food production locations and in its proposed seed industry and corn marketing projects by providing improved technology, in-country training and improved planting material. It will support the FAO fertilizer project and the agricultural assistance programs of Canada, West Germany, Great Britain, France, Italy and other bi-lateral and multi-lateral programs the same way. If an IFAD project materializes in Shaba, for example, this project would support it.

2. Non-government agencies:

The mission is in contact with 123 non-government PVO's who provide agricultural assistance at the farm level. (Annex E 4). The list is not yet complete. A high percentage of these organizations are expected to participate in the project.

VII. COVENANTS

The following special covenants are proposed:

A. Establishment of an Interim Agricultural Research/Outreach Policy Commission

The GOZ shall covenant to formally establish an Agricultural Research/Outreach Policy Commission, co-chaired by the Prime Ministers' Office and the Presidence, with representatives from the Department of Agriculture, the Department of Scientific Research, the Department of Education, the Department of Plan, the Department of Finance, and others as appropriate, to convene when necessary concerning multi-departmental GOZ policy regarding agricultural research and outreach.

The GOZ shall covenant to generate, through this Commission, an official GOZ request to ISNAR for the services of one or more consultant (s) to participate in a GOZ study of the reorganization of agricultural research in Zaire (see Annex Q), the request to be sent within 30 days after signing of the Project Agreement by the United States Government (USG) and the GOZ. The study will begin mid-January 1984 and be completed within five months. The GOZ shall covenant to appoint the best Zairian expertise available to serve full time for four months to conduct the study and make a package proposal to the GOZ for a clearly defined system of agricultural research in Zaire. The USAID considers a clearly defined system, with a clearly defined role for all GOZ participants, to be a prerequiste to justification of continued USAID investment in agricultural research in Zaire. (Note: As of the Conseil Executive meeting on July 15, 1983, it appears that the GOZ has made short-term agreements to resolving these and other issues concerning organization of the agricultural research system.)

B. Project Organization and Authority

The GOZ shall covenant to place authorization for coordination of the National Foodcrop Programmes (Manioc, Maize, Legumes and Rice) in the Division of Agronomic Research, Training and Information within the Service d'Etudes et de Planification of the Department of Agriculture.

The GOZ shall covenant to formally approve the proposed organizational structure, staffing pattern, functions, and delegations of authority for the project; and men and women shall be provided equal opportunity to participate in all positions and activities of the project.

The GOZ shall covenant to appropriately staff officers in charge of management offices within the central and regional offices of ARIT including the clerical and personnel unit, financial management and accounting services units, procurement and logistics support unit, training unit, and support services (housing, transportation, etc.) unit.

C. Research and Outreach Facilities and Vehicles

The GOZ shall covenant to negotiate a definitive agreement with INERA for use of land, houses, offices, garages, warehouses and service buildings, with control of these facilities vested in the project - at M'Vuazi, at Gandajika, and at Mulungu, and INERA will be permitted to maintain longstanding research activities, in order to preserve patrimonial germ plasm stocks. The GOZ shall covenant to insure that all project facilities, including those at Kinshasa, M'Vuazi, Gandajika, Mulungu, Kitwit/Kiyaka, Kaniama, and Lubumbashi/Kaniameshi are serviced with adequate utilities (electrical, water, and sewage distribution systems) as part of the Project infrastructure.

The GOZ shall covenant to invest authority in the Director of each of the national programs for complete control of corresponding principal and secondary stations.

The GOZ shall covenant to provide adequate space for a national headquarters in Kinshasa.

The GOZ shall covenant to title all project vehicles under the GOZ; appropriate insurance coverage including third party liability insurance for vehicles used by the USAID-financed contract team will be secured from a commercial carrier; premiums for the above mentioned insurance coverage will be paid from the Trust Fund Account.

D. Project Accounts:

The GOZ shall covenant to establish and maintain budget line items for the national programs separate from those of INERA and/or other entities. The project grant agreement will clearly indicate the terms and conditions for use of project funds and the responsible signators on payment vouchers. The agreement will provide for periodic replenishment of the project account(s) in accordance with the financial requirements of the project. Deposits to the project account(s) are expected to flow from Counterpart Fund and other sources to be indentified such as the Convention Development Fund, in addition to those from normal GOZ budgetary sources such as B.O., B.I. and B.A.

E. Project Staffing, Salaries and Remuneration, and Housing:

The GOZ shall covenant to assign no less than 66 A-3 or higher level personnel to the project, including personnel in training, by fiscal year 1985. By fiscal year 1988, personnel should number 93.

The GOZ shall covenant to include assignment to the project of personnel trained and/or assigned to current and past CIMMYT and USAID supported PNM, PRONAM and PNL activities.

The GOZ shall covenant to establish appropriate salary scales and levels of remuneration for project personnel at competitve levels with those of the Institut Facultaire d'Agronomie (IFA) and similar institutions. The GOZ shall covenant to establish locality hardship allowances for project personnel assigned to isolated posts.

The GOZ shall covenant to continue to provide housing for project participant trainees and their nucleur families when they are in long-term (more than one year) training overseas or away from assigned posts.

F. Project Evaluation: The GOZ shall covenant to establish an evaluation program as part of the Project, including: (1) evaluation of progress toward attainment of the objectives of the Project; (2) identification and evaluation of problem areas or constraints which may

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inhibit such attainment; (3) assessment of how such information may be used to help overcome such problems; and, (4) evaluation, to the degree feasible, of the overall development impact of the Project.

As an integral part of the evaluation process, representatives of the GOZ and USAID agree to conduct an in-house evaluation annually to re-examine Project strategy and to assess actual performance against planned performance as presented in the Project Paper and as presented in the annual work plan. Based on the results of these annual evaluations, adjustments will be made as necessary and as agreed upon by the GOZ and USAID in the form of letters of implementation, or redesign and/or amendment to the Project. Subsequent incremental contributions by USAID will be dependent upon the conclusion of the GOZ and USAID that the purpose of the project is successfully being met.

A mid-project evaluation will be conducted before the end of year three. Based on the results of this evaluation, adjustments will be made as necessary and as agreed upon by the GOZ and USAID in the design for the final two years of the project. This evaluation will cover all aspects of the project including strategy, approach, implementation and financing. The GOZ and USAID also agree that an end of project evaluation will be conducted during year five. This evaluation will be a comprehensive technical, financial, social, and economic analysis, matched against project objectives, to measure the extent to which project outputs, purposes and goals have been achieved. It will assess causality and analyze the sustainability of the project strategy and operations. The approach, methodology, and composition of the evaluation team will be much the same as that of the mid-project evaluation. A positive finding will set the stage for the 5-year Phase II activity.

VIII. EVALUATION PLAN

There are three principal evaluations scheduled for this project. The first two are aimed at evaluating the first 5-year phase of the project; the third will be the final evaluation of both phases (ten year LOP). The first major evaluation, conducted by outside expertise and scheduled for March 1986, represents the interim evaluation of Phase 1.

Major emphasis will be placed on assessing the design and structure of the project. Questions to be answered will include:

1. Have inputs been delivered?

2. Is the application of these inputs leading to the generation of the intended outputs?

3. Are the outputs contributing to the achievement of the project purpose? At this point, modifications can be made as necessary to better achieve the project purpose and goal.

Both the first and second evaluations will address fundamental issues relevant to the viability of the project. These include the farming systems research component, research management and institution-building objectives, and the outreach approach.

Farming systems research represents a new component in research efforts in Zaire. The first evaluation will determine whether the correct inputs are being applied to generate the intended outputs and whether the outputs are contributing to the project purpose. The objective of the second evaluation will be to assess the contribution of the FSR approach to the achievement of the project's purpose and goal.

Another objective of the project is institution building. A major issue to be resolved is the apparent lack of agreement within the GOZ over the direction and control of agricultural research. As an initial Phase 1 action of the project, a study will be carried out to make recommendations for the resolution of this issue The first evaluation will assess the merits, utility, and influence of this study on the reduction of the problem.

A third objective is strengthening research management. The project will strive to establish a national capacity within the GOZ to manage foodcrop research activities. This will include the capacity to:

1. plan research activities;
2. allocate personnel, material and finances;
3. set research goals and targets;
4. direct research operations; and,
5. monitor and evaluate research activities.

In the first evaluation, the appropriateness of the inputs and outputs will be assessed; by the second evaluation, the impact of the project upon reaching these objectives can be measured.

The primary outreach strategy of this project is to mobilize potential rural outreach agents (religious and voluntary development organizations, public development projects, and private sector commercial teams) to participate in a network for distribution and adoption of project research material. The first evaluation will examine the extent to which these agents have been mobilized. The second evaluation will assess the efficacy of this approach.

ANNEX A.
PID APPROVAL CABLE

1/2 UNCLASSIFIED STATE 122[illegible]

ACTION AID2 INFO AMB-DCM ECON CHRON 6/AN

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ACTION DUE: 5-11-83

AIDAC, ABIDJAN FOR REDSO/WCA

E.O. 12356: N/A
TAGS:
SUBJECT: ZAIRE - APPLIED AGRICULTURAL RESEARCH (660-0091) PID REVIEW - ECPR

REF: (A) STATE 46212, (B) KINSHASA 2279, (C) KINSHASA 2367, (D) KINSHASA 2447

1. THE PID WAS APPROVED ON 12 APRIL 1983 AT AN ECPR CHAIRED BY AFR/PD DIRECTOR COHEN. THE COMMITTEE FOUND REFS. B, C AND D TO BE RESPONSIVE TO THE ISSUES RAISED IN REF. A AND, WITH THE ADDITIONAL NEW COMMENTS PROVIDED HEREIN, RECOMMENDS THAT PROJECT DESIGN BEGIN.

2. THE COMMITTEE FOUND THE PROPOSED PROJECT TO BE CONSISTENT WITH THE MISSION'S PROPOSED STRATEGY SHIFT FROM SHORT TERM STABILIZATION TO LONGER TERM PROJECTS. ALTHOUGH THE STRATEGY CHANGE HAS NOT YET BEEN AUTHORIZED, PARAGRAPH 3, CHAPTER 2 ALLOWS FOR PROJECT DESIGN AND AUTHORIZATION PRIOR TO REVISION OF THE CDSS.

3. THE RESEARCH METHODOLOGIES SELECTED SHOULD BE CONSISTENT FOR ALL SITES SELECTED. THE PP SHOULD DESCRIBE IN SOME DETAIL THE MIX OF FARMING SYSTEMS AND APPLIED RESEARCH PLANNED FOR EACH PRIMARY STATION AND SUBSTATION. IF METHODOLOGIES WILL DIFFER, THE PP SHOULD DETAIL THE DIFFERENCES.

4. THE PP MUST PROVIDE AN ANALYSIS OF THE RELATIONSHIP OF THIS PROJECT TO THE WORK BEING DONE BY THE IBRD, ESPECIALLY FOR THE SEED MULTIPLICATION COMPONENT.

5. THE PROJECT SHOULD TAKE ADVANTAGE OF THE S AND T CRSP RESEARCH PROJECTS. THE PROJECTS MAY BE ABLE TO PROVIDE INFORMATION AND SHORT-TERM ASSISTANCE FOR BOTH DESIGN AND IMPLEMENTATION. THE LIST OF PROJECTS AND PROJECT NUMBERS INCLUDES:

- A. CRSP - BEANS/COWPEAS - 931-1310
- B. CRSP - PEANUTS - 936-4048
- C. CRSP - MANAGEMENT OF TROPICAL SOILS - 931-1311
- D. AG. PRODUCTION TECHNICAL ASSISTANCE - 936-4109

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- E. WEED CONTROL UTILIZATION - 931-0208
- F. PEST MANAGEMENT - 931-0930
- G. FARMING SYSTEMS SUPPORT SERVICES - 936-4090

4. WILL INSURE THAT DESIGN TEAM MEMBERS CONSULT WITH S AND T PERSONNEL ENROUTE TO ZAIRE.

6. THE TECHNICAL ANALYSIS SHOULD PROVIDE AN ASSESSMENT OF POTENTIAL PRODUCTION INCREASES FOR DIFFERENT LEVELS OF INPUTS FOR EACH CROP. IT SHOULD ALSO DISCUSS THE RELATIONSHIP OF PRICE INCENTIVES TO PRODUCTION, IN PARTICULAR AT WHAT POINT PRICE DISINCENTIVES ARE A BAR TO PRODUCTION.

7. THE PP SHOULD PROVIDE AN ANALYSIS OF THE IMPACT OF THE COMMITMENT OF COUNTERPART FUNDS TO MEET GOZ REQUIREMENTS FOR THIS PROJECT AND HOW THAT COMMITMENT WILL AFFECT OTHER AID AND GOZ PROJECTS. THERE MUST ALSO BE AN ANALYSIS OF RECURRENT COSTS REQUIRED TO SUSTAIN THE RESEARCH EFFORT AND A REALISTIC PLAN FOR THE EARLIEST FEASIBLE ASSUMPTION OF THOSE COSTS BY THE GOZ. (SEE AID POLICY PAPER ON RECURRENT COSTS FOR GENERAL GUIDANCE.) THE PP AND GRANT AGREEMENT SHOULD PROVIDE FOR REGULAR USAID/GOZ REVIEW OF GOZ PROGRESS TOWARDS PLAN TARGETS.

8. THE TRAINING COMPONENT OF THE PROJECT MUST PROVIDE DETAILS ON WHO IS TO BE TRAINED AND WHAT THE ROLE OF RETURNED TRAINEES IS TO BE. THIS SECTION SHOULD INCLUDE A DISCUSSION OF PAST USAID PARTICIPANT TRAINING, PARTICULARLY THAT DONE UNDER THE INERA AND PROGRAM PROJECTS.

9. THE PROPOSED INSTITUTIONAL LINKAGES, ESPECIALLY IN LIGHT OF THE PROPOSED REORGANIZATION OF THE DEPARTMENT OF AGRICULTURE, MUST BE DETAILED.

10. THE ECPR NOTED THAT THE PID HAD NO MENTION OF WOMEN AND THEIR ROLE AS FARMERS IN THE RESEARCH EFFORT. THE SOCIAL AND TECHNICAL ANALYSES SHOULD PROVIDE DETAILS OF THE PROPOSED ROLE OF WOMEN, PARTICULARLY IN THE FARMING SYSTEM RESEARCH METHODOLOGY AND IN THE TRAINING COMPONENTS OF THE PROJECT.

11. THE CONSTRUCTION/REHABILITATION COMPONENT OF THE PROJECT IS SIGNIFICANT IN BOTH COST (40 PERCENT OF GOZ BUDGET) AND FUNCTION. AS FUNDING WILL BE REQUIRED DURING THE FIRST PROJECT YEAR, THE DESIGN TEAM SHOULD INSURE THAT THOSE FUNDS WILL BE AVAILABLE. THE PP MUST ALSO SHOW WHO WILL BE RESPONSIBLE FOR THE CONSTRUCTION ACTIVITIES AND ANALYZE THEIR CAPABILITY TO DO SO. THIS IS ALSO TRUE FOR HOUSING FOR THE TA TEAM. AS IT IS NOT

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MENTIONED IN THE PID OR SHOWN IN THE BUDGET, YOU SHOULD INSURE THAT THE PP PROVIDES FOR IT.

12. BUILDING ON THE ASSESSMENT OF POTENTIAL PRODUCTION INCREASES FOR DIFFERENT LEVELS OF INPUTS FOR EACH CROP (SECTION 4 ABOVE) AND ON THE RECURRENT COST ANALYSIS, THE PP TEAM MUST DO AN ECONOMIC ANALYSIS OF THE RESEARCH PROJECT. IF THERE ARE UNRESOLVABLE QUESTIONS ABOUT SIZE AND TIMING OF PROSPECTIVE PAYOFFS FROM THE RESEARCH ACTIVITY--AS ALMOST CERTAINLY THERE WILL BE--SENSITIVITY ANALYSIS SHOULD BE CARRIED OUT TO DETERMINE THE LIKELY RANGE OF THE RATE OF RETURN TO THE RESEARCH INVESTMENT.

THE ECONOMIC ANALYSIS SHOULD DISTINGUISH AMONG THE VARIOUS COMPONENTS OF THE PROJECT, SUCH AS SEED PRODUCTION. DAS
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ANNEX B

PROJECT DEVELOPMENT PROCEDURE

A. Project Design Team:

1. AID Officers in charge: Lee Braddock, Design Officer; Norman Sheldon, Technical Officer
2. GOZ Officer in Charge: Cit. Mota Bakajika, Chief, Division of Research, Information and Training, Bureau of Studies and Planning, Department of Agriculture.
3. Senior consultant: Dr. Francis LeBeau, Contract Consultant
4. Design team:
   - a. General coordination and design:
     - (1) Dr. Francis LeBeau
     - (2) Cit. Mota Bakajika
   - b. Applied research:
     - (1) Coordinator: Dr. Frank Brockman, IITA, Director, PRONAM
     - (2) Tubers:
       - (a) Dr. Frank Brockman
       - (b) Cit. Lutaladio ne Bambi, Co-director, PRONAM
     - (3) Legumes:
       - (a) Dr. Eric Kueneman, IITA
       - (b) Cit. Mundundu Ndonambah, Director, INERA/MULUNGU
     - (4) Maize:
       - (a) Dr. Joseph Pajemisin, IITA
       - (b) Cit. Binsika Bi Mayala, Director, P.N.M.
       - (c) Cit. Mukendi Nkashama, (Coordinator of P.N.M. Research programs)
     - (5) Soil management:
       - (a) Dr. Tony Juo, IITA
       - (b) Cit. Matungulu Kande, INERA Mulungu
       - (c) Cit. Makumbi ma Nguayila, Professor, I.P.N.
     - (6) Research station farm management, land development:
       - (a) Paul Hartley, IITA
     - (7) Research station physical plant:
       - (a) John Craig, ITTA
       - (b) Cit. Mulamba wa Kabasele, USAID Engineer Advisor
   - c. Farming systems research:
     - (1) Dr. James Jones, AID Farming Systems Research Support Project University of Florida
     - (2) Cit. Nkiere Mbo Wassa, Agricultural Economist, USAID/Zaire
   - d. Outreach:
     - (1) Dr. Lloyd Clyburn, Contract Consultant
     - (2) Cit. Tshishiku Kabundi, Agronomist, USAID/Zaire
   - e. Administration:
     - (1) Dr. Pierre P. Antoine, ISNAR
     - (2) Dr. Lloyd Clyburn
     - (3) Dr. Francis LeBeau
   - f. Financial Management:
     - (1) Ray King, AID controller
     - (2) Cit. Kungula Biantanga, Department of Plan
     - (3) Dr. Francis LeBeau

g. Economic Analysis
   (1) James Snell, USAID/AID/Washington
   (2) Robert Navin, USAID/Zaire
   (3) Henriette Emond, USAID/Zaire
   (4) Cit. Mangindula M'baki, USAID/Zaire
   (5) Cit. Mobula Meta, Chef de cellule agronomie et géolgie au Service Présidential d'Etude(SPE)
   (6) Dr. Francis LeBeau
h. Social Soundness Analysis: Dr. James Jones
i. Environmental Analysis: Dr. Lloyd Clyburn
j. Procurement: A. T. Bilecky, REDSO/WCA
k. Contract: J. Dzerwa, REDSO/WA
l. Conditions and Covenants: Norman Sheldon
m. Training
   (1) Dr. Wade Reeves, IITA
   (2) Cit. Chirume Mendo, CENACOF
   (3) Cit. Chizungu Rudahindwa, CENACOF
   (4) Philippe Bossard, Consultant

B. Terms of Reference:
1 AID Project 660-0091, PID Applied Agricultural Research.
2 State 122609, May 4, 1983 (approval cable).

C. Method:
1. Project Evaluations:
The latest evaluations of Projects 059, Project North Shaba, 064, INERA Support and 077, PRONAM, reviewed in detail. (Dr. LeBeau evaluated Project 077).
2. Briefings:
a. Dr. Richard Podol, AID Director and staff briefed Drs. LeBeau, Clyburn, Jones and Antoine.
b. Development community briefing: Richard J. Peters, AID Agricultural and Rural Development Officer, briefed the senior officers in the GOZ and the heads of the major donor agencies (Appendix A).
c. DOA briefing: Cit. Muamba Kduba, Secretary of State for Agriculture, briefed Mr. Sheldon, Cit. Mota and Drs. LeBeau, Clyburn, Jones, and Antoine.
3. Review of Literature:
The files of Project 059, 064 and 077 were reviewed, as well as the AID CDSS and PNM progress reports.
4. Reconnaissance:
a. Bas-Zaire, including M'Vuazi and the Mbanza-Ngungu area
b. Shaba, including the general area of Lubumbashi
c. Kasai-Oriental, including Gandajika and Mbuji-Mayi
5. Interviews:
The following persons were intervivwed in depth:
- Cit. Nzungu Lutandi: Conseiller Agricole à la Présidence
- Cit. Aduya Ayega, Conseiller Agricole au Cabinet du le Commissaire d'Etat.
- Cit. Wufela Yeak Oluigo, Conseiller Principal au Cabinet du Commissaire d'Etat à la Recherche Scientifique.
- Cit. Botula Manyala, Conseiller Agricole au Département de l'Agriculture (et Chef du Departement de Genetique et de l'Amelioration des plantes au CREN-K. C.G.E.A.)

- Cit. Mobula Meta, Chef de cellule Agronomie et géologie au Service Présidentiel d'Etude
- M. Bergasolli, Conseiller au Cabinet du Commissaire d'Etat à l'Agriculture
- Tom Wayman, Associate Peace Corps Director for Agriculture and Rural Development
- Mike Coté, Agricultural Officer, Peace Corps
- M. Tadesse Yossef, Charge du Programme FAO
- M. Claude Joly, Responsable du Programme National Engrais, FAO
- Réverend Pére Vannest, Director General, INERA
- Cit. Massey Mwanagulu Zanga, Conséiller, Coordinateur du project Assistance Technique Banque Mondiale
- Dr. S.J. Pandy, Extension Agronomist, PRONAM, M'Vuazi
- William Fiebig, Extension Specialist, PRONAM, Kikwit
- M. La Porte, Director, Projet Agricole de Mbanza-Ngungu
- M. Ernaux, Extension Director
- Cit. Kiatoko Soli, Co-director
- M. Losso, Director Program National Engrais à Mbanza-Ngungu, FAO
- Cit. Zapasi
- Mme. Louise Fresco, Agronomist, FAO Project, Kikwit
- Cit. Useni Kembolo, Chef de Programme de Vulgarisation, Projet Nord Shaba.
- Cit. Mukosa Teka, Chef de Planteur Primaire, Groupe Mukulubwe, Lubumbashi, Shaba.
- Cit. Kalenga Mzuiceta, Chef de Cellule Munama II, Quartier Kalebuka, Shaba
- M. Jean Dubois, Agriculturist, Mission Sambwa, Shaba
- Cit. Matumbu Kipambi, farm manager, CEPSE-Mangombo farm, 70 km west, Lubumbashi
- Mrs. Ruth Welch, missionary, Centre Chrétien de Santé Bakwadianga, M'buji-Mayi
- M. Manus Snelder, Coordinator, Projet Rurale de Coopération Internationale au Développement des Compagnons Batisseurs, Mbuji-Mayi
- Cit. Djamba, Director, PMKO, Mbuji-Mayi
- Cit. Oyokololo Lomena, Chief of extension amd training service
- Cit. Kilumba Ndayi, Coordinator PRONAM/Gandajika.

REUNION SUR LE PROJET 091
EN DATE DU 25 MAI 1983
A 16:30 HEURES

NOMS DE PARTICIPANTS		OCCUPATIONS
Dr. Lloyd Clyburn	:	Consultant avec L'USAID.
Mr. T.R. Wayman	:	Director Adjoint Agriculture Corps de la Paix d'Amerique.
Mr. Michael Coté	:	Assistant au Directeur Adjoint pour l'Agriculture du Corps de la Paix.
Père Vanneste	:	Président Directeur-Général INERA.
Prof. Makumbi-ma-Nguayala	:	Professeur IPN.
Cit. Binsika-bi-Mayala	:	Directeur PNM.
Dr. Francis LeBeau	:	Consultant avec l'USAID.
Dr. Pierre Antoine	:	Cónsultant avec l'USAID.
Mr. Paillet	:	Mission Française de Coopération
Mr. Steven Mack	:	C.O.P. INERA Support Project
Dr. Frank Brockman	:	Directeur, PRONAM
Dr. James C. Jones	:	Farming Systems Support Project Consultant avec l'USAID.
Dr. Quyen H. Nguyen	:	Agronome MAGI/USAID, Mulungu
Cit. Lutaladio-ne-Bambi	:	Co-Directeur, PRONAM.
Mr. Tadesse Yossef	:	FAO-Chargé du Programme.
Mr. David L. Olson	:	ITD-USDA/OICD.
Mr. C. Joly	:	PNE FAO.
Mr. David Soroko	:	USAID/Projet Nord Shaba.
Mr. Hermogène Durant	:	Conseiller à la Coopération Canadienne.
Dr. Mohammed Haroon	:	Agronome de Recherche Coopération Canadienne.
Dr. Heinz Gasser	:	Expert FAO/DG IFA/Yangambi.
Cit. Mota Bakajika	:	Chef de Division de Recherche et Formation/Département Agriculture.
Cit. Ir. Tshibangu Mutshi	:	Directeur Projets de Coopération Italo-Zairoise Luala.
Cit. Ir. Oyokololo Lomena	:	Chef de Service de Vulagarisation PMKO.
Cit. Mobula Meta Lidoga	:	Chef de Cellule AGronomie et Géologie au Service Présidentielle d'Etudes.
Cit. Mundundu Ndonambah	:	Directeur de l'INERA Kivu.
Cit. Kilumba Ndayi	:	Coordinateur Régional du PRONAM à Gandajika.
Cit. Ing. Msc. Mukendi N'Kasham	:	Programme National Mais/Lubumbashi.
Mr. Robert Navin	:	USAID-Economiste Agricole.
Ms. Henriette Emond	:	USAID-Program Economist.
Mr. Michael Steiner	:	Ambassade de la République Féd. d'Allemagne.
Mr. David Leong	:	USAID/DEO.
Cit. Phandi Nkiama	:	Département de la Recherche Scientifique.
Cit. Aduya Ayege	:	Conseiller au Premier Cométat en Matières Agricoles.

Dr. Botula Manyala	:	Conseiller Département de L'Agriculture, Chef de Département de Génétique et Amélioration des Plantes Cren-K.CGEA.
Cit. Ir. Matungulu-Kande Mutanda	:	Programme National Légumineuses/INERA Mulungu-Kivu.
Mr. Willson G. Lane	:	USAID/Zaire.
Mr. Richard J. Peters	:	Chief ARD.
Cit. Nkiere Mbo Wassa	:	Assistant Project Manger/ARD.
Cit. Tshishiku Kabundi	:	Assistant Project Manager/ARD.
Mr. Norm Sheldon	:	D/Chief ARD.

Ainsi fait à Kinshasa, le 26 mai 1983.

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ANNEX C

NARRATIVE SUMMARY	MEASURE OF ACHIEVEMENT
1. Sector Goal: National self-reliance for agricultural products.	1. Importation of basic foods reduced or eliminated; nutritional standards of the population improved.
2. Sub-Sector Goal: Increase the marginal labor productivity of small farmers.	2. Output per farm family increased; marketed surpluses increased.
3. Purpose: To improve and expand the ability of the Department of Agriculture to undertake applied agricultural research activities and to transfer agricultural technology needed to increase village cultivators' production of food crops.	3. A functioning institution integrating agricultural research; technical and managerial personnel in place; Budgetary and management systems operating. Mechanisms in place for defining research priorities, allocating resources, and programming and evaluating program in place; Effective linkages with national, regional and local change structures.
4. Project Outputs:	4.
(a) An organizational and managerial structure for a national agricultural research system developed which will be capable of defining and managing research programs; the structure must be responsive to current and changing needs and within the support capabilities of the GOZ.	(a) The organization and structure defined with detailed plans for implementation.
(b) A coordinated and integrated food crops research program using the FSR approach to establish farming forward and backward linkages to	(b) The existance of operational research stations with linkages to the population through FSR and extension.
(c) Sufficient numbers of Zairian personnel trained in technical and managerial skills and familiar with FSR and extension organization to manage and carry out applied research on major food crops;	(c) Zairians appropriately trained and assigned to management and technical positions in the research methods in sufficient numbers

MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
1. Sector Goal: Customs records; Health and nutrition statistics and surveys.	1. Political stability; GOZ commitment to the goal of food self-sufficiency; Commitment of increasing budgetary resources to agriculture; A policy framework which provides production incentives to the rural population.
2. Sub-Sector Goal: Farm surveys; Marketing statistics.	2. Improved technology developed by the research program; Technology transfer mechanism developed and/or improved; Communication and transfacilities will be improved; Same as in 1. above.
3. Purpose: Project evaluations; Special studies of institutional structures, operations, and linkages.	3. (a) Inter-departmental and inter-institutional relations defined by the GOZ; Same as 1. above. linkages. (b) Personnel and commodity resources committed towards developing an effective network with national, regional, and local change structures.
4. Project Outputs: (a) An institutional evaluation of the organizational system developed.	4. (a) The GOZ entities concerned with agriculture research and cooperate with external entities in developing the organization.
(b) Project evaluations, project files, reports, annual programming documents; publications, site inspections, personnel interviews at national, regional and local levels. Extension through an FSR approach.	(b) Technical assistance, personnel, equipment, and supplies expeditiously provided.
(c) On-site inspection	(c) Salary scales competitive with those of other organizations for employees of equal or similar training are established for research personnel; Adequate quality of life facilities are provided for project personnel at isolated stations.

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NARRATIVE SUMMARY	MEASURE OF ACHIEVEMENT
4. Project Outputs, cont.	
(d) The major constraints to increasing small farmer production identified and approaches designed for addressing these constraints;	(d) Research objectives defined in terms of identified constraints.
(e) A methodology developed and implemented for utilizing a wide range of public, semi-public and private entities in the dissemination of technology and the provision of feed-back and evaluations;	(e) Seeds and plant materials made available to various organizations for multiplication and distribution;
(f) A capacity developed for maintaining and producing foundation seeds and plant materials in support of seed plant material production by public and private entities.	(f) Improved seeds, plant materials and agronomic practices disseminated and utilized by farmers;
(g) Improved seed, plant materials soil management, agronomic practices developed, tested under farmer conditions, demonstrated, and employed by at least 29,800 farm families in 4 major regions by year 11.	(g) Soil management system with low levels of inputs developed for low fertility soil
5. Project Inputs	
(a) Technical Assistance (1) 63 person years, long-term (2) 60 person months, short-term consulting.	(a) Technical assistance contracts completed for 63 person years of long term and 60 person months of short term consulting.
(b) Training (1) Long-term training for 21 M.S. and 14 Ph.D. participants. (2) 1-6 month short-term training for 60 participants.	(b) 20 M.S. and 14 Ph.D. degrees received.
(c) Commodities: including vehicles, research equipment and supplies, and extension equipment and supplies.	(c) Commodities as ordered arrive at project stations.

MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
4. Project Outputs, cont.	
(d) Project evaluation	(d) The GOZ makes available proposed technical and personnel support.
(e) Records of seed distribution and sales by producing entities	(e) GOZ makes available sufficient numbers of personnel for training.
(f) Surveys of practices in areas served by the projects	(f) GOZ budgetary commitments and allocations to the research/outreach system gradually increase.
(g) Project evaluation	(g) Farmers recognize positive incentives to cooperating with adaptive research program.
5. <u>Project Inputs</u>:	5.
(a) (1) Project Records: Contracts signed and personnel in place. (2) Project Records: Contracts signed and personnel in place.	(a) Contractor hires personnel with the training, the language skills, and the personal temperament to work well in Zaire.
(b) (1) Project Records: Students studying at universities or having returned and are working at the research centers. (2) Short-term courses completed as scheduled by Zairian technicians.	(b) Students are adapting well to the work, and are willing to return to Zaire.
(c) Site inspection to verify that commodities have been received and installed in working condition.	(c) GOZ makes sufficient fuel available for the operation of the vehicles.

ANNEX E1

TECHNICAL ANALYSIS

SUMMARY

A. Technical Description:

Zaire inherited a farm contact network from the colonial government, which remains largely in place. Its effectiveness as an agricultural support service has been limited, due to burdens of regulatory tasks and deficient technical and logistical support. Over the years a large number of private voluntary organizations(PVO's), mostly religious missions, have launched localized efforts to assist small-scale farms in socio-economic improvement. Very few of these missions have had more than token success, due to (1) their lack of access to the essential technology and (2) their lack of extension methods, including rural organization and communication skills. The two groups have records of great stability, and from the point of view of the GOZ, they require a low level of maintenance.

In the 1970's the GOZ launched national programs to improve the production of the basic food crops, maize, manioc and seed legumes, in support of the domestic supply. AID cooperated in manioc (project 660-0077) and grain legumes (project 660-0064). In each case, project scientists identified or bred cultivars that were economically superior to the traditional types available to farmers and, they were offered to other projects and farmers through "outreach".

The AID projects will end in FY1984. The present project, 091, would:

(a) combine research on the three crops in three or more geographic regions;

(b) add a strong soil management and cropping systems element in an attempt to maintain soil fertility;

(c) implement farming systems research in these regions (which leaves the crops research program open, pending FSR findings);

(d) establish an outreach service with or linked to each research center to provide the research outputs to the existing farm contact change agencies (this would include technical assistance

to these agencies to improve their efficiency in delivering technology).

The new project would absorb the present two AID projects and the pertinent elements of the National Maize Program(PNM) taking full advantage of the personnel trained and developed in those projects as well as their residual property and germ plasm.

B. Appropriateness of the Project and its Technological Implications:

1. Suitability of the technology:

a. Crop research: Whereas in the foregoing research projects, a complete research team (plant breeder, plant pathologist/entomologist and agronomist) was required by each crop program, one team will manage all three crops while there will still be a main station for each of the three crops, except for grain legumes, which will require a specialized plant breeder. Cropping systems is included as an equal activity in the new project.

b. Farming systems research: Farming systems research will be introduced to Zaire by this project. A farming systems research/extension team will survey the regions in which the project will be located and assist in delineating project bounds as defined by needs, access to market and social cohesiveness. The first project year is to be used for training and surveys. The second year, one regional center will convert to farming systems research. The other two regions will convert as experience is gained and personnel are trained. It is appropriate to go ahead with the "traditional" crop research planned because the crops addressed represent a very large percentage of local and national dietary need.

c. Technical services to non-government change agencies: The project proposes to provide project-generated technology to any and all self-sustaining change agencies and to train their personnel in the efficient delivery of it(the overall agreement would be with the regional government). The project would have only three employees in a region, supporting hundreds of village level change agents. This is a new concept, and it does not duplicate any effort underway or contemplated.

d. Assistance to large-scale farms: The project would provide limited technical assistance to large-scale farms. Although they make up only a very small percentage of total farmland in Zaire, they are important to the national ecomony because most of their output goes into the market for urban consumption. The project would continue the established bias of small-scale or scale-neutral research.

One or more research centers would hold annual field days for farm managers and agronomists, (and another for small-scale farmers) and would develop a communications network among them. Some would become seed growers, thus supporting the project.

2. Employment effects:

The employment effects of the project would be negligible. The coordinating office would require 13 senior level Zairian agricultural officers and/or social scientists, and the regional outreach services would require three each. The crops research personnel are for the most part in place as outputs of the foregoing projects, or they will be trained.

3. Suitability for use in replication and diffusion:

a. Replication: The project design envisages replication in regional modules, as the administrative regions coincide fairly well with agro-climatic regions. Successful replication in certain regions would not be feasible now, due for one thing to lack of roads for market transportation. However the system would be applicable, once roads were built.

b. Diffusion: It is not expected that diffusion will be a problem. Research in the design process indicated that farmers, hard-pressed economically, are rather anxious to experiment with new prospects. The foregoing projects have never been able to get enough seed produced to meet the would-be adopters' demands. The supply of maize seed could be critical. With transportation as it is, maize seed almost certainly must be produced in the communities where it is to be used. This is included in the outreach service.

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4. Host country capability of operation and maintenance:

There are two elements to this question, one dealing with plant and equipment and the other with the institution. The latter is addressed under Administrative Analysis.

a. Operation: Zairian research and extension officers in the project will learn professional methods from formal training and from on-the-job training by their counterparts. Research procedure and management is fairly straight-forward.

b. Maintenance: Equipment maintenance will be a direct project responsibility during the project. An expatriate equipment maintenance specialist is included in the project. He will train a complete maintenance force.

C. Reasonableness of the Design and the Price:

a. Design: The design was tested in part in Project PRONAM, and found to work. It is a logical package to assist farm people in answering economic and agronomic questions. It includes the special efficiency element of combining three major crops and cropping systems research under a single research team. The strategy of getting outputs delivered to the target population through other government and independent agencies is sound as those agencies need the project outputs to function.

b. Price: All elements of the project were priced on current market. Construction and reconstruction were held to an absolute mininum. Technical services costs were based on the average scale of a typical if not likely contractor. Outputs are delivered to the target population through other agencies at a minimum cost to the project.

D. Consistency with current development theory: This project is a successor to three single-commodity research projects. It was designed to maintain the momentum of those projects while phasing in farming systems research. This is consistent with farming systems research theory by assuming that the three crops--maize, manioc and grain legumes--would occur in farmer's need lists once the farming systems survey is made. This is a basic assumption of the project.

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E. Conclusion: This project, designed to make maximum use of predecessor project outputs and human resources provided by established government servies and PVO's while moving into a farming systems approach, is technically sound, cost effective, and its outputs are sustainable. It adequately meets the conditions set out in FFA Section 611(a).

ANNEX E-2

APPLIED AGRICULTURAL RESEARCH

I. AGRONOMY

By Frank Brockman and Tony Juo

IITA, June, 1983

Objectives and Approach

Agronomic research is to be an integral part of the farming systems component of the research and outreach system. The principle objectives will be:

(i) to develop and evaluate new technologies or components of technologies that are easily adapted by small-holder farmers in Zaire. A number of low input farming systems technologies and practices have already been developed at IITA and are ready for on-farm testing and evaluation. These include alley cropping, cover crop in-situ mulch, and minimum tillage using the rolling injection planter.

(ii) to develop cropping systems involving mixed cropping, relay cropping and rotations that are suitable for the different physical and biological and socio-economic environments.

(iii) to evaluate and classify soil fertility status of the major agricultural soils in the project area, to determine nutrient requirements for sustained crop production, and to develop appropriate methods to meet the requirements.

Research priorities and formulation of agronomic research projects will be based on information from farming systems diagnostic surveys on production constraints and on opportunities that can be exploited. The agronomy research program will be closely linked to the various crop programs, the agronomists assisting the breeders in determining breeding objectives, testing new materials and in relating agronomic practices to new varieties. Initial testing and evaluation of new technology will be carried out under the controlled conditions of the research stations. Promising practices will then be widely tested under actual farm conditions in on-farm trials. At that juncture, close interaction between research agronomists and extension (outreach) personnel will take place.

Agronomy research will build on the existing body of information already developed in PNM, PRONAM and PNL. However, agronomic research will now be designed to maximize total farm crop production rather than being focused on production of single commodities.

Agro-ecological Considerations

Because of distinct differences in physical, biological and socio-economic conditions in the four proposed project operation areas, agronomic research activities will differ in the different areas. From the agonomic standpoint, the four areas may be briefly described as follows:

(1) Bas Zaire: Bandundu area. This area is a low altitude (1000m) humid region (1200-1800 mm rainfall, 90-150 day dry season) with a rolling topography. Leached sandy soils (Psamments, Orthents) predominate in the uplands while more fertile, finer textured soils with better moisture regimes are formed in the valleys. The dominant traditional cropping system is cassava intercropped with groundnuts and maize.

(2) Kasais, North Shaba, Southwest Kivu: The area is a low altitude (500-1000m) humid region, with undulating to flat topography. Medium to fine textured Alfisols and Ultisols are abundant in the area. Important crops are cassava, maize, and cotton. Morevover, soybean has been expanding rapidly in recent years.

(3) South Shaba: This is a mid-altitude (1000-1500m), sub-humid (1000-1200mm; 150-180 day dry season), region. Both rolling and undulating land forms predominate. Extensive areas of fine textured, deep, porous Oxisols (Entrustox) are formed around Lubumbashi. Such soils are among the most productive soils in the tropics and are suitable for large scale, relatively high input food crop production but, at present, a relatively small percentage of the area is cultivated.

(4) Eastern Kivu: The area is a humid, tropical highland (above 1500m) with mountainous and hilly terrain. Soils are predommantly fertile volcanic soils (Andepts, Hummults) derived from basalts (e.g. Mulungu station) and volcanic ash (e.g. Goma). The area is characterized by intensive cultivation of bananas and beans, high rural population density and small farm size (0.8 ha average).

Research Activities:

1. Bas Zaire - Bandundu area. As leached sandy soils are dominant, cropping systems and soil mangement research should put strong emphasis on Cassava/legume intercropping and rotations as a means of maintaining or improving soil fertility. The alley cropping system developed at IITA using Leucaena or other tree or shrub species to provide nitrogen and recycle nutrients should be evaluated through on-farm trials for farmers' acceptance and adoption. As land pressure is not a serious limiting factor in the area, systems involving cover crops and mulch production (e.g. Pennisetum) should be tested as practices to maintain soil organic matter level and favorable soil biological activity, and, in the case of legumes, to provide nitrogen. Research on nutrient management should give priority to the potassium requirement of improved cassava cultivators. Some work on secondary and micronutrient deficiencies and imbalance problems in maize and groundnuts may be required on highly degraded soils. Such work could receive technical support from scientists at the IITA main station through post graduate fellow research.

2. Kasais, North Shaba, Southwest Kivu. Maize, cassava, and food legumes (soybeans, cowpeas) should receive equal emphasis in the cropping systems research. Mixed cropping systems involving maize/cassava, maize/cowpea and maize/soybean and rotation studies involving cassava, maize, cotton, and food legumes should also be studied. The abundance of leguminous trees and shrubs (mainly Cassia and Leucaena and tree-type pigeon peas) in fields near farmers' compounds give an encouraging indication that alley cropping may be a promising soil fertility maintenance practice in the area. The fact that the system also provides firewood could make it additionally attractive in this area where the natural vegetation is almost exclusively grasses. In view of serious transportation and infra-structure problems in the region, it is suggested that research on fertilizer use be limited to nitrogen requirement for maize.

3. South Shaba. Emphasis should be put on evaluating crop and soil management systems for maize and food legume production on both small and large scale farms. Research on economic use of fertilizer, minimum and strip tillage, economic use of herbicides and pesticides should be carried out.

4. Eastern Kivu. Research in this densely populated highland area should emphasize yield maximization and soil erosion control. Cropping systems research should include work on intercropping and relay cropping of maize, beans, soybean, sweet potato, and vegetable crops. Research on judicious use of fertilizers (phosphate in particular) and herbicides should be initiated, as use of such inputs may prove economic on intensively cultivated farms when improved, high-yielding crop varieties are introduced. Soil fertility research on phosphorus requirements of maize and legumes should be initiated with emphasis on placement and residual effect. Intensive cultivation on steep slopes due to heavy population pressure is leading to serious erosion problems. Research on soil conservation such as the terrace farming experiments established at Mulungu station should be carried out. This work should be expanded to include alley cropping, live-mulch and minimum tillage systems. As it is felt that on-farm adaptive research and extension would have an immediate impact and pay-off and as preliminary socio-economic surveys have already been conducted by INERA Support Project, it is suggested that initial emphasis of farming systems research and extension be placed on this area.

Positions

Three research agronomist positions should be established. These agronomists are to work on agonomic problems of an agro-ecological zone(s). They would be posted as follows:

(1) M'Vuazi - to serve Bas-Zaire and Bandundu regions (5 years)

(2) Lubumbashi - to serve Shaba, the Kasais and southwest Kivu. Although based at Lubumbashi, a large part of his work will be carried out at Gandajika and in the area it serves (5 years).

(3) Mulungu - to serve eastern Kivu, and this position will be filled by a trained (MSc) Zairian with supervision from project senior agronomists.

All three agronomists should have Ph.D. degrees in crop or soil sciences. Or, equivalent broad knowledge and experience in tropical crop and soil mangement is desirable. In addition, one of the agronomists should have a strong background in soil fertility. He will be responsible for coordinating the soil fertility component of the agronomy research program.

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II. PLANT BREEDING (MAIZE)

by Joseph Fajemisin

IITA, June 1983

Background

Maize is a major staple in Zaire and an important component of the cropping system across the various ecological zones of the country. Since the mid sixties, maize production has not kept pace with consumer demand thereby resulting in reduced per capita consumption and increased importation. This led to the establishment of the National Maize Program (PNM) in 1972, implemented with CIMMYT assistance. Six improved maize varieties (Shaba Safi, Salongo Salongo II, PNM I, Kasai I and Shaba I) were produced, multiplied and released with potential for increasing national average yields from less than 1 ton to over 2 tons per hectare. However, since 1980, CIMMYT has withdrawn its participation and subsequent limited government funding has reduced the activities of PNM to the very minimal maintenance level.

Objectives

The Maize Genetic Improvement component of Project 091 is to consolidate the progress made by PNM and enhance the stability of high yields in maize production through incorporation of resistance to the prevailing economically important diseases and pests and improvement in other agronomically desirable traits. Seed of the improved varieties will be provided as a component of the package of technology for on-farm testing. Through on-the-job training the capability of the Zairian researchers and technicians will be improved as an integral part of a sustained agricultural research institution development.

Strategies:

Breeding activities will be focused on exploiting the environmental resources and/or combating the prevailing specific production hazards of the major ecological zones -- lowland (below 1000m), mid-altitude (1000-1500m) and highland (above 1500m). The highlights of the strategies are:

(i) improve the high-yield promoting qualities of PNM varieties through appropriate recurrent selection system for (a) low ear and plant height to reduce vulnerability to lodging (b) improved husk cover to avoid insect damage and (c) high yield potential;

(ii) incorporate resistance to maize streak virus (MSV) disease and downy mildew for lowland ecology through controlled artificial infestation/infection. This will require construction of screenhouses for MSV vector (leafhopper) rearing and the development of downy mildew disease nursery;

(iii) incorporate resistance to streek for the mid-altitude and highland areas;

(iv) introduce highland germ plasm into appropriate PNM varieties for ecologies above 1500m; and

(v) maintain breeders' (nucleus) and foundation seed stock of recommended varieties and assist in regional/national seed multiplication activities.

This breeding approach together with the staff requirement is presented in Table 1.

Table I Maize Research Stations and Adaptational Trial Sites: Target Ecologies, Activities and Personnel

	Lubumbashi	Gandajika	Mulungu	Trial Sites
1. Target Ecology	Mid-altitude (1000-1500m)	Lowland (Below 1000m)	Highland (Above 1500 m)	Average of 2 sites for each target ecology
2. Activity	Variety Development for long growing season Incorporate streak resistance	Variety development for long and short seasons with emphasis on combined resistance to streak and downy mildew	Variety Development for high altitude	Adaptation trials
3. Staff				
a) Breeders				
Expatriate	1	-	-	-
Zairian	2	1	-	-
b) Technicians				
Ao	4	3	2	6
A1-A3	12	9	4	12
c) Labor	48	48	20	60

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JOB DESCRIPTION

PLANT BREEDER (MAIZE)

Ph.D. in Plant Breeding with considerable background in Plant Pathology. Experience in plant breeding in the tropics desirable. Ability to communicate in French is desirable.

Duties and Resposibilities:

1. Develop high yielding maize varieties for the major agro-ecological zones of Zaire;
2. Incorporate resistance/tolerance to the major diseases and insect pests through controlled infection/infestation;
3. Conduct multi-location trials to validate recommendations for each of the target ecological zones;
4. Maintain foundation seed stock of recommended maize varieties and assist in regional/national seed (maize) multiplication activities;
5. Participate in integrated cropping system and on-farm-trials;
6. Ensure a close and amiable working relationship with the Zairian counterpart maize breeder; and
7. Participate in training M.S. and Ph.D. candidates and extension workers.

Equipment/Facilities (Maize Breeding)

1. Field preparation equipment -- plows, harrows, planters, (jab and tractor mounted), fertilizer applicator, boom sprayer for herbicides.

2. Crop processing equipment -- dryer, sheller, moisture meters, threshing space/room/lab.

3. Seed/storage equipment/facilities -- seed store with airconditioners and dehumidifiers, plastic containers for medium term storage (up to 5 years), bulk storage room.

4. Seed production facilities.

5. Pollination materials -- tassel bags, shoot bags, pollination aprons, clips, staplers.

6. Screenhouses for streak vector rearing and screening for disease resistance.

7. Crop protection equipment/facilities -- microscopes, binoculars, inoculation chambers, autoclave, lab. space.

Note: i/ Detailed equipment list for items 6 and 7 will await the visit of consultant Pathologist and Entomologist.

ii/ All the above items (1-7) will be installed at Lubumbashi. All items except 4 will be required for Gandajika while only items 1-3 and 5 are needed for Mulungu.

III. PLANT BREEDING (GRAIN LEGUMES)

by Eric Keuneman

IITA, June 1983

Scope of Work and Rationalization

During the first five years of this project the research should focus primarily on legume improvement in two ecological zones.

The Eastern Highlands Region (1000-2000m) should receive attention because, although rural, it is very densely populated, and as a consequence, protein malnutrition is already an acute problem. In this region, beans (*Phaseolus vulgaris*) are a staple food crop. There are exciting possibilities to raise and stabilize bean yields in the region by incorporating genetic resistance to the principal diseases. Soybean production is expanding in the region in response to a high market demand (soybeans are presently selling for approximately twice the price of beans). Missionaries have effectively demonstrated to the local population the importance of soybean in their diet, and have established a mill for grinding soybeans into flour. The flour is used in many traditional dishes. The development of improved soybean varieties with the ability to nodulate effectively with indigenous Rhizobia will significantly improve productivity.

The savannah region of Southern Zaire is the other ecological zone that will receive principal attention during the first five years of the project. Because this zone has large areas of relatively fertile soils with low population pressure, it is probable that it will in the future become a principal food production region, providing staple foods to urban populations. Legume crops such as groundnuts, soybeans, and in some cases cowpeas will become important components to maintain soil fertility in a maize or cassava based cropping system.

Selection and development of improved legume varieties adapted to this zone will contribute to the development of a stable farming system for the region and supply much of the badly needed protein and vegetable oil for Zaire.

If IITA is the executing agency, IITA will contact CIAT and ICRISAT to provide technical "backstopping" on bean and groundnuts research. CIAT plans to place a regional representative in Rwanda. This will greatly facilitate building a close working relationship between CIAT and the Zairian Legume Project.

Equally important as the accomplishment of the above research goal, is the training of competent technical staff to carry out research assignments in the absence of daily supervision. Considerable effort should be focused on human resource development.

General Work Plan

Because of the enormous amount of work to be done on several legume crops in two distinct environments, and because travel between the two regions is very difficult, costly and time consuming, it is logical that two breeders be employed for this project. However, due to financial constraints it was suggested that only one breeder be employed, and that he would be placed for two to three years at Mulungu station in the eastern highlands zone to consolidate the legume research initiated by the AID-funded INERA Support Project.

When a Zairian scientist returns from M.S. training in the US and when he has a full understanding of the research program, the expatriate breeder will turn the highlands program over to him and move to either Lubumbashi or Gandajika to initiate research on legumes (groundnuts and soybeans) for the savannah environments. During the first three years, when the breeder is placing major emphasis on the establishment of a program in the highlands zone, he should make arrangements to receive genetic stocks of materials for the savannah region. Agronomists at Lubumbashi can grow observation nurseries out of these genetic stocks. The nurseries can be evaluated and characterized by both the breeder and the agronomist. This approach will provide genetic materials for the agronomists to test in cropping systems and give the breeder a head start when he moves into

the savannah region at a later date. It might also be possible to receive segregating populations from IITA and ICRISAT which could be handled as large bulk and/or 'single-pod-descent' populations so that the breeder would already have advanced generation breeding lines for selection when he moves into the savannah zone.

Staffing:

As previously mentioned, the expatriate breeder would spend approximately 3 years at Mulungu Station near Bukavu to consolidate the legume research initiated by the INERA/AID/MASI project. An outline of support staff required is shown in Table 1. An MS level Zairois legume breeder would take over the research activities at Mulungu in years 4 and 5 at which time the expatriate breeder would move to Lubumbashi and set up the legume improvement program for the savannah region. During the first 3 years of the project a modest staff will be required to carryout adaptation trials at both Lubumbashi and Gandajika. The staffing at those sites will be expanded in the last 2 years. (Table 2).

Job Description for Legume Breeder

Ph.D. in plant breeding with experience in legumes. Experience in tropical agriculture is desirable, but not essential. Ability to speak French is desirable, but not essential; it will, however, be necessary to learn French. A strong field research orientation is required. Duration of job is 5 years. The duties and responsibilities are:

1. Collect and evaluate germ plasm of food legumes (beans, peanuts, soybeans and cowpeas) in Zaire.

2. Establish a grain legume breeding program with emphasis on beans and medium elevation soybeans in Eastern Zaire during a three year period.

3. Establish a breeding program with emphasis on peanuts and soybeans for the savannah region of Southern Zaire during years 4 and 5.

4. Train research technicians to carry out routine aspects of managing field experiments and to handle experimental breeders seed.

5. Cooperate and interact closely with Zairian counterpart scient... and staff.

6. Cooperate with IITA's Grain Legume Improvement Program.

Notes: On capital equipment needs for legume breeding nurseries. It is understood that equipment lists are being prepared by others. However, some suggestions by technical staff may be useful.

Mulungu station:

1) A tractor big enough to pick up the equipment already purchased by the AID/MASI project should be provided.

2) A 2-row cone-type seeder should be purchased for small plot planting. I recommend ALMACO cones on John Deere Max-merge planter bases with no-till coulters and two carrier seats for the operators. Alley marking systems would not be required. Contact Alan Machine Co., Ames, Iowa.

3) The 4-row commercial planter now at Mulungu could be sent to Lubumbashi for seed multiplication work. Depth bands for the furrow openers need to be ordered and a series of seed plates are required. The planter also requires a row marker. If it is too expensive to move the planter to Lubumbashi; it could be given to the Catholic mission to assist in seed production.

4) A small (200 l) tractor mounted sprayer with a 10-15 foot boom should be ordered for herbicide application on breeders nurseries.

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5) A seed store should be developed with two airconditioners and two room dehumidifiers.

6) Air-tight plastic seed storage bottles should be ordered. I suggest that 2000 - 500ml bottles and 1000 - 1 liter bottles be purchased.

7) 6 CP3 knapsack sprayers and 24 plastic spray guard shields should be purchased.

8) 6 ULV hand-held insecticide sprayers, 36 rechargeable batteries and 2 chargers should he ordered.

9) A decent set of hand tools should be purchased.

10) Tool bar with tires for row markers.

Lubumbashi or Gandajika

Items 2, 4, 5, 6, 7, 8, 9, and 10 listed for Mulungu should be purchased. In addition, a 4 row Lilliston rolling cultivator should be purchased for weed control in seed production plots.

IV. ENTOMOLOGY (ALL CROPS)

Objective

The overall objective of the entomology program will be to develop an integrated pest management program for each of the major crops in Zaire. A complete integrated pest management program may include (1) introduction of exotic natural enemies of pest species (classical biological control) and augmentation of native natural enemies, (2) development of pest-resistant varieties, (3) employment of cultural techniques for suppression of pests, and (4) possible limited use of pesticides (probably not practical in Zaire for economic, ecological, and medical reasons).

Work Plan

The initial steps in setting up the integrated pest management programs will be to (1) establish central and branch agricultural entomology libraries which include works in both French and English, (2) bring together insect collections now scattered among the various INERA stations and the National University at Yangambi, and (3) visit the major agricultural research centers (PRONAM, INERA) to identify and learn the seriousness of the major insect and mite pests and to determine the status of the pest management programs.

Following these initial steps, the project entomologist will coordinate the efforts of project agronomists, plant breeders, and national staff entomologists in developing integrated pest management systems, and he will act both as a consultant on special pest control problems and as a contact for the short-term engagement of pest management consultants.

Currently the most important crop pests in Zaire are the cassava mealybug and cassava green spider mite. In 1978, the last year of outbreak of the cassava mealybug, this pest devastated cassava fields across Bas-Zaire and Bandundu, and it has now spread into Kasai Occidental and Shaba. Although the severity of attack has declined in recent years, the weather patterns believed

responsible for the outbreaks can be expected to recur, causing repeated enormous losses in yield and consequent hunger and even famine on a large scale. For this reason the control of the mealybug will receive the highest priority in the entomology program for at least the next five years. Releases of imported natural enemies across the endangered cassava-growing regions of Zaire have already begun and will continue at an accelerated pace in a cooperative effort with the mealybug biological control project centered at IITA in Nigeria.

While the damage by the cassava mealybug has been declining, damage by the green mite has become increasingly severe in some areas. This pest, too, has been targeted for control in the IITA regional or Africa-wide program against cassava pests, and participation in that program will be an important part of the effort to control green mite in Zaire.

Cultural methods of managing green mite populations seem to hold little promise, and the cultural methods of managing the cassava mealybug, while effective in principle, seem unlikely to be adopted on a wide scale in time to reduce significantly crop damage during an outbreak year. Therefore, along with biological control, breeding of resistant varieties will be emphasized. This work will require close cooperation between the breeding and entomology sections.

Positions

One position should be established for a senior entomologist, who will have immediate support from two Zairians holding MS degrees. In the second or third year of the project a Zairian trained to the Ph.d. level is expected to join the entomology team. If arrangements can be made with INERA and the Faculty of Agriculture at Yangambi to form a Zairian National Insect Collection, a Zairian senior technician (AO) will be needed for about eight months to assemble and curate the collection. The senior entomologist would be based at M'Vuazi; the junior Zairian entomologists would be posted according to needs determined in the initial country-wide survey of crop pest management problems.

Job Description--Senior Entomologist

1. Establish integrated pest management programs for each of the major food crops in Zaire, working in cooperation with plant breeders, agronomists, and junior entomologists.
2. Cooperate in the regional or Africa-wide cassava pest biological control program centered at IITA in Nigeria.
3. Evaluate the effectiveness of imported and native natural enemies of the cassava mealybug and cassava green spider mite in Zaire, and investigate the physical environmental factors that contribute to cassava pest problems.
4. Cooperate closely with breeders in development of pest-resistant cassava varieties.
5. Participate in training MS and Ph.D. candidates and extension workers.

Qualifications--Ph.D. in entomology with specialization in insect pest management or biological control. Work experience in both of these areas is desirable. Fluency in spoken French is desirable.

Equipment

The following equipment will be needed at each station where a junior or senior entomologist is posted:

1. Dissecting microscope, preferably a Wild M5A, with 1/2x objective attachment and a fiber optics illuminator.
2. Standard insect collecting equipment and supplies: vials, insect nets, pins, pinning boards, etc.
3. Insect cabinet with twelve Cornell drawers and foam-bottomed trays.
4. Herbarium cabinet with plant folders.
5. Plant collecting equipment: plant press, blotters.
6. Hand microtome.
7. Triple-beam balance.
8. Backpack insecticide sprayer.
9. Insecticide duster.
10. Prefabricated compartmentalized screenhouses (two).
11. Soil analysis kit.
12. Standard laboratory apparatus: large and small beakers, graduated cylinders, filter paper, wash bottles, etc.

ANNEX E-3

The Farming Systems Approach to Research and Extension

by James Jones*

June 1983

The Applied Agricultural Research Project (660-0091) will extend two existing commodity programs, the National Cassava Program (PRONAM) and the INERA Support Project (soils and grain legume research), and rehabilitate a third, the National Maize Program (PNM). The project will integrate these commodity programs within a framework of farming systems research and extension (FSR/E). More generally, the farming systems approach will be used to better integrate research, extension, and the small farmer in an effort to increase the national production of basic foodstuffs and to enhance small-farmer welfare. These objectives are supported by both the Government of Zaire and the United States Agency for International Development.

Considerable confusion still attends the farming systems approach to research, a relatively new approach that is receiving much attention and liberal funding by donor agencies and some national research programs. Such attention is rapidly making the approach trendy, with the result that much activity is termed farming systems research that does not so qualify. Everywhere the rush is on to engage in farming systems research as that term is variously understood, or is often understood not at all. Since a failure to initially establish some common understandings among all involved parties regarding the farming systems approach can later have severely disruptive consequences for a project, some general comments delineating the essence of the approach are in order.

A. The Farming Systems Approach:

FSR/E is a response to a vacuum, to a perceived need in many developing countries. The approach emerged as a more effective and more efficient way to reach small farmers with appropriate agricultural technology, thereby increasing both their welfare and the national production of basic foods. FSR/E not only focuses on low-resource farmers but also presupposes limited resources on the part of national research and extension agencies.

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Fundamental to FSR/E intervention is a holistic systems perspective, the point of departure of the approach. A small farm, which is first and foremost a household rather than a firm, is conceived as a system of interrelated elements that includes crops, livestock, the farm family, soil and the general agroecological environment. Impinging on that system is a wider institutional setting (also a system) that includes infrastructure and those institutions concerned with the supply of credit and inputs. Agricultural price and other policies are also included in that setting.

In conceptual opposition to the farming systems approach is the reductionist approach, which has traditionally formed the basis of much agricultural research and extension. Commodity programs, for example, are an institutional expression of the reductionist approach. Under this approach, a commodity technology may be developed with little regard for the role of the commodity in the farmer's total present system. In particular, there may be little regard for the consequences of the new technology for his (or her) present allocation of time and resources over an often wide spectrum of activities. A holistic systems perspective, by contrast, recognizes the role of the commodity in the farmer's total production scheme and accepts his present allocation of time and resources as a reasoned (rational) human adjustment to circumstances that enables him to survive. Interventions informed by a systems perspective first ascertain the character of the farmer's present system in order to develop and promote only technology that can be accommodated by that system. Such technology shocks the present system only minimally, or at least in ways that do not threaten household survival. The farmer, consequently, is more likely to accept the technology.

This is not to say that commodity programs and farming systems research are totally incompatible. But it is to say that a certain complementarity requires that commodity research and extension be informed by a systems perspective. And it is to say further that those charged with the management of commodity research within the framework of a systems perspective should be aware of the inherent tension between a reductionist and a holistic systems perspective that such an endeavor implies.

Farming systems research can be reduced conceptually to four stages, with some temporal overlap between them: diagnosis, design, testing, and

extension. The approach begins with a diagnosis which involves a survey of farmers conducted by a multidisciplinary team. The team is composed of agroecological (e.g., agronomists, soil scientists) and socioeconomic (e.g., economists, social anthropologists, rural sociologists) scientists as well as elements from extension (which may be included in the former). There are different kinds of surveys, ranging from the formal and highly structured to the informal and loosely structured. Initial FSR/E surveys are generally rapid, informal and loosely structured. They do not, that is, involve administering questionnaires, and they are not designed to gather quanitative data. Such surveys seek to define homogeneous groups of farmers (i.e., homogeneous at a certain level of abstraction), or recommendation domains. The assumption is that farmers within a homogeneous group have made similar adjustments to enviromental circumstances, agroecological and socioeconomic, and thus face the same constraints and opportunities. Technology appropriate to one farmer of the group is therefore appropriate to all. It is in this way that FSR/E is cost effective. In addition to delineating recommendation domains, on which extension efforts must ultimately focus, the farming systems survey locates constraints in the present system and suggests opportunities that can serve to guide the efforts of technology design. The initial survey, then, is critical to the farming systems approach.

The second stage, the design stage, seeks to design technology that will overcome the constraints and exploit the opportunities of the present system. Such technology may already be at hand, so that little design effort is involved. And design may or may not entail considerable prior, on-station research. It must be realized that any technology, before it is taken to the farm for testing, is no more than a first approximation and must be viewed as tentative. Further, an important principle in design is that the tentative technology must be simple and must not exceed the ability of the system to accommodate it. Shocks to that system must be carefully calculated. Even modest failure at the farm level at first testing can result in a farmer's loss of confidence in research and extension.

Testing, the third stage, is inextricably bound to design, or to put it another way, there is often no clear line separating the two. This is because

any proposed technology must ultimately be tested in farmers' fields, after which it will be modified, refined, or even totally discarded. Such modifications and refirements are a part of research and design through a feedback process. On-farm testing, therefore, is very much a part of research. The testing process involves a varying mix of researcher and farmer management. Generally, the process begins with researcher managed trials (represented in their purest form by on-station research) and moves toward farmer managed ones.

It is at the fourth and last stage, the extension stage, that the proven technology is extended to all farmers within the homogenous group, or recommendation domain. But in a sense, extension does not come last, at all, for it was represented on the multidisciplinary survey team. Since extension agents usally reside in or near the georgraphic areas on which FSR/E efforts concentrate, they can be vital links between research and the farmer. Ideally, an agent knows his area's agricultural practices and problems. He can thus help orient multidisciplinary survey teams and provide them with entrees to local communities. He can interact importantly with farmers during the period of on-farm trials, always monitoring their reactions to new technology. If so trained, he can also play a technical research role in those trials. Since the extension agent has been a part of the technology generation process from the outset, he knows and identifies with the technology and knows how local farmers can best exploit its advantages. And he is in the position of promoting a product appropriate to the needs of his small-farmer clientele.

The implications of infrastructure and government policy for farming systems research have heretofore been only broached. But infrastructural and policy issues are important, for a decision regarding them must be taken by the farming systems team before embarking on the design stage. Either the policy and infrastructural settings are taken by designers as parameters, and technology designed within the bounds of those parameters, or the settings are taken as variables that can be changed to suit the demands of design. Other things being equal, a farming sytems effort that can increase the availability

of inputs and credit and can further create favorable product prices, clearly enjoys a latitude in technology design that is denied an effort that cannot bring such pressure to bear. It is entirely conceivable, for example, that no technology could be designed to create marketable surpluses in the face of overvalued currencies and pricing policies that penalize agriculture. Design efforts under such conditions can be futile. A farming systems program that has the endorsement of government at a high level, then, enjoys more flexibility in technology design than one that does not.

In conclusion, FSR/E integrates research, extension, and the farmer. Much traditional research took place in isolation from the farmer and his conditions. Researchers alone decided on technologies that farmers ought to employ, and it remained the problem of extension to secure farmer acceptance. Farming systems research reverses that process, for it takes its design cues from the farmer and his present system.

B. Caveats and Clarification:

The newness of FSR/E, its deviation from most traditional agricultural research and extension, and the current pressure to adopt the approach have all led to fears, misconceptions, and confusion regarding it. A few points follow that seek to rectify misconceptions and alert the unwary.

1. FSR/E does entail some reorganization of research and extension activities and involves the introduction of some new research methods. Perhaps most important, it involves a shift in perspective from that of reductionism to that of holistic systems. FSR/E in not a substitute for on-station research and those who practice it. There is still a need for breeders, pathologists, soil scientists and other specialists. FSR/E tries only to make research more responsive to actual farmer needs and opportunities. The approach can encounter much oppostion from traditional quarters if this is not understood.

2. FSR/E should initially be undertaken on a small scale, with efforts well focused efforts. This is especially important when the approach is largely in the hand of beginners. It is important to score a few early successes in order to build confidence in all parties concerned.

3. There is nothing magical about FSR/E: it does not work miracles. The approach requires time and hard work, some of it away from the comforts of research stations. The wide attention that FSR/E is now receiving can lead to unrealistic expectations that give way to disillusionment when not met. The approach is then unduly maligned, perhaps rejected. It can also happen that FSR/E efforts fail because they are in the hands of inept or disinterested persons. Such failure can extract a heavy price, for FSR/E is often on trial by national research administrators and politicians who will not grant it a second chance.

4. FSR/E employs social scientists--social anthropologists and rural sociologists--somewhat differently from traditional research and extension. In the traditional scheme, these disciplines (when used at all) were charged solely with facilitating the extension effort. They were the peddlers of technology, since it was believed that through their special social and cultural insights they knew better how to approach the farmer and convince him to accept what agronomic research knew was right. FSR/E, by contrast, uses social scientists in all stages of the research and extension process. They play a vital role in the initial survey, monitor and analyze farmer reactions to on-farm trials, and untimately aid in the extension of new, appropriate technology.

5. Farming systems research is not equivalent to cropping systems research, which is only a subset of it. Neither is it equivalent to farm management, although the two do share some common features.

6. There must be an initial, common understanding among all parties--administrators as well as team members--to an FSR/E endeavor with regard to what the approach is about. This is necessary in order to avoid conflict.

7. The role of livestock in a farming system must not be overlooked. There is a tendency to focus exclusively on crops.

8. Differential sex and age roles in the farm household must not be overlooked. Children often pasture livestock and keep birds at bay in the fields. And women play a formidable role in agriculture over much of Africa; vitrually all cultivation and marketing activities are in their hands in some regions.

C. Plan for Zaire:

The farming systems approach to research and extension can be used in Zaire to better integrate research, extension, and the farmer in order to generate appropriate technology for the small farm. The approach entails the integration of the manioc, legume, and maize commodity programs, which will supply much of the technology, but must also open the possibility of directing research and extension efforts to other food crops, or even livestock, if such a need is indicated. The farming systems perspective requires this flexibility.

The initiation of a farming systems program in Zaire requires the creation of certain minimal facilitating structures. The creation of a central coordinating and planning unit (CPU) for farming systems research and extension is therefore proposed. The unit will be based in Kinshasa but will have mobile elements. It will be charged with planning, coordinating, and conducting agricultural research within a farming systems framework. This includes the coordination of donor agency activities in areas where FSR/E activities are underway. The CPU will also coordinate and conduct training activities in this new field of endeavor. The CPU will be composed of a technical group made up of a general agronomist, a social anthropologist or rural sociologist, and an agricultural production economist. The technical group must be trained and experienced in FSR/E orientation. They will also be the training nucleus for FSR/E in the country. The group must be mobile, for it will take part in and monitor FSR/E acitivities e.g., diagnostic surveys and on-farm farm trials about the country.

The CPU must also include official representatives from those national agencies charged with agricultural research, extension, and planning. The directors of the three commodity programs should likewise be in the CPU, though they would not necessarily reside in Kinshasa. The important point is that all key elements of the national research and extension structure be represented at a high level in the CPU. Since FSR/E is site specific, operations must focus on a particular region of the country. Indeed, they must focus on homogenous target groups of farmers within a region in order to define recommendation domains. Such domains are defined through an initial

survey. It is at the regional (or local) level that the CPU mobile technical team will articulate with other useful research and extension personnel. In some areas local personnel are already present and active, as in Bas-Zaire, where PRONAM is engaged in both adaptive research and outreach activities, and where at least seven other programs are concerned with outreach. Elsewhere it will be necessary to activate qualified and interested local personnel (if present) or even to secure personnel from outside the area. The precise tack to take is a function of the area selected for FSR/E operations.

The role of local research and extension personnel is important, for they localize the FSR/E effort and provide program continuity in the absence of the CPU technical team. Local personnel and the CPU team together conduct diagnostic surveys and collaborate in designing and testing of technology. But it is mainly local personnel who will conduct and frequently monitor research operations. And it is local personnel who will ultimately extend the technology. It will be the task of the CPU, especially its mobile technical team, to train, mobilize, and supervise local personnel so that research and extension activities are carried out in the FSR/E mode. Local research stations or substations will serve as bases for operations in the selected areas. The farming systems efforts of this project should concentrate initially on a single region, or rather some part thereof. There is always a danger of dispersing the effort, the more so when experienced personnel are scarce. Ideally, efforts should be focused on the region that offers the greatest prospect of increasing either national food production or small-farmer welfare. Under the actual circumstances, given the lack of experienced personnel and the need to instill confidence in both farmers and researchers, as well as to demonstrate the viability of the approach to funders and supporters, the ideal may have to be compromised. Instead, initial operations should probably be conducted in an accessible area with good communication networks, a comfortable base for operations, and where local research, extension, and other important personnages are receptive and competent.

The initial survey should be conducted during the cropping season, a time when agriculture is uppermost in farmers' minds and activities and fields can be observed by the FSR/E team. An effort should be made to have some technology ready for testing, perhaps on-farm, by the following cropping season. During that cropping season the CPU technical team can initiate survey activities in another area. The process continues in this manner as more people are trained and as other resources permit. The CPU mobile team, when not actually engaged in helping local personnel conduct surveys, design appropriate technology and set up trials, will be involved in planning and conducting a variety of training activities wherever there is deemed a need.

D. Implementation Issues and Problems to be Faced in the FSR/E Plan for Zaire:

The plan discussed above is necessarily a general one. Owing to the considerable indeterminacy surrounding research and extension in Zaire, as well as to the dearth of readily available information both relevant and reliable, greater detail is hardly possible. But this seeming deficiency may prove to be a virtue, since it provides for a certain latitude in implementation. Success with such a novel venture as FSR/E in the uncertain setting of Zaire will likely depend substantially on the sound judgement and flexibility for action of the implementing agency. Several issues and problems face the plan during implementation and are enumerated as follows:

1. FSR/E involves agricultural research on stations and on small farms. This research will be executed by both individuals affiliated with research agencies and those affiliated with extension agencies. FSR/E field operations will be based at research stations. A clear deliniation of responsibilities must be made in order to guarantee a smooth continuity of effort.

2. FSR/E involves survey and on-farm testing at the village level. Both activities, as well as extension proper, will involve extension personnel, often from the extension service of the Department of Agriculture. Effective work at the village level requires the confidence of local farmers and good rapport with them. The system of inforced cultivation, whereby farmers are requird to cultivate minimal areas of certain food crops, is theoretically enforced by "moniteurs", or local extension agents employed by the Department of Agriculture. There are penalties for farmers' non-compliance. In

actuality, the system appears to be enforced only differentially across the country. But the scheme does invite abuse. In an upland village of Shaba, local extension agents recently forced villagers to plant maize and provided them (late) with "improved" seed. As it happened, the seed had been developed for a lowland environment. The system of forced cultivation is not compatible with FSR/E and cannot coexist with it. It is not possible for an FSR/E team to gain and maintain the confidence of villagers where such a scheme is operant.

3. The FSR/E approach seeks to integrate the manioc, maize, and legume commodity programs. This is no mean task, as there may be too little knowledge of current farmer practices and small-farm systems to effectively launch the program.

4. The importance of policy to the FSR/E approach must not be overlooked. In the Shaba region, for example, maize is imported at official exchange rates. Since the currency is vastly overvalued, the maize is relatively cheap--so much so that possibly no technology could enable a farmer to compete with it in the marketplace.

5. FSR/E requires mobility. Both the diagnostic survey and the establishment and monitoring of on-farm trials require considerable movement about an area of operations. Vehicles, their maintenance, and fuel to run them must be available on a timely basis. It is of utmost importance that the on-farm research process not be interrupted, once begun, in order that the farmer not lose confidence in the research team. Lengthy bureaucratic procedures to replace tires or obtain spare parts can result in disruptive and costly delays. The unavailability or inadequacy of per diem for researchers can also pose problems.

E. FSR/E Technical Assistance:

Technical assistance of both a long-term and a short-term nature will be required. Long-term technical assistance will provide the three persons comprising the central, mobile technical team--an agronomist, a social anthropologist or rural sociologist, and an agricultural economist. They will likely be expatriates, and they should be employed for the duration of the project. Their qualifications follow:

General Agronomist: A general agronomist with job experience; Ph.D.preferred. FSR/E training and/or experience required; African experience highly desirable and fluency in French required; Multidisciplinary background (e.g., training in a social science such as social anthropology or economics) highly desirable, as also a demonstrated ability to work on a multidisciplinary team. Must be willing and able to do agronomic research on small farms away from comforts and experimental controls of research stations.

Social Anthroplogist/Rural Sociologist: Ph.D. preferred; long-term experience living and working in village Africa (preferably in Zaire) highly desirable. Fluency in French essential. Training and/or experience in methods of FSR/E required. Multidisciplinary background (e.g., training in economics or an agronomic science) desirable, as also a demonstrated ability to work on a multidisciplinary team.

Agricultural Economist: A production or farm-management economist, preferably with Ph.D. training and/or experience in methods of FSR/E required. African experience highly desirable and fluency in French essential. Multidisciplinary background (e.g., training in social anthropology or plant science) highly desirable, as is a demonstrated ability to work on a multidisciplinary team. Must be oriented toward on-farm research and able to handle qualitative data. Must be willing to engage in simple and practical kinds of economic analysis requiring only hand calculators, or perhaps microcomputers.

Since in the case of FSR/E short-term technical assistance is often difficult to separate from training, the section below has some relevance here. Short-term assistance can be provided by the FSSP, by IITA, or by a collaboration of the two. Apart from assisting with FSR/E program design and evaluation endeavors, forms of technical assistance specified in the FSSP cooperative agreement, short-term technical assistance here refers to assistance with implementing methods peculiar to the FSR/E approach. It includes such activities as assistance in the design and implementation of surveys, design of on-farm trials and analysis of data from them. It does not, include assistance in the design of technology to overcome constraints to farmers' achievements; that kind of assistance must come from elsewhere, largely through the commodity programs in the present project. FSR/E short-term technical assistance will be largely ad hoc, since needs cannot be known until problems with implementation are clearly foreseen or actually encountered. It will be the task of the CPU technical team to make decisions regarding short-term FSR/E technical assistance needs.

F. Opportunities, Requirements, and Recommendations for FSR/E Training:

Training in the farming systems approach is necessarily an important part of this project. At present there are no Zairians known to be trained in the approach and its methods. There are three major sources of training:

1) Universities outside the country, mostly in the United States, where there is currently much interest in FSR/E.

2) IITA and CIMMYT; the latter has engaged in FSR/E training activities for some time, concentrating on the fundamentals of the approach, on surveys, and recently on on-farm research design. IITA has only just begun farming systems activities, with the creation of its On-Farm Research Subprogram, but plans major FSR/E training activities for the near future.

3). The Farming Systems Support Project(FSSP), is a USAID, centrally-funded project (936-4099) to provide AID missions, upon their request through Washington, with FSR/E support services in the areas of training and technical assistance. The project is managed by the University of Florida and includes a consortium of about twenty American universities, four consulting firms (IADS, Winrock, DAI, and Research Triangle), and the USDA. The FSSP will also cooperate closely with the International Centers, especially CIMMYT and IITA. Collaboration with IITA in the areas of training is already underway.

There is a need for long-term and short-term training. Long-term training would consist mainly of degree training at American universities. Universities now offering farming systems courses include the University of Florida, Virginia Polytechnic Institute(VPI), Kansas State, Iowa State, Cornell, Purdue, and Michigan State, to name a few. Other schools are developing courses that will soom be in their curricula. The University of Florida offers two courses, one for FSR/E practitioners and the other for administrators and managers of farming systems progrms. The practitioner's course is offered during the spring semester that begins in January and is followed immediately by the administrator's course, taught during the first, one-month summer term. Zairian students pursuing agricultural degrees in the United States should at least be required to take a farming systems course.

It is also highly desirable that those students receive exposure to disciplines beyond their traditional majors and minors. Agronomists and agricultural economists, for example, would take courses in social anthropology or rural sociology, while the latter would pursue courses in agronomy and economics. The farming systems minor offered by University of Florida requires this. Such exposure greatly facilitates productive, multidisciplinary teamwork. A farming systems course could eventually be part of the agricultural curriculum at IFA, Yangambi.

The opportunities and recommendations for short-term farming systems training are several:

1) The FSSP is charged by USAID with a variety of training activities (see the 1983 FSSP Plan of Work on file at the mission; it also includes a copy of the cooperative agreement between USAID and University of Florida). There are two farming systems short courses for in-country delivery, one for practitioners (one to two weeks duration) and another for managers/administrators (of one-week duration). In addition, modules are under development to treat such topics as diagnostic surveys, the design of on-farm trials and the analysis of data from them, and economic analysis. With sufficient lead time, the FSSP will also respond with instruction(which can also be viewed as a form of technical assistance) tailored to specific problems encountered by national programs. The short courses for practitioners and managers are now ready for in-country delivery in English; they will be ready in French by the second quarter of 1984. These two courses should definitely be delivered in Zaire during the first year of the project. Modules can be delivered as needed. It will be the responsibility of the CPU technical group to monitor training needs in the country and advise the missions that requests can be made to the FSSP through AID/Washington.

2) IITA will also engage in farming systems training activities in the region through its new On-Farm Research(as FSR/E is termed at IITA) Subprogram. These activities can be conducted independently by IITA or jointly with the FSSP. The two collaborated in March of this year to present a two-week farming systems workshop on the IITA campus that included a diagnostic survey in nearby villages of Ogun State. The workshop was attended by researchers from Nigeria, Cameroons, and the Ivory Coast.

3) CIMMYT conducts (in English) FSR/E short courses periodically at the University of Zimbabwe and occasionally in Nairobi. CIMMYT has considerable experience in these endeavors in eastern and southern Africa. There exists the possibility of enrolling English-speaking Zairians in these courses.

4) The West African Farming Systems Research Network (WARFSRN) was created at a meeting on the IITA campus in November of last year. Attending the meeting were delegates from several West African countries as well as representatives from ICRISAT, IITA, and various international agencies and donor countries. A seven-member steering committee was elected which includes representatives from IRAT (France), IITA, and ICRISAT. Dr. Jacques Faye of Senegal, who heads an active farming systems program there, was elected president of the committee. Dr. George Abalu of Nigeria was elected animateur and head of a rotating secretariat. Dr. Abalu, a very capable agricultural economist who has worked closely with David Norman, has been doing farming systems research for some years in that country. Although now only in a fledgling stage, WAFSRN will play an important networking role in the region. It will conduct workshops and seminars and circulate research papers among member. It will arrange for national farming systems researchers to visit the programs of other countries both inside and outside the area. Plans further call for the publication of a regional newsletter. Since francophone Zaire has a natural affinity with West Africa, and since the FSSP is slated to provide substantial support to WAFSRN, it would seem reasonable that Zaire belong to the network. Such a link would provide further training to interested Zairians as well as added incentive through identification with a regional community of agricultural researchers.

5) The FSSP will hold a two-week seminar in Ouagadougou, Upper Volta, September 26 through October 7 of this year. The seminar will be for USAID mission officers of West and Central Africa, for AID contract agricultural personnel operating in the region, and for nationals involved in the management of FSR/E projects and programs. Through informal discussions, the seminar will provide participants with an

introduction to the approach and the problems and ramifications of implementing it in national setting of the region. It is strongly recommended that personnel affiliated with the AID mission in Zaire attend.

6) AID/Zaire should consider the possibility of sending English-speaking Zairians to the University of Florida, Gainesville, to take either the FSR/E practitioner course, or the management course, or both (the courses are given back-to-back) in January, 1984. They could also take other useful courses while there, or even do independent projects with the Florida faculty. If such candidates for training can soon be identified, it would provide some early, in-depth exposure to the approach and its methods. These individuals could then further assist with in-country training activities. There are presently several English-speaking Zairians with degrees in agriculture working with the Service d'Etudes and with one of the commodity programs, who might qualify.

7) Periodically the FSSP will offer short courses (of, say, two weeks duration) to USAID contract personnel destined for overseas agricultural assignments. These courses will be offered in the States; one will be given this summer. There is a chronic need to standardize the approach (within certain limits) in order to facilitate harmonious project operations. It is further recommended that those individuals, especially expatriates who are hired for the commodity programs, receive some farming systems training before reaching their assignments. This could be handled by the FSSP or, IITA, or whatever particular contracting agency. Above all, researchers and extensionists working directly with the commodity programs should have a farming systems orientation.

G. <u>Project Schedule for FSR/E Activities</u>:

<u>Year 1</u>:

Hire one person (social scientist) for the CPU technical team. Duties at this time will include:

Working with USAID staff, GOZ personnel, and commodity program personnel to select an appropriate location to begin FSR/E activities.

Determine those individuals who will be involved in the first FSR/E field operation. These persons will be targeted for early, in-country training.

Year 2:

The two remaining positions on the CPU technical team would be filled. The first diagnostic field survey in the selected area will be conducted by the CPU technical team working with research and extension personnel to be based in the area. The survey should be conducted during the cropping season.

Technology design should begin for the area where the survey was conducted; on-farm trials should begin if possible--these efforts to be carried out by the CPU technical team working with local research and extension personnel.

FSSP will offer in-country training modules on diagnostic surveys, on-farm research design and data analysis, and economic analysis if/when requested by the CPU technical team.

The CPU technical team will determine where the second diagnostic survey (for year 3) is to be conducted.

The two short courses delivered in year one will be delivered again; the CPU technical team will select the participants, which should include those research and extension personnel to be involved in the second area for FSR/E operations.

Send to University of Florida, Gainesville, two or three English-speaking Zairians to take the FSR/E practitioner and/or manager course.

Year 3:

The CPU technical team, together with local researchers and extensionists, conducts the second diagnostic survey in the area selected last year.

Technology design efforts for the first area of operations (first survey area) should be well underway; On-farm trials in this area should also be underway.

The CPU technical team selects an area for a second diagnostic survey as well as those individuals to participate in it.

The CPU tehnical team, now with the help of experienced nationals, conducts (without help from the FSSP) short courses for practitioners and managers, especially for those to work in the third area of operations.

Technology design efforts, perhaps also on-farm trials, must begin for the second area of operations.

CPU tehnical team gives modules (if necessary, and without help from FSSP) on diagnostic surveys, design of on-farm and analysis of data, and economic analysis.

FSSP conducts mid-course evaluations of farming systems activities in Zaire toward last of year.

Year 4:

CPU technical team, always with local researchers and extensionists, conducts a third diagnostic survey in selected area.

Technology design efforts for the second survey area should be well underway; some kind of on-farm trials in that area should also be underway.

CPU technical team selects an area for a third diagnostic survey as well as those individuals to take part in it.

CPU tehnical team, with help from experienced nationals, conducts short courses for practitioners and managers, especially for those to work in the fourth area of operations.

Technology design efforts and on-farm trials should begin for the third area of operations.

CPU technical team, if deemed necessary, gives modules on diagnostic survey, design of on-farm trials, and analysis of data from them, and economic analysis.

Year 5

CPU technical team, with the assistance of local researchers and extensionists, conducts the fourth diagnostic survey in selected area.

Technology design efforts for the third survey area should be well underway as well as some sort of on-farm trials in the area.

CPU technical team selects area for a fourth diagnostic survey and those individuals to take part in it.

CPU technical team, with help from experienced nationals, conducts short courses for practitioners and managers, especially for those to work in the fifth area of operations.

If necessary, CPU technical team again gives modules on diagnostic surveys, design of on-farm trials and analysis of data, and economic analysis.

Technology design efforts, perhaps also on-farm trials, begin for fourth area of operations.

FSSP conducts a final evaluation of FSR/E program in Zaire and makes recommendations for the future.

As the above schedule indicates, the CPU technical unit plays a crucial role in training and directing FSR/E operations in the country. As the project proceeds, fewer interventions by the FSSP to provide training and technical assistance are called for. Instead, the CPU technical unit, with the help of a cadre of trained nationals, takes full charge of those activities. Given sufficient lead time, the FSSP and/or IITA can provide a variety of training and technical assistance services as deemed necessary by the technical unit.

ANNEX E-4

Technical Feasibility and Outreach

Lloyd Clyburn

June 1983

This annex describes the technical feasibility of increasing the marginal labor efficiency of small-scale farmers and thereby directly contributing to the national goal of self-sufficiency in staple foods. This goal will be achieved by, among other things, establishing and operating an "outreach" service which would deliver agricultural research outputs to existing, formally or informally organized groups of farmers.

I. INTRODUCTION:

A. Purpose and Scope:

The contribution of agricultural research to local, national and world food supply has been well documented. However, in recent years it has been recognized that the rate of return on agricultural research was sometimes severely reduced, especially in developing countries, due to generally inefficient means of delivering research outputs, including technology and associated production inputs, to farmers. It has been noted further that in the past agricultural research has not asked all the questions or recognized or resolved all the constraints to improved labor efficiency and other similar or related goals of farmers. This is treated in detail in the analysis of farming systems research. It is referred to here because it affects the ways in which the research establishment, the rural population and the "outreach" facility relate, one to another.

The purpose of this paper is to conceptualize in an institutional framework a public service that, with prudent evaluation and adjustment, would bring the agricultural research capabilities developed by the project to bear on as many constraints to farmers' goal achievement (and this project's goal achievement) as possible. It is assumed that the project goal is at least compatible with the farmers' goals.

In scope, the paper presents a package of procedures that village level farm groups could follow in participating in the projects and sharing outputs. Means of equitably providing technical assistance to specialty crop projects and large holders is presented. These activities are proposed in an institutional framework as the outreach elements of the project. A technical feasibility analysis of the proposed activity is presented.

B. Terms of Reference:

The terms of reference were.

(a) the PID, 660-0091, Applied Agricultural Research, and

(b) State 122509, 04 May 83, 660091 PID Review

C. Method:

1. Secondary research:

We read all background documents and communications relevant to the project, including PID reviews and the correspondence and reports in the files of the predecessor projects, 064, INERA Support, 059, Project North Shaba and 077, National Manioc Program. The recent project evaluations were particularly useful. We read the PNM reports of recent years.

2. Project briefing:

The U.S. AID Mission briefed the team on the relationship of the project to predecessor projects as well as the activities of other donors.

3. Project interviews:

We held informal, detailed interviews with the leaders of the major, ongoing agricultural development projects in the country, including PNM, PRONAM, INERA Support and PMKO.

4. Reconnaissance:

We made selected field reconnaissances in Bas Zaire, Shaba and Kasai Oriental regions. The leaders of 16 groups engaged in agricultural improvement were each requested to describe his organization and how it functions in the pursuit of the group's goals. In the case of small-scale farmers, there was a common intermediate objective of increasing farm labor efficiency, which coincides with the project goal. We looked for programmed activities that would confirm the PID hypothesis and models, complete or partial, and applicable to project design. Most of the reconnaissance was made jointly by the outreach specialist and the farming system expert. (The reconnaissance is reported without analysis as Appendix A of this paper. The reader is requested to read that before continuing here.) This was a joint reconnaissance with GOZ agricultural officers.

D. PID Analysis:

1. The PID: The PID proposed a second generation, follow-on project that would continue research in maize, manioc and legumes and add cropping

systems research. The outreach program would be a continuation and expansion of the present PRONAM model, which produces planting material and delivers it for the most part to other agricultural development groups or change agents who would in turn diffuse the material through result demonstrations on private farms. Technical assistance is limited to teaching the retail change agent to produce result demonstrations. (Figure 1)

Figure 1

PID Concept of Project 091 Applied Agricultural Research

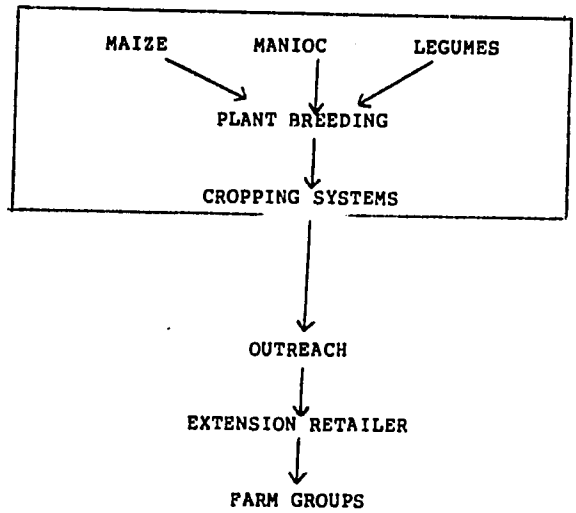
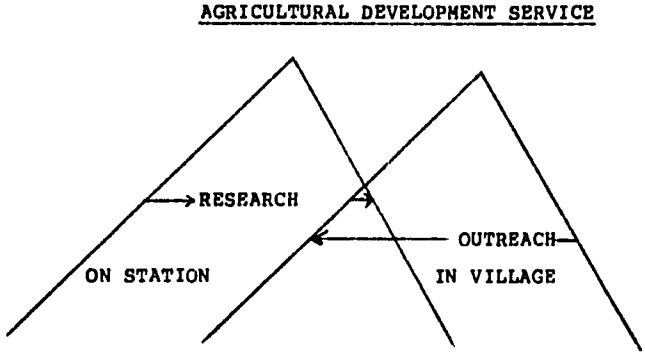


Figure 2

Concept of Project 091 With a Farming Systems Research and Extension Perspective



2. The approval cable:

The approval cable went along with the PID, but inserted farming systems research. To incorporate farming systems research would require the research activity to shift in part off the experiment stations into the farm villages and from predetermined areas of inquiry to responding to new and unrelated problems. It also requires the extension or outreach personnel, as well as the farmers themselves, to participate in research. The farming systems concept is illustrated in Figure 2. It is noted that with this structure, Applied Agricultural Research would not appropriately describe the project. Agricultural Development Service comes closer.

E. Feasibility Tests:

These feasibility tests were applied:

1. Validity:

- Whether it is technically feasible to achieve the project purpose and contribute to its goal by employing the proposed outputs.

2. Suitability and cost-effectiveness:

- Whether the proposed approach is the most usable and most cost effective among options.

3. Consistency with current development theory.

II. PROJECT DESCRIPTION:

A. The Whole Project:

The functional purpose of the project is to aid and facilitate organized agricultural development efforts. It is a farming systems research and extension project which would provide technical assistance, including research, training, and improved germ plasm to organizations at the regional and lower levels who are doing agricultural development work. It would consist of a national coordinating office and regional agricultural development services. Subject to agreement between the national and regional governments, the first four services would be located in Shaba, Kasai Oriental, Bas Zaire and Bandundu Regions. Research would be continued at Mulungu, although the inputs to the extension element would be constrained, due to the lack of accessibility.

1. Criteria for location selection:

a. The relative need of the target group (found to be about equal throughout the country, although the people in Kivu Region appear to be more needy than those in the southern and western regions).

b. The representativeness of the region, as in a national geographic agro-climatic context.

c. Condition of the market infrastructure: whether transportation and marketing constraints would defeat increased production.

d. Existence of change agents already funded and in place with the improvement of the socio-economic lot of farmers their objective.

e. Compatibility of existing government programs and methods with the desires of the farming people.

2. The package:

The project would provide this package of services to change agents at the regional and sub-regional levels:

a. Farming systems research (described elsewhere):

(1) Training

(2) Implementation

b. Organization skills:

(1) training

(2) commodity support (example: bicycles)

(3) consultation (follow-up of training)

c. Shelf solutions (developed in 091 and predecessor projects):

Improved germ plasm

d. Technology

(1) Cropping systems	(1) Training
(2) Seed production	(2) Demonstration
(3) Other	(3) Consultation
	(4) Evaluation

e. Responding solutions (new solutions of new problems):

(1) Joint research

(2) Demonstration

(3) Evaluation

f. Procedure: The project would develop and offer a list of procedures that a village level organization could follow to participate in the project and share in its outputs. The package of procedures would be implicitly offered to the regional department of agriculture and rural development in the national-regional project location agreement. However, the project would reserve the right to offer the package to any and all village groups upon request.

3. Project structure:

a. Coordinating unit: There would be a national coordinating office in Kinshasa consisting of 15 senior grade Zairian officers and five U.S. advisors. The functions of the coordinating office would be:

(1) Establishing the organization's objectives

(2) Directing employment of resources toward objectives

(3) Monitoring and disciplining organizational performance of the regional agricultural development services, as the sub-projects would be known

(4) Training in farming systems research (described elsewhere)

(5) Conducting farming systems research (described elsewhere)

(6) Providing technical assistance to the GOZ soil disciplines (described elsewhere)

(7) Training in extension methods:

(a) Farming systems extension

(b) Traditional communication system

(c) Organization

(8) Assistance in preparing regional project orientation programs

(9) Assistance in preparing teaching materials

(10) Assistance in designing regional programs

(11) Evaluation

b. Regional agricultural development services: In the regions the project would be at two locations. Those engaged in "traditional" agricultural research (plant breeding, agronomy, etc.) would be at an assigned, appropriate experiment station--Gandajika in Kasai Oriental, for example. Those engaged in extension would maintain offices at the most central city of the region. In Kasai Oriental, that would be Mbuji Mayi.

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The reason for this is that these cities--Mbuji Mayi, Lubumbashi, Mbanza Ngungu and Kikwit--are the crossroads of communication for the organizations the project proposes to work with; the experiment stations are remote.

B. Outreach:

Up to this point the whole project, including research and extension activities, has been described. Although the two functions were designed together with every hope that they will work together, the remainder of this paper describes the "outreach" function in terms of what outreach workers will be expected to do, leaving farming systems research and "traditional" research to appropriate members of the design team.

1. Rationale:

a. Small-scale farmers: The rationale of the project is that, other things being equal, there is a strong potential for developing a low cost, self-sustaining agricultural extension service in Zaire. In each region there is a hierarchy of agricultural workers, down to the encadreur or moniteur at about the village level (in two regions, relating to 300 families).

American and World Bank observers have questioned the effectiveness of the Zairian system as a development agency. Many causes are cited:

(1) having to serve as cultivation enforcement officers
(2) having priorities assigned by higher-ups
(3) low salaries
(4) limited mobility (by foot)
(5) "nothing to extend"
(6) extending the wrong thing (variety, for instance)
(7) lack of support or counter-support by operating officers

Nevertheless, it is reported that some, ranging from the bottom to the very top of the civil service grade scale, are doing great jobs.

For about the past 10 years, the Belgian Government, through the FAO, has operated a fertilizer introduction and credit sales program which requires farmers to organize to participate. The procedure is to place a

result demonstration on a farm, and on the strength of the results expected at the ensuing harvest, enroll farmers to buy fertilizer for the next crop. In order to facilitate repayment, the project requires 10 or more borrowers to countersign each other's note. It appears from the amount of fertlizer distributed, that the project works with about 40,000 families.

There are an unknown number of organized agricultural improvement efforts in Zaire implemented by private voluntary organizations, mostly religious organizations. USAID/ARD maintains direct contact with over 20 of these groups through the PRONAM program and has had direct contact with over 150 in the past two years. It appears that, typically, the PVO mission, in which there is usually an expatriate involved, organizes a group of "volunteers" into a "committee" or groupement to pursue a common objective--a water supply, a bridge, increased crop yields. In two regions, at least, the groups organize formally and elect their officers, one person-one vote. It is assumed that these are stable organizations.

Factors affecting the viability of these groups have emerged:

- cohesiveness of the social structure
- participation of the power figures
- common near-term objectives
- common goals
- common problems
- access to solutions

The success rate of these efforts is not as great as one might think. For example, one organization has been working with 32 groups for some time but can count only 11 that are working well. The professional extension worker could likely find reasons for muted success, as has the organization in question. Knowledge and respect for the traditional, social hierarchy and proper lines of communication appear to be lacking, especially among the larger bilateral and international donor agencies.

Still, these volunteer forces provide an effective base to begin a low-budget, sustainable extension service, assuming that the missionairies stay a long time.

The project addresses another type of small scale farmer, those who grow industrial crops (tobacco and cotton) on contract. These people have their own extension agents who can profit from project services. It may be assumed, for example, that they would profit from farming systems research as well as cropping systems, maize seed, and so on.

So the project, the regional agricultural development service, would provide technology to organized groups through their organization mentors. Included in the technology would be training for their ch e agents, which would increase their efficiency.

b. Large scale farmers: The project would also provide technical assistance and foundation seed to large scale farms. Although there are not many in the country they are important to the national economy, because they provide a significant portion of the domestically produced and marketed maize.

All research done by USAID/Zaire projects to date has been biased toward small-scale farmers or it has been scale-neutral. That policy would continue in the new project. However, a small but definite effort would be made to make project services available to large-scale farmers as well. Most if not all of these farms are producing market maize at the President's urging that they contribute to the national food self-sufficiency campaign. Some may become seed farms and thus support the project in servicing small-scale farmers.

A very significant economic return to the project may be expected by providing minimal services to the large-scale farms. Since for the most part they are well organized, often with university trained agronomists as managers and skilled field foremen, project services would amount to keeping the farm managers informed of what the project is doing and sharing technology and foundation planting material with them. The fact is that the actual and potential output of these farms is too important to the national economy to be ignored.

2. Scenario:

a. Assumptions:

(1) Socio-administrative structure: It is assumed that the collectivity is the seat of rural social power structure and that one or several groups may function subordinate to the collectivity. This was

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(3) researchable in the village and at the experiment station combined

(4) beyond the scope of the project and referred to the appropriate agency.

e. Initial research program: Dr. James Jones described the farming systems research approach in detail, and where the above outline deviates from his procedure, his prevails. It is included here in abbreviated form because farming systems research and extension must be planned and implemented as a combined operation.

The project assumes that for the regions tentatively identified, the following elements of research will be required:

(1) maize breeding

(2) manioc breeding

(3) grain legume breeding

(4) cropping systems cultural practices and soil management. This work is described elsewhere.

f. Pre-operational training: Courses or orientations on farming systems research and extension and on basic extension methods would be held at the following levels:

(1) Centrally, for senior ministry and regional officials (conducted by the farming systems research team)

(a) the farming systems approach to development

(b) policy implications

(2) By region:

(a) for agronomes and PVO project leaders

- farming systems research and extension (by the farming systems team)
- implications of farming systems research and extension in program planning and execution
- principles of rural social organization and communication; implications
- managing modular programs (as implied in the village package)

- review and inspection of shelf solutions (completed research outputs) and research in progress.
- review and inspection (in the field) of project-extension methods

(b) for encadreurs, moniteurs and animateurs from both public and private sectors:

- farming systems research and extension procedure
- rural social organization and communication
  - principles
  - procedures
- relating to client farm groups
- method demonstrations
- result demonstrations
- field days

(c) For village leaders:

- farming systems research: purpose and procedure
- review and inspection of shelf solutions
- review and inspection of research in progress
- result demonstrations (inspection)
- seed supply
  - problems
  - production and distribution

g. The package of procedures: Above (A2) we described a package of technology and germ plasm that would be offered by the project to cooperating groups. Here we describe a list of procedures that a would-be cooperating group would follow to receive those services.

There is an implicit assumption that these steps are necessary for a group as a whole to make significant economic progress. Technology is expensive when moved at low volume. An example of the steps that a change agent might take and help his clients take in pursuit of increased farming efficiency, and the project's response to the successive requests were shown in Figure 4.

Figure 3.

A. Suggested Procedure for Implementing a Sub-regional Agricultural Development Service Program

Actions by the Change Agent or the Group	Project Response
1. Apply for enrollment of specified groups	1. Explain the program
2. Request a farming systems-social systems survey	2. Request local assistance in conducting the survey
3. Provide volunteers from the groups	3. Train the volunteers
4. Assist in the survey	4. a. Conduct the survey b. Make a technical analysis of the survey results
5. Assemble the traditional leaders: analyze the findings	5. Review the findings
6. Assemble the groups: a. Review the findings b. Analyze problems for feasibility and priority	6. Observe
7. Organize to address the problems on long-term basis	7. Abstain
8. Request technical solutions	8. Offer available shelf solution
9. Agree to accept shelf solutions	9. Train change agents in implementing the shelf solutions chosen
10. Elect or appoint a farmer to host the result demonstration	10. Provide technical specifications a successful result demonstration, including a. representative conditions b. accessibility c. agreement to follow technical guidance

Figure 3 continued

Actions by the Change Agent or the Group	Project Response
11. Call a meeting at the site of implementation; implement the shelf solution: - result demonstration - cultural practice - seed production - other	11. a. See that the necessary technical inputs are at the site on time b. In the beginning, monitor the implementation
12. By schedule, call meetings at the demonstration site for method demonstration	12. Monitor change agents at work as a follow-up of training
13. Call a meeting for a harvest demonstration: Get a group evaluation of the solution	13. Observe
14. If project solution is found favorable, a. Adopt it b. Recruit others to adopt it	14. Recommend a technical procedure for adoption. Example: seed production by the local group in order to get the seed they need
15. Agree to cooperate in solving unresolved problems (farming systems research	15. Incorporate the groups available resources in the research activities

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The fifteen matched steps are only illustrative. They suggest a step-by-step progression by the beneficiary as a condition of continued project assistance. Many groups will have already taken many of the steps suggested above, such as organization, hosting result demonstrations and method demonstrations. They would be given credit for these achievements and advance accordingly.

Steps may be added or substituted. For example, in a scheme to multiply seed, recipients of the new seed might be required to turn back twice the amount received for redistribution by the group.

There are certain attractive aspects to the recognition of group advancement. For example, a point system could be devised whereby a group is given points for recruitment, participation, adoption, seed production and so on. The points might be cashed in for things the group wants as a group--for example, a gasoline lantern, a bicycle for the encadreur, cement for a group project, a scholarship for a child to go to high school. A single variety seed-producing group would receive extraordinary credit.

h. Package service: The package of procedures would be monitored and adjusted to the socio-economic needs of subregional groups. Seed production would be an integral part of the village level program. Given the national transportation system, there appears to be no other way to provide the kind and amount of seed required. The role of the project in seed production would be to train people to monitor seed production and to replace the starting seed at appropriate intervals.

i. Service to large scale farms: The managers and agronomists of the large scale farms, along with the government and PVO agronomists, would be invited to the regional research station for a field day and seminar once a year. The agronomists would:

(1) inspect research work under way;
(2) review data on recent years' research;
(3) exchange experiences with each other and with the service scientists on varieties, cropping systems and other subjects;
(4) take result demonstration kits back to their farms; and
(5) buy elite seed to begin seed production for the farm and for sale.

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j. Women in development: A program for advancing women in development within the constraints of this project will be designed by a specialist in that field in the first project year. The program will likely include special, in-country training for women as well as treatment of the subject in all training offered.

The availability of women qualified for participant training will be determined. If there are some women qualified who could be recruited by the government, we would propose that at least four receive training in extension methods and associated subjects in the United States.

III. EXPECTED RESULTS:

A. End of Project Status:

1. Regional agricultural development services:

There would be four regional agricultural development services in place and functioning. The outreach element of the services, operating out of the regional capitals, would consist of an office of three senior grade Zairian agronomists and a small staff of support personnel.

a. They would provide pre-service training for new encadreurs and in-service training for agronomist, encadreurs and local leaders.

b. They would have written and revised a local group development procedures guide (package), reproduced it and distributed it to the cooperating change agents and group leaders.

c. With the aid of research personnel, they would have written in the local vernacular, produced and circulated, simple, how-to-do-it pamphlets supporting the major technology advocated by the service.

d. They would have devised a village-local seed production system that would enable cooperating groups to provide their own seed and supply some for new groups coming into the program.

2. Village level groups:

A significant number of cooperating groups would be functioning as independent agricultural development, self-help groups, taking advantage of most of the development resources made available through public and private sources.

3. Farming systems:

The farming systems approach to agricultural development would be working satisfactorily in most of the localities in which the service would have been offered.

4. Industrial crop groups:

At least one industrial crop group would have adopted project recommended cropping systems.

5. The national coordinating unit:

The national office would have become established at a policy forming level in the national government, and the outreach element would be bearing its share of national leadership in agricultural development. The office would be supporting the regional offices in coordination, planning, directing, assessing, training, and logistics.

6. Large, private farms:

Most of the managers and agronomists of the large, private farms producing annual crops would attend annual, project sponsored field days, which might be held at the regional experiment station or at one of the farms. We would expect considerable participation in Shaba and Bas Zaire Regions, but very little in Kasai Oriental and Bandundu, where there are not many large farms. Most of the large farms would be using project recommended varieties, and some would be growing commercial seed of those varieties.

B. Outputs:

Output	Project Year 1	2	3	4	5
1. Extension workers trained in farming systems research and extension methods:					
a. National level:					
(1) pre-service training:	3				
(2) advanced training:		1			
b. Regional level:					
(1) pre-service training:	4	8	12	16	16
(2) advanced training:		1		3	6
c. Sub-regional level:		2	4	8	8
d. Zone level:		15	45	120	200
2. Village leaders oriented to farming systems research and extension methods:	30	30	90	240	400
3. Regional agricultural development service centers:		1	2	3	3

Output	Project Year 1	2	3	4	5
4. Enrolled farm groups:		30	90	240	400

Growth in village enrollment should be fairly simple and easy to sustain given favorable market conditions, as the major burden of delivery would be by change agencies financed by other sources already in place. The major constraint to growth is likely to be the availability of seed.

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IV. INPUTS:

A. Technical Assistance:

1. Extension advisor, national:

A technical advisor holding a Master's degree in extension methods and having distinguished himself as an organizer and trainer, would assist three senior Zairian officers in organizing and coordinating the outreach program.

2. Extension advisor, regional:

A regional extension advisor would be added in the second project year and two in the fourth. Each would assist three Zairian counterparts in implementing the outreach elements of the project in a region.

B. Participant Training:

One officer in the national office would be sent to a U.S. university to pursue the Master's degree in extension education with a minor in farming systems research.

C. In-country training:

The project will offer pre-service or pre-operational short courses to everybody involved from the national government to the encadreurs. The courses will address farming systems research and rural organization, communication and extension demonstrations.

The cooperating officers all along the grade scale will get in-service training in agricultural technology, including seed production, once a year. For the most part this will be in the form of field days at the experiment stations and in villages.

An important output of this project will be that the encadreurs trained in this project will assist with monthly meetings of the farmers' groups at which they will pursue ways of improving their agriculture.

D. Commodities:

1. Transportation:

Vehicles will be required by the central office and the regional office. If the Peace Corps cooperates in the project, a pick-up truck will be required by their technical leaders. Bicycles will be required by the encadreurs, and motorcycles by cooperating zone agronomes.

2. Office furniture and equipment:

(see table)

E. GOZ Contribution:

The GOZ would provide the operating staff and clerical personnel, office rent, office furniture available locally, bicycles and vehicle fuel and service.

Summary of Inputs

Item	Year/Person Months				
	1	2	3	4	5
1. Technical assistance:					
a. Extension advisor, national	12	12	12	12	12
b. " " , regional		12	24	48	48
c. " training advisor	2	2			
d. " advisor, women in development:	2	2			
2. Training in-country:		(course offerings)			
a. Pre-operational: farming systems research and extensions:					
(1) National-regional	1				
(2) Zone-sub-zone:	4	1	1	1	
(3) Farm managers:	1	1	1	1	
b. In-service training:					
(1) National-regional		1	1	1	1
(2) Zone-sub-zone:			2	4	4
(3) Farm managers:		1	1	1	1
	Year				
	1	2	3	4	5
c. Participant training:	Person months				
(1) National officers	6	12	6		

COMMODITIES	Project Year				
	1	2	3	4	5
Typewriters, electric	2	2	2	4	
Duplicating Machine (stencil)	2	2	1		
Slide Projector (35mm)	2	1	2		
Duplicating Supplies					
Office Supplies					
OTHER COSTS					
Motorbikes	5	5	5	5	
Desks	6	6	6	6	
Chairs	18	18	18	18	
Bicycles		15	30	60	90
Vehicle Fuel and Service					

V. TECHNICAL FEASIBILITY ANALYSIS:

A. Validity:

The question rests on whether the project can generate solutions of sufficient magnitude and get them delivered and in practice in sufficient frequency to make the difference.

In response to the first part, organized research has in fact contributed to agricultural productivity around the world. Although research is sometimes slow in solving problems, where research fails, all else does. Farming systems oriented research should do the job.

As for delivery, the project proposes a sort of wholesale delivery of supporting technology to existing change agents working with farm groups. The predecessor project, 077, PRONAM, is already supporting several projects working with groups. The regional departments of agriculture and rural development have complete staffs of change agents in place, down to the village level. There is also an unknown but large number of non-government organizations in proposed project areas who appear to be seeking technical support in their work with organized farmer groups.

Conclusion: The approach is valid.

B. Suitability and Cost-effectiveness:

Whether the proposed approach is technically the most suitable and the most cost effective means of pursuing the project goal:

The project proposes to provide technical support to an existing, organized effort which is self-sustaining or nearly so, considering small inputs by PVO's and other aid donors. Its aim is to increase the effectiveness of others. Insomuch as the final delivery of project outputs is done by others, it is the most cost effective approach available.

The project is fully compatible with the goals, roles and structure of the traditional social systems it will service. By using the farming systems approach the project is likely to be highly responsive to the needs of the target groups.

Conclusion: The proposed approach is the most suitable and the most cost-effective means presently known to address the project goal. It appears to be most likely to be self-sustaining.

C. Consistency with Current Development Theory:

The project will use the rural social systems approach to communication with the target groups, which observers have found to be the most effective means of gaining the ear and confidence of rural people. The project will follow the farming systems approach to problem solving and in program planning and implementation, taking into account the farmer's whole milieu.

Conclusion: The proposed project is wholly consistent with modern development theory.

ANNEX E-4

Appendix A

Cases and Sketches: Profiles of Selected Agricultural Improvement Efforts in Shaba, Kasai Oriental and Bas Zaire

by Lloyd Clyburn, assisted by Tshishiku Kabundi

June, 1983

From May 27 through June 3, 1983, we interviewed sixteen group leaders who were directly involved in agricultural improvement through the introduction of new or non-traditional technology and one who was not involved. Our objectives were (a) a fairly clear description of the major extension methods used in the promotion of food crop production, and (b) the generally accepted communication channels among and within the rural social systems.

Insomuch as the interviewees were selected by project advocates, it might have been assumed that there was at least an attempt to bias the "sample" in favor of their advocacy. However, this worked in favor of the first objective, a description of extension methods used. Our travel hosts were not aware of established communication channels in rural social systems, which removed all bias there.

Tom Wayman, Associate Peace Corps Director for Agriculture and Rural Development, was interviewed in Kinshasa on May 25 and William Fiebig, outreach specialist for PRONAM in Bandundu, was interviewed there on June 6 and 7. Louise Fresco, former FAO agronomist at Kikwit, was interviewed in Kinshasa on June 9.

A. The Mukulubwe Farmers' Group:

Some years ago, Citoyen Mukasa Teka, a farmer, and Citoyen N'Dandanda, also a farmer and chief of the Kaponda Collectivité, approximately ten kilometers across the main road from the site of the proposed new research station near Lubumbashi, observed a result demonstration of the application of fertilizer in maize production on a farm between Kaponda and Lubumbashi. The demonstration was organized by and shepherded by a monitor or an encadreur of the zone agricultural office.

That story:

The FAO fertilizer project had agreed to foster an effort in Shaba, provided that the Regional Governor would cooperate by accepting the activity in the regional agricultural program and giving it a high priority. This was accepted, and the regional agronomist designated a number of encadreurs or monitors to interface with the FAO project.

The National Maize Program (PNM) was already operating an extension program to popularize its varieties. They joined efforts with the regional agricultural agency and the FAO project.

The FAO project operates on the proven assumption that prudent use of fertilizer in the production of maize, manioc, and certain vegetables is profitable, given favorable prices of inputs and outputs, and that as rational beings, farmers will use it if it is financially feasible. Their first step was to train the encadreurs in selling fertilizer their way:

Step 1: Go to a village, get a gathering of farmers, make an oral sales pitch and recruit volunteers. If as many as ten farmers volunteer, they may form a collective buyers' group and buy a year's supply of fertilizer on credit (usually one bag per farmer). This is to facilitate collection later.

Step 2: The "best" farmer in the judgement of the group or the encadreur, or both, is invited to host a result demonstration of the use of fertilizer and, in this case, improved varieties. The demonstration fertilizer and seed are gratis, which is significant, as usually 100 square meter plots are used.

Step 3: By early planting time, a proper seedbed is prepared, and a method demonstration is held at the demonstration site. This includes seedbed preparation, fertilizer placement, plant density, planting depth, seed protection, and perhaps early weeding.

Step 4: Continuous monitoring, more method demonstrations, as appropriate.

Step 5: Result demonstration: All farmers are invited to the site to witness the differences in yield attributable to fertilizer at two levels and to plant improvement through breeding. At this meeting farmers are recruited into the group for future participation. Organizations may be formal or informal; however, they are bound in partnership by virtue of countersigning each other's note for the fertilizer.

Step 6: The project collects for the outstanding fertilizer notes and contracts with the group for the next year's supply.

Interjection: In the case review, a PNM officer said that PNM, with their own encadreurs, had been conducting variety and fertilizer demonstrations on farms in that vicinity and in the region in general when the FAO project arrived and that it merely adopted their method.

Back to Mukulubwe:

Citoyen Mukasa Teka related that he and Chief N'Dandanda held several meetings of the farmers in Kapundu Collectivité, arriving at a consensus that their land was poor and getting poorer every year. Citoyen Mukasa Teka wrote this in a letter to the Regional Governor, requesting technical and financial assistance. (This may have included delivering the letter in person and meeting the Regional Governor and the agronomist.) Action was assigned to the regional agronomist, who notified the appropriate encadreur.

The new group went through steps one through six, above, and they repeat step seven annually.

Subsequently, the group became too large for optimal operations (distance to walk to meetings, etc.) so Citoyen Mukasa Teka spun off a second group, wrote the Governor, and established linkage. His First Groupe Mukulubwe, has 146 members, a secretary, a vice-secretary, and a treasurer. He is the Chef de Planteur. Officers are elected by the members, one member-one vote, for two-year terms. The group meets once a month for financial and technical discussions. At the meeting, May 5, 1983, the main topic was loan repayment.

Members were reminded that the fertilizer they had received and used was not a gift but had to be paid for for the users to qualify for participation next year. They also discussed water management and vegetable production. Neither the encadreur nor anybody else from the outside was present.

Although Kaponda Collectivité is organized along traditional, social lines--that is, chief and council of elders--Citoyen Mukasa is not an elder, nor was his father or uncle. He has nine children and a farm that is 100 by 160 meters (1.6 ha.). With family labor, they raise maize, vegetables, sugar cane and bananas. Maize is grown in the rainy season for auto-consumption and in the dry season, by hand irrigation for the fresh market. Vegetables, fresh maize and sugar cane are sold for cash. Fertilizer is used mostly on maize, but a little on vegetables.

When asked to enumerate his problems or needs, which he may have interpreted as production inputs, he put seed first, followed by hand tools (hoes, machette, and coup-coup or grass scythe).

PNM long since dropped out of the program, and their varieties have been lost. The group chief said that they did get seed from the regional agricultural office last year, but germination was poor (a government official present said also that a variety not suited to this region was supplied by mistake). Citoyen Mukasa had his corn harvest of a traditional type drying on his roof. He will select his next year's seed from that crop when he takes it down to store. Citoyen Mukasa expressed obvious gratitude to the FAO project, although he was mildly critical of its fertilizer this year; he said it was weak. An agronomist present explained that this year the project provided a 12-10-12 analysis, compared to 17-17-17 in past years, amounting to a 30 per cent drop in the nitrogen level.

B. Cellule Munama II:

On June 1, 1983, fourteen members of Cellule Munama II met across the road from the chief's compound to continue construction of a bamboo and thatch community meeting hall. This was in Quartier Kalebuka, 30 kilometers off-road, east of Lubumbashi. Citoyen Kalenga Muiceta, Chef de Cellule, greeted us, and Citoyen Mututu Mumeno, Chef de Rue Mataba, and Citoyen Mutombo Kantambwe, Chef de Rue Kifungo, cellule subdivisions, assisted in hurriedly

arranging a seated conference in Citoyen Kalenga's compound. (This cellule grows only maize).

In 1980, representatives of the Zone agricultural office came and implemented a forced land assignment which included a minimal area of maize for each farmer. The representative of the zone agronomist with us explained that they helped the farmers by locating the land most suitable for cultivation, marking it, and assigning it. (In addition to responding to the national program for food self-sufficiency, land assignment was intended to include a crop rotation which included five years of bush fallow. In another area, the cycle ran: cotton, maize, manioc, five years bush fallow.)

The farmers planted their traditional maize variety, some with seed they had saved and some from maize bought in the market. For the 1981-82 crop, th agronome promised to supply the seed for the whole cellule, and he did. The seed was provided by KANIAMA-KASESE, a DOA project. It was late arriving, pushing the crop into the dry season. But there was also a mistake: they go a PNM variety bred especially for lower elevations rather than the highland variety they needed. This was mass adoption without a trial or a result demonstration. It was a complete disaster.

One of the visitors asked, "What are your problems? What do you need?" an got the following answer:

"We need more extension (vulgarisation) so that we will know how to farm better. We also need fertilizer because our land is poor, and we need better seed."

When asked how he knew he needed fertilizer, the chief said he had seen th results of fertilizer on the big (expatriate or company) farms nearby.

He was asked to identify the best three farmers in the cellule, which he did without hesitation. All were present. He named the best farmer, who accepted the honor with graceful pride. When asked to give the characteristics of a good farmer, he listed:

1) strong
2) hard work
3) big fields
4) weed control

C. Mission Sambwa:

Jean Dubois was standing in his recently harvested, 40 hectare maize field, obviously contemplating his next move, when to turn under the residual biomass, while two Zairian colleagues waited in the pickup. Jean is a Belgian agriculturist at Mission Sambwa in a village by that name, 30 kilometers east of Lubumbashi.

Mr. Dubois' objective is to demonstrate farm mechanization to Zairian farmers. He produces his 40 hectares entirely with machinery, including harvesting. He uses SR-52, an old Zimbabwean hybrid, 500 kg of 15-15-15 fertilizer with 150 kg of urea side-dress. He gets a yield of about 6000 kg per hectare, which is about 96 bushels an acre.

Mission Sambwa does custom breaking and disk harrowing for farmers, the combined operation for 750 zaires per hectare, and has over 100 clients.

They also give farmers vegetable seed that is sent from mission supporters in Europe--probably packets from retail racks, which would be another case of introduction without adaptive testing.

Except for custom plowing, Mr. Dubois said that his practices are not for the local farms. Even those who use his service plant their traditional maize.

Mr. Dubois said that he learned about SR-52 from a large farm nearby (the Italian farm). He did not know about PNM. He would not be interested in growing seed on contract.

Notes:

1. The economic feasibility of tractor hire at the rate charged could be questioned.
2. In its Eighth Annual Report, 1980, PNM stated,

> "...several agencies continue to import Rhodesian (Zimbabwean) hybrid maize seed. PNM feels this is not a good practice for the following reasons:
> "...The Rhodesian hybrids, especially, grow too tall in Shaba Region ...susceptible to root and stalk lodging."
> "...SR-52 is quite susceptible to Fusarium ear rot."
> "The Rhodesian hybrids are no more resistant to maize streak virus than PNM varieties."

D. CEPSE- Mangombo:

The Centre d'Execution des Programmes Sociaux et Economiques (CEPSE) is a wholly owned subsidiary of GECAMINE, the mining company. CEPSE-Mangombo is a 2000 hectare maize farm. It is understood that they are growing maize in direct response to the national program for food self-sufficiency. This is also consistent with the limited objective suggested by the name of the organization--that is, contributing to food availability for local mine workers.

Citoyen Matumbu Kifambi, farm manager, planted 1400 hectares of the SR-52 hybrid in the past season. The farm is completely mechanized from land turning to harvest and delivery. He uses 400 kg of 12-18-12 per hectare at planting and 200 kg of urea as side-dressing. The average yield for the farm, 1975-1982, was 5877 kg per hectare, or about 94 bushels an acre.

Citoyen Matumbu grows a small crop of soybeans. He has four varieties, including the American varieties, Arnold and Jupiter (actually developed by the University of Florida in Guyana).

E. Centre Chretien de Santé Bakwandionga:

From October to December, 1981, Doug and Ruth Welch surveyed 24 villages around Mbuji Mayi in search of a site to begin their agricultural mission. The church had sent Citoyen Mubumba Katanga to an agricultural extension course, and he was back and ready to go to work when the Welches arrived. Welch holds a Master's degree in poultry science, and Ruth is a biologist--both graduates of the University of Florida.

Mainly, they observed farm practices and problems, but for the pilot village, at least, they sought fertile land. Muleba village, off the main road and without commercial traffic, was chosen. The chief was consulted before the survey and upon the selection.

Doug and Mulumbo, the local encadreur, made 13 trips to Muleba from January to May, 1982. They held meetings, recruited 17 farmers into the "committee" (group or association), got them organized and committed to a program with the goal of increasing farm output.

To get the center's cooperation, the committee agreed to build Citoyen Mulumbo a house. They developed a cooperative testing field to test new varieties brought in by the center in competition with their local varieties.

This is also a requirement. Maize and manioc (PRONAM) varieties are included so far. The committee provides the labor.

Subsequently, the Welches have organized a committee at Tshondo Village with 70 active members. This committee has a hectare in its test field, and Welch has assigned an agricultural school graduate to supervise it. The members provide the labor.

In addition, 17 or 18 are taking an agricultural correspondence course from CEPAS, which is distributed by the DOA Division of Research, Information and Training, through the center. The committee has a benevolence program in which they assist widows and each other in hardship cases.

The Tshando group has a youth cooperative group which cultivates a field and will sell the crop to buy a soccer ball.

One village has a bridge project underway, which when complete, would give it ready access to the commercial market, and they have already raised Z3000.

Welch is working on organizing two other villages, but so far he has not gotten far enough along to assign an encadreur at either place, although the center has one trained and ready to go.

The Muleba committee hasn't grown much, and Mrs. Welch suspects that this may be due to internal strife in the village social system. The chief is not a member of the committee.

The program includes dooryard kitchen gardens.

The center fosters a community development program in the city. This includes vegetable gardening and rabbit production. To get a bred female rabbit, a person must take a course and build a hutch.

Mr. Welch was co-host of a three-day seminar for independent agricultural workers recently.

They say one of their big problems is making their local board of administration aware of the value of the program.

P. COOPIBO

Manus Snelder, a Dutch industrial engineer, is the coordinator of Project Rural of Cooperation Internationale au Development des Campagnes Batisseurs, Mbuji Mayi (COOPIBO). Agronom Kabeya Dijimba is responsible for the agricultural sector.

Objective:

COOPIBO's objective is to improve the socio-economic lot of small-scale farmers. Their strategy is:

1) informing and educating their target groups into a state of organized or concerted economic self-help.
2) improvement in agriculture and poultry production. The major effort is in expanding the use of ox traction.
3) development and improvement in domestic water supply.

Their approach is,

1) auto-organization for common objectives in response to common need
2) technical support:
   a) research
   b) extension: technology and means

Means:

For its means, COOPIBO is dependent upon a Dutch Catholic order as a base and a grant of five million Belgian francs a year for five years from the Belgian government. Since it is a policy of the Belgian government not to renew such projects, they are seeking a new source of finance, beginning in 1985.

Organization:

The program has been introduced to 32 villages in two zones--Mbuji Mayi and Gandajika. A paid animateur is located in each operative village. Village animateurs respond directly to district animateurs, who visit once a month (have motorbikes). District committees of farmers are functioning well in three districts. The predictive factor of village representation appears to be a common objective requiring collaboration--a water supply for two or more villages, for example. Two of the district committees are not working so well.

The districts are represented in the central coordinating committee by the district animateurs in bi-monthly meetings. Affairs that reach beyond the established program are cleared by the Diocese.

The village level "committees" or groups are volunteer members without initiation or dues. They elect their officers from among themselves, one member-one vote.

Procedure:

Group discussions, concensus and determination:

1) identify problems and needs
2) prioritize problems and needs
3) seek solutions
    a) make feasibility determinations
    b) refer problems beyond the COOPIBO's capacity
4) distribute work: get commitments on
    a) what has to be done by the group (they must pay their way)
    b) what has to be done by the project

Criteria:

Of the 32 villages on the list, the programs of one-third or fewer are advancing well. This has led to criteria for electing groups to the program:

a. Internal cohesiveness of the social system (village)
b. Goals and attitudes of the power structure of the social system
c. Goals and attitudes of the power structure of the committee (group)
d. Relations between the committee and the power structure of the social system
e. Participation in the pursuit of the general welfare
f. Pursuit of common goals and objectives
g. History of common effort
h. Extent of participation in the present efforts

It has been observed that groups firmly organized in pursuit of a common goal with a common approach--Catholic or Presbyterian or Methodist, for example--are easier to work with than groups without common bonds. Villages with little or no experience in the joint pursuit of a common cause are difficult and expensive to organize.

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Women's participation:

No particular effort is made to involve women in the program. On the west side of the region, in the direction of Miabi, fewer than 30 per cent of committee participation is by women. In the Gandajika area, approximately 60 percent of the members are women. The difference is accounted for by the work of an order, Soeurs de la Misericordé, which has worked with the women around Gandajika for years, beginning by healing children of clinical protein deficiency by feeding them soybeans, then supplying the mothers with soybean seed (They have since shifted to a women's home management program.). The extent of women's participation is dependent upon the leadership.

Relations with other agricultural workers:

Mr. Snelder's central group meets with Doug Welch and other missionary agriculturists once a month. Snelder: "We are interested in PMKO. We use their methods in our result demonstrations. Sometimes when our committees want to buy fertilizer from PMKO, we buy it for them. We don't know whether PMKO is interested in us or not, as we are small." Agronome Kabeya maintains informal, "old boy" relations with PMKO agronomists.

G. PMKO:

Agronome Djamba is a busy person, and June 2 and 3 were no exceptions. On June 2 he accompanied the Secretary of State for Agriculture and the Chief of the Bureau for Studies and Planning to Gandajika. They were his house guests that night; and on June 3, he hosted them while receiving a foreign delegation at his home until eleven o'clock in the morning. Then his office day began by seeing an AID team.

Citoyen Djamba is director of Project Mais au Kasai Oriental (PMKO) a World Bank financed project. He implements PMKO through the Regional Department of Agriculture and Rural Development.

The maize aspect:

Agronome Djamba explains that agriculture in Kasai Oriental is 90 per cent maize, with the rest divided among manioc, cotton, and a few other minor crops. But this doesn't rule other crops out. The cotton: maize: legume fallow rotation has been around a long time, and it needs improving. There is plenty of room for improvement in cropping systems to maintain soil

fertility. To talk about rotation one must have an objective, and to talk about legumes is to talk first about maize.

The project:

This is an expanded, second generation project. The European Economic Development Fund (FED) had fostered an agricultural machinery project at Gandajika. FAO had a fertilizer introduction and supply project in the same area. Then there was Project Mais Tshilenge, which covered 1600 square kilometers around Tsshilenge. PMKO picked up most of the functions of all three of these projects, region-wide.

Services:

PMKO provides these services:

1) introduction of new planting material and fertilizer;
2) supply of fertilizer and farm tools; and
3) credit to finance fertilizer and farm tools.

Agronome Cyokololo, Chief of the extension service, outlined his field force, all Department of Agriculture and Rural Development personnel:

trainers	2
chiefs of sector	11
chiefs of subsectors	56
monitors (one per 300 families)	420

Program:

a. Vulgarisation is carried out in three ways:

1) one-to-one contact
2) meetings
3) result demonstrations

Monitors identify and work with over 700 existing groups.

b. Weekly radio program

c. Distribution of production supplies:

Farmers who receive fertilizer, seed, and equipment from the project sign mutual pledges to repay, by groups of 50 or more. Efforts have been made to serve the "best" groups first. The project is considering advancing these groups into pre-cooperatives.

Both Citoyen Djamba and Citoyen Oyokololo indicated keen interest in linking with the proposed project for support of the extension program, especially in training, once they learned that it would not compete with PMKO but would support it.

H. PRONAM/Gandajika:

Agronome Kilumba Ndati, head of the national manioc program at Gandajika, provides cuttings of their improved types and technical assistance to any group he can interest, Welch and friends, for example. He says he does not provide material to PMKO because PMKO demonstrates monoculture, while the farmers practice companion cropping.

I. PRONAM OUTREACH, M'Vuasi:

The PRONAM project at M'Vuasi has bred and released two manioc varieties that last year outyielded the common types in farmers' trials by 35 percent without fertilizer and by 63 per cent with fertilizer (100-100-100). One is a sweet type suitable for fresh consumption, and the other is bitter for making flour. The project has been busy multiplying these varieties since it was decided to release them, and they have over 60 hectares. But they don't have enough to satisfy the demand. They sell the material and they put it out through result demonstrations.

Result Demonstrations:

In addition to their own demonstrations, PRONAM cooperates with the Belgian-FAO/DOA fertilizer project, French food production project, Salvation Army, OXFAM, an Italian project and a Rumanian project. The project provides technical assistance to the collaborators in producing demonstrations.

Sales:

Cuttings are sold at the station during planting season.

J. Mboma Demonstrations:

Every 10 kilometers for 100 kilometers along the road going northeast from Mbanza Ngungu, Agronome Lutaladione Bambi, Co-director of the PRONAM project at M'Vuasi has established four varietal result demonstrations. They are planted in the first and second rainy season near the top of the slope and at the bottom.

ITA

Design:

The demonstrations at Mboma village, 30 kilometers northeast of Mbanza Ngungu, were planted on beds approximately 125 cm wide between 50 cm furrows. Each bed bore two rows planted at intervals of about 50 cm, making a plant population of about 22,600 per hectare, compared to 10,000 plants recommended by PRONAM (PRONAM research indicates about the same yield, regardless--merely a saving of planting material.). The manioc was completely interplanted with groundnuts, which is its most popular companion crop.

Markings:

Neither these nor any other result demonstrations seen in this reconnaissance were labelled.

K. Projet Agricole de Mbanza Ngungu:

(Cooperation Français, Conseil Executif Zairois)

This project, aimed to increase food production, services six collectivites, each with four encadreurs. Each encadreur works with 300 families (540 adults). The encadreurs are visited and trained on the job once a month, and they hold informative or training meetings with the village people once a month. In the interim, the encadreurs follow up to assist farmers individually with the new technology. The program is built around meetings, result demonstrations, field days and method demonstrations. Also, farm groups exchange visits.

Women's participation:

Men attend the project affairs and inform the women at home. It is important that women participate because they bear more than equal responsibility for food production and home consumption. In matrilineal systems women control the land. M. Ernaux, project extension officer, believes that female change agents are needed by the women.

L. FAO Fertilizer Project:

The Belgian government, through the FAO, finances and provides the personnel for a project to popularize the use of fertilizer in Zaire (see above). The program is built around result demonstrations followed by the sale of fertilizer on credit secured by the joint signature of at least ten borrowers. The fertilizer that is applied to the demonstration plots is free.

M. PAZA:

The FAO project sponsored a fertilizer and manioc variety demonstration for a "good" farmer in 1981, and he abandoned it. In 1982 he measured, staked, and replanted it, then invited the project to bring the free fertilizer. He and his brothers and cousins formed a group and applied for ten bags on credit for next season.

N. Vinda Demonstration:

The young man was obviously proud of his demonstration. It was at the bottom of a long slope on good land, and he had good reason to believe that the PRONAM varieties would set a new record in those parts. He had a uniform stand on the exact, one-meter square, cultivated flat: no ridges, no weeds. The plots were 10 X 10 meters, standard PRONAM plots, so the free fertilizer for the 300 square meters had value.

He was the chief of a farmer's group formed to participate in Projet Agricole. His group lived some distance from this field, although it was easily accessible. The last meeting at the site was in March, and "everybody came."

Social Structure:

Upon departure, a question was asked about the social structure of the village. Somebody said, "Ask the chief; he is standing there." (There was an old man in the compound). He replied that he didn't believe that he should answer that question, since he was not consulted when the group was formed. However, he continued that the social system was blocked. Many of the people in the social hierarchy were not interested in improving agriculture, and anyway, they were continually invaded by strangers, and he didn't know what they were up to.

O. Kilonga:

PRONAM outreach fostered two demonstrations in Kilonga village, due to extreme friction between two resident clans. The first year the chief sponsored a demonstration, but after it was set at one-meter intervals, he interplanted it with a local variety (as did the wife of a chief in his demonstration sponsored by the Salvation Army and the Peace Corps). So, Dr. Pandy, the outreach agronomist, abandoned the project.

This year, the chief laid out nine plots for fertilizer and variety trial planted them with the correct materials and invited Dr. Pandy to come inspec his work (he also requested fertilizer).

PRONAM/Bas Zaire: Partial summary of result demonstrations, 1981-82

Eight Locations

Clone	Yield/Fertilizer Treatment		
	0-0-0	50-50-50	100-100-100
	T/ha.	T/ha.	T/ha.
3008.28	10.15	17.08	22.58
LOCAL	7.52	10.94	13.85
INCREASE	2.63	6.14	
Percent increase	35%	56%	63%

PRONAM/Kiyaka: Partial summary of result demonstrations, 1981-1982

Eight Locations, Without Fertilizer

Clone	Yield	Percent Increase
	(T/ha.)	(%)
F100	13.7	108
F150	10.6	61
F156	9.8	50
402	9.2	39
LOCAL	6.6	

P. PRONAM-Kiyaka:

On April 1, 1983, PRONAM-Kiyaka, at Kikwit, had 52 ha. of improved manioc varieties going--15.59 ha. at the station, 4.75 ha on individual farms, and 31.75 ha. in group demonstration and multiplication fields in 30 villages. The plot sizes ranged from 0.1 ha. to 1.8 ha.; however, 0.2 to 0.4 ha. fields were most numerous: large enough to demonstrate and produce a substantial amount of cuttings, yet manageable at result demonstration, harvest, and distribution time.

In eight on-farm, comparative yield tests conducted by Bill Fiebig, PRONAM's outreach man in Bandundu, their F-100 outyielded the prevailing local type, two to one. Being a white rooted plant, introduced by Fiebig, it got named by the mamas, Willie.

True to PRONAM tradition, Fiebig works with everybody interested in manioc. This includes the World Bank project, CODAIK, OXFAM, and FAO. As an example, in April, the private, volunteer entities of Bandundu Region convened in Kikwit to exchange views on how to pursue their agricultural programs. Seventeen religious groups, plus OXFAM, CODAIK, and the regional government were represented. OXFAM became the acting secretariat for the group. Fiebig got their names and addresses and wrote them, asking them to notify PRONAM of their need for planting material in 1983-1984. He got requests from most of them.

Program with the mamas:

Administratively, there are subregions, zones, and collectivités. In the collectivités there are the traditional social structures, localités, and souslocalités, and many of them, individually or jointly, have groupements. There is a male chief at each level. Fiebig's method is informal. Besides the linkages described above, he tells the collectivité chiefs about F-100, et. al. The chiefs get the mamas out in groupements, because manioc is their thing. The men come along and help prepare the seedbed and trim the cuttings. The women plant, weed and harvest. Women outnumber men at the meetings.

Organization:

There are almost as many organization styles as there are groups. The main thing seems to be an attractive, common interest.

Training:

Fiebig held a field day for the agronomists of the region, covering spacing, weed control, varieties and disease. He plans to hold similar field days in July and September.

Transportation:

He says the encadreurs need bicycles.

Q. The Kikwit women:

For the past five years, Louise Fresco has worked with the women in the manioc fields around Kikwit, Bandundu Region. She tried to identify constraints to economic gain, the women's criteria for crop excellence, and so on. She worked with them in their fields and walked with them in the road. They would not usually give her straight answers at meetings, where men were always present. But she got her chance, as the men would refuse to walk.

Ms. Fresco found that in that area, manioc is exclusively the woman's crop--all of it. She found them to be congenial and motivated to experiment.

Organization:

Her women's groups were informal, although each group had its leader, frequently but not always, the wife of a traditional chief. It is a matrilineal society with women marrying out of their villages of birth, so there is not much cohesion there. However this presented no real problem.

One woman leader was the equivalent of the chef du terre, who establishes the village planting calendar and so on. This woman was trained and provided implements early on, and she took the lead in implementing the program.

Fresco says that working with women or men, it is absolutely essential to contact both the administrative chief and the traditional chief early on. And if the traditional chief is not on your side, your program is dead.

She found the Agronome du Zone to be a very important figure in agriculture with very little to do, due to the lack of ways and means. She believes they should be incorporated in any regional or subregional agricultural program.

R. Peace Corps:

The Peace Corps is presently involved in teaching agriculture as well as in appropriate technology, beekeeping, small animal husbandry and fish culture. They plan for 25 volunteer agriculturists in FY1984 and 44 or 45 in FY1985.

While he has in no way committed the Peace Corps to participate in the AID Project 091, Tom Wayman, associate director for agriculture and rural development, indicated that to work with organized village groups in improving the quantity and efficiency of farm production as outlined in conversation,

might be attractive to them. Each volunteer would have one or several village/local co-workers who would maintain frequent contact with their respective cooperating groups of farmers. The American and Zairean co-workers would require training in program implementation methods and techniques. It would be anticipated that this would include at least organization, demonstrations, and seed production. The Peace Corps technical supervisors involved would require pickup trucks, the volunteers motorbikes, and the Zairian co-workers bicycles.

Appendix B

Administrative and Social Structures

The following information was given by Citoyen Kiatoko Soli, an engineer, who used to be head of department at PMKO and who is now a director, on the Zairian side, of the Agricultural project in the zone of MBANZA-NGUNGU.

SYSTEM IN ZAIRE

A. Administrative structures

- The State: The Republic of Zaire
- The State is divided into regions, the equivalent of provinces
- The Region is divided into sub-regions, the equivalent of districts
- The Sub-region is divided into zones, or territories
- The Zone is subdivided into collectivities, or sectors
  - "Collectivité secteur": the chief is elected according to administrative procedures
  - "Collectivité chefferie": the chief is elected according to customary authority.
- The collectivity is subdivided into groupings or localities
- The grouping is subdivided into sub-localities or villages. The grouping is under the direction of a chief of grouping with the assistance of the leading citizens.
- The sub-locality is under the direction of a chief of sub-locality known as capita (often connected with taxes). In some sub-localities the women are represented by a woman chief known as the "NDONA".

B. Social structures:

- ETHNIC groups: in the case of Bas-Zaire the group is the BAKONGO.

- The ethnic group is divided into tribes. In the case of MBANZA-NGUNGU there is the BANDIBU tribe with certain characteristics related to the milieu (different pronunciations for certain words, expressions, linguistic questions). In this connection people will speak of NDIBUZA, NZADI, NDIBU za LUVAKA, NDIBU za TUMBA, etc.

The group that is most distinctive of the principal tribe of the zone is that of the BESI NGOMBE, in the vicinity of COMBE-MATADI. This group has almost become a tribe of its own. The other group is made up of the BANDIBU OF LUVAKA and of KIMPANGU. This population is so mixed with the BAZOMBO tribe of ANGOLA that it is often assimilated with it.

Within the tribe there are clans insofar as Bas-Zaire is concerned. The clan members are matrilineal descendants with a common ancestor. The clan members are spread out across the villages and often even across other tribes or other countries, such as ANGOLA and CONGO. Every clan has a chief, often the eldest man of the clan. In the vernacular he is referred to as MFUMU a KANDA (this title can be used either by the men or by the women, although not commonly used by the latter). Most of the clans have villages or localities where their lands can be found. The customary authority in those circles is held often by one of the members of the clans who is the land owner (MFUMUAVATA=CHIEF OF VILLAGE=sub-locality or capita of village which corresponds in this case to MFUMU A NTOTO=Chief of lands). The latter distributes the land to the inhabitants of his village that are not necessarily from his clan. In the case of conflict he can refuse land to an inhabitant. The chief of a sub-locality is assisted by counsellors, or leading citizens who may not be from his clan. A sub-locality is often made up of inhabitants that belong to different clans.

C. Manioc Culture:

As far as the savannah fields are concerned (the most common) 80 per cent of the work is done by the women.

D. Extension:

Within the agricultural project of the zone of Mbanza-Ngungu, extension work is very limited. There is a need for new ideas and structure for activating the work. It has to do with political problems and manpower.

Appendix C

Apparent Relative Distribution of Agricultural Missionary Programs in Zaire

Region	Number*
Bas Zaire	----------
Kinshasa	----------
Bandundu	----------
Equateur	----------
Haut Zaire	----------
Kassai Occidental	----------
Kassai Oriental	----------
Kivu	----------
Shaba	----------

*Extrapolated from the distribution of 123 missions mentioned in USAID/ARD trip reports, 1981-83. This shows at least that (1) such groups exist and (2) that USAID/ARD is in touch with them.

ANNEX E 5

DISTRIBUTION OF TECHNICAL ASSISTANCE in PERSON YEARS (PY) and PERSON MONTHS (PM)

Position	Project Year						
	0	1	2	3	4	5	Total
Long Term	PY	PY	PY	PY	PY	PY	PY
Project Coordinator (COP)(Kin)		.5	1.0	1.0	1.0	1.0	4.5
Management (Deputy)(Kin)	1.0	1.0	1.0	1.0	1.0		5.0
Farm Manager, Services/Equip. (M'Vuazi)		.5	1.0	1.0			2.5
Plant Breeder-maize (Lubumbashi)		1.0	1.0	1.0			3.0
Plant Breeder-legumes (Lubumbashi)		.5	1.0	1.0	.5		3.0
Agronomist-Research (M'Vuazi,Lubumbashi)		1.0	2.0	2.0			5.0
Agronomist-FSR (Kin)		1.0	1.0				2.0
Agronomist-Soil fertility (Kin)		.5	1.0	1.0	1.0		3.5
Production Economist-FSR (Kin)		1.0	1.0				2.0
Rural Sociologist/Soc Antho.-FSR (Kin)		1.0	1.0				2.0
Outreach-National (Kin)		.5	1.0	1.0	1.0	1.0	4.5
Outreach-Regional (Lubumbashi, Mbuji Mayi)				1.0	2.0	1.0	4.0
Plant Pathologist (M'Vuazi)		1.0	1.0				2.0
Entomologist (M'Vuazi)		.5	1.0	0.5			2.0
Subtotal (person years)	1.0	10.0	14.0	10.5	6.5	3.0	45.0

	0	1	2	3	4	5	Total
Short Term	PM	PM	PM	PM	PM	PM	PY
Management		1			1	1	3/12
Plant breeder (Maize)		1	1	1	1		4/12
Plant breeder (Legumes)		1	1	1		1	4/12
Agronomists		1	1			1	3/12
Production Economist		1	1				2/12
Farming systems research		1	1	1	1	1	5/12
Rural Sociologist/Social Anthropologist		2	1	1			4/12
Outreach Extension		2	1	1			4/12
Entomologists		2	1		1	1	5/12
Plant Pathologists		2	1	1			4/12
Research organization		1	1				2/12
Soil Scientist (classification & fertility)		2	2	1	1	1	7/12
Evaluation				3			3/12
Subtotal (person months)		17	12	10	5	6	50/12PM
Total technical assistance (person years)	1.0	11.4	15.0	11.3	6.9	3.5	49.1

ANNEX F

Initial Environmental Examination

A. Project Proposal:

The purpose of this project is to sustain, integrate, and expand the structural, technical, and managerial capacities of Zaire to maintain indigenous stations capable of acting as centers for development and transfer of technology in food crops. This project will combine two ongoing USAID funded research projects (cassava and legumes) and a third research project (corn) previously assisted by CIMMYT.

The project will modernize and equip three extant agricultural research facilities and two substations, will train a cadre of Zairian technicians, scientists, and research managers, and will provide technical assistance to help establish the components of a viable national foodcrop research system. Each station will have primary responsibility for research on one of three crops (corn, cassava, or legumes) and secondary research emphasis on the other two crops. Major research emphasis will be on variety development, cropping systems, and on-farm trials. Working relationships will be established between the research stations and international research institutes. Research results and imported technologies, adapted for use by small farmers in Zaire, will be disseminated through established rural development groups.

B. Impacts:

Considering prior experience with these activities, this project is not expected to significantly affect the biological and physical environments of the project sites. There will be minimal disturbance of the research station sites, inasmuch as the principal infrastructure, buildings, and fields are in existence. Except at stations where electricity and/or water facilities may need to be installed, only the interiors of existing buildings will be changed significantly. Upgrading of existing facilities will concentrate on rehabilitation rather than new construction.

As in the current crop research programs, fertilizers, pesticides and herbicides will be used only sparingly and under controlled conditions. Given the limited use of chemicals and the limited structural changes at the research centers, the impact on the ecosystem, water quality, air and noise quality, flora and fauna should be negligible.

The objective of the project is improved small farmer labor productivity through increased yields derived from the use of improved varieties and cultural practices. During the life of the project and beyond, increased yields should raise the farmers' incomes and increase the amount of food available to the population at large. The project includes cropping systems research which should result in soil management systems that would reduce water and soil runoff while stabilizing soil fertility.

C. Project Description:

1. Ecology: Three principal research stations will be located in ecologically distinct geographical regions of Zaire: the central basin, the northern and southern uplands, and the eastern highlands. These regions are differentiated in terms of terrain and vegetative distribution.

2. Pesticide condsiderations: Pesticides will be used for pest control rather than for pesticide experimentation. The pesticides will be used under the direct supervision of qualified and experienced project personnel who will ensure that the manufacturers provide the necessary toxicological and environmental data to safeguard both the research personnel and the local environment. All pesticides used will be approved in advance by the USAID Mission Director (22CFR and 216.3 b.1.v.). Biological pest control has been employed in previous related research on food crops. Biological controls also will be featured in the proposed projects. This use will obviate some of the need for chemical pesticides.

D. Recommmendation and Conclusions:

All chemical pesticides will be handled and applied by the technical staff assigned to the projects. All personnel handling pesticides will be trained in the proper, safe usage and storage of those pesticides. Appropriate storage facilities will be established and maintained. All pesticides will be employed according to the manufacuturers' recommendations, only to control insects. No significant short- or long-term, adverse impacts on the environment are anticipated from any project activities. Therefore, it is recommended that a negative determination be made.

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ANNEX G

Social Soundness Analysis

By James Jones*

June, 1983

A. Sociocultural Context:

This project will extend the two commodity programs of manioc and legumes, and rehabilitate a third, the National Maize Program. Further, the project will integrate the three commodity programs as well as the production of other basic foodstuffs, using the farming systems approach to research and extension (FSR/E). Since the three commodity programs are to be continued, the social soundness analyses for those projects should remain valid. The analysis here will be concerned with the unique feature of the present project, the introduction and implementation of the farming systems approach to the Zairian setting.

FSR/E has emerged gradually over the past decade as an effective and efficient means of generating appropriate technology for small farmers in the developing world. This is achieved through a close integration of research, extension, and the farmer. FSR/E offers the prospect of increasing both small-farm family welfare and the national production of basic foods. These are goals of both the United States Agency for International Development and the Government of Zaire. There is a pressing need to achieve these goals in Zaire, where perhaps seventy percent of the population is engaged in subsistence agriculture and the government is consuming substantial quantities of scarce foreign exchange to import basic foodstuffs.

Under the farming systems approach, a small farm--its crops, livestock, and husbandry practices--is viewed as a reasoned (i.e., rational) adjustment (or response) to both its agroecological (e.g., soils, rainfall, topography) and its socioeconomic setting (e.g., land tenure arrangements, marketing opportunities, government agricultural policy). Through surveys and subsequent monitoring, FSR/E looks first at that adjustment(i.e., at the present system) and then develops technologies appropriate to it. Such an approach is especially suited to a setting like that of Zaire, which is characterized by great sociocultural and agroecological diversity. The farming systems approach stands in marked contrast to the more traditional and

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narrow commodity approach currently practiced in Zaire. The farming systems approach views the small farm as a household system of several enterprises which must first be understood, taking account of pre-existent cultural practices and potentials to accommodate them.

B. Project Beneficiaries and Impact:

The immediate beneficiaries of this project will be the small farmers actually receiving improved agricultural technology. These will be first those farmers who collaborate in on-farm trials in the area selected for FSR/E operations, and on whose plots the technology is developed and refined, and who then accept them. Next will come those farmers living nearby, often in the same villages where trials were conducted, who find the technology attractive and accept them. Then will come all those farmers in the larger, homogenecus recommendation domain (the "target group") for whom the technology is intended. This larger group will be reached through formal extension efforts.

The more indirect beneficiaries of the project will be Zairians at large, especially urban consumers who are not directly engaged in the production of basic foods. Also benefitting from the project will be Zairian researchers, extensionists, and administrators who will be trained in the methods of farming systems research and extension. And therein lies the greatest strength of the project, which is first and foremost concerned with institution building. Therein lie the long-term gains.

Since the project is mainly about institution building, it is difficult to quantif project benefits within a time frame. There are too many imponderables for that, not the least of which is the stability and continuity of the entire research and extension structure of Zaire. Tangible benefits accruing during the five-year time frame of the project may be few. They will probably consist of no more than a few viable outputs developed and extended over limited areas in only one or two regions of the country. But the long-term potential benefits to be achieved through institutionalization, especially training, are substantial. And this must be the ultimate project objective.

C. Participation:

The farming systems approach to research and extension gives the small farmer a voice in the development of technology that can profoundly affect his (or her) welfare. Such participation, especially when the formulation of national agricultural and development policies takes his circumstances and

interests as points of departure--as it certainly should under the FSR/E approach--gives the small scale farmer a measure of control over his destiny unusual in most developing countries. Under the farming systems approach the farmer is the ultimate arbiter of new technology, and success is measured by farmer acceptance of that technology.

The project will require the participation of host-country entities and personnel at two levels. At a high level, there will be official representatives of the research, extension, and agricultural development planning entities in the central coordinating and planning unit (CPU). With the cooperation of the heads of the commodity programs, also in the CPU, those individuals will work with the CPU mobile technical teams to plan and coordinate FSR/E operations in selected areas of the country.

The bulk of the FSR/E effort will be made at the village and household levels. There, FSR/E teams will conduct diagnostic surveys and install and monitor on-farm trials. It is there also that extension efforts will operate. All of these activities require that researchers and extensionists understand and respect local customs and social structures, which tend to be quite variable as one moves about rural Zaire. Successful FSR/E efforts rely on the confidence and support of local farmers and leaders. Research and extension teams must pay their devoirs to lineage heads and to chiefs, both traditional and administrative, before undertaking activities in a village or local area. The permission of such persons of influence to operate in the locality must be obtained and they should be kept abreast of all research and extension activities. And villagers must at all times be given the option of not cooperating with the team for interviews or on-farm trials. Coercion must never be employed.

The importance of understanding and respecting the local sociocultural setting cannot be overemphasized. This is necessary not only to gain entry to a village or household and maintain operations once there, but understanding of local custom can bear importantly on the technology design process. Women, for example, play a formidable role in Zairian agriculture. In many areas the cultivation and marketing of most crops are entirely in their hands. This is especially true for manioc, which is in the female domaine par excellence. The decisions of when to plant, where to plant, when to harvest, what varieties to plant and why, are all made by women. Much of the logic of such

a farming system, especially the critical, decision-making criteria, lies with the women. In order that any new manioc technology be ultimately appropriate to that system, then, the women must be consulted closely throughout the diagnostic, design, and testing stages of the research process. And they must be given special attention during the extension phase.

D. Sociocultural Feasibility:

As with any project, there are with the present one certain forces that could adversely affect the achievement of project goals. An awareness of such potential obstacles from the outset can help to remove, circumvent, or contain them. In Zaire today there is a strong tradition of commodity-oriented research that is uninformed by a holistic systems perspective. This is no less true for donor agencies and expatriates than it is for national agencies and Zairians throughout the life of this project, there will likely be strong pressures in the direction of that tradition.

Related to that strong tradition, and also found among both nationals and expatriates working in agricultural research and extension in Zaire, is a view of the small scale farmer, that does not square with the farming systems approach. It appears that the small scale farmer may be seen by some as an irrational being, bound by tradition and unenlightened agricultural practices, who is unable to behave in his own best interests. In its more benign form, the view leads logically to researchers deciding what technology farmers ought to use, and to extensionists trying to convince them of the merits of the technology. In its more virulent form, the view leads to the scheme of cultures imposees (forced cultivation), whereby farmers are required under threat of penalty to cultivate minimal areas of certain crops.

The scheme of forced cultivation, which seems to be only differentially functioning across the country, lends itself to abuse by the extension agents (the moniteurs) who enforce it, and in any case is not conducive to establishing good rapport between research/extension and the farmer. More specifically, it would do great violence to any farming systems effort, which must operate at the village level. It is imperative that no FSR/E activities be undertaken in those areas where the scheme is practiced, and just as imperative that the policy soon be abandoned by the government if the farming systems approach is to be seriously followed in Zaire.

Other government policies also bear importantly on the farming systems approach. Policies that govern the distribution of agricultural inputs and products are important here. Possibly no technology could be developed that would permit marketable surpluses in the face of pricing and fiscal policies that penalize agriculture and create disincentives to produce. Such may be the case presently in the Shaba region, where maize is imported at unrealistically low prices because of an over-valued national currency.

A further problem likely to be encountered in the project is that of getting researchers and extensionists to spend substantial amounts of time working at the village and household levels. Poor roads, a lack of amenities in the villages, and low salaries all work against the farming systems approach.

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ANNEX H

ECONOMIC ANALYSIS

Table 1

Increased Yield Estimates
(metric ton/hectare)

	Medium	Low	High
Cassava	5	3	7
Maize	1	.5	2
Beans	.5	.3	.6

Table 2

Minimum Necessary Number of Hectares Planted to New Varieties Needed by Year 20 as a Percentage of Total Hectares Planted to Each Commodity

Commodity/Yield	Medium	Low	High
Cassava	.9	1.6	.7
Maize	2.2	4.4	1.1
Legumes	1.4	2.4	1.2

Table 3

Sensitivity Analysis (benefit/cost ratios)

	Benefits		
	-10	-5	0
Costs			
+10	.82	.87	.92
+5	.86	.91	.96
0	.91	.96	1.01

Table 4

Sensitivity Analysis (benefit/cost ratios)

	Benefits		
	-10	-5	0
Costs			
+10	1.19	1.25	1.32
+5	1.24	1.31	1.38
0	1.31	1.38	1.45

Table 5

Project Costs*

Year	Costs excluding training		Training Costs		Total Costs	
	US ($000)	GOZ** (Z000)	US ($000)	GOZ (Z000)	US ($000)	GOZ** (Z000)
1	587.8	6560	396.8	1800	984.6	8360
2	787.9	39205.9	765.4	7895	1553.3	47100.9
3	820.8	44563.4	970.6	8395	1791.4	52958.4
4	1329.5	46182.4	728.4	7595	2057.9	53777.4
5	1605.3	45174.6	282.0	6895	1887.3	52069.6
6	340.5	45933.1	58.0	5795	398.5	51728.1
7	787.9	39205.9	396.8	7895	1184.7	47100.9
8	820.8	44563.4	765.4	8395	1586.2	52958.4
9	1329.5	46182.4	970.6	7595	2300.1	53777.4
10	1605.3	45174.6	728.4	6895	2333.7	52069.6
11	340.5	45933.1	282.0	5795	622.5	27400.5
12	0	27400.5***	0	0	0	27400.5***
13	0	27400.5	0	0	0	27400.5
14	0	27400.5	0	0	0	27400.5
15	0	27400.5	0	0	0	27400.5
16	0	27400.5	0	0	0	27400.5
17	0	27400.5	0	0	0	27400.5
18	0	27400.5	0	0	0	27400.5
19	0	27400.5	0	0	0	27400.5
20	0	27400.5	0	0	0	27400.5

* Contingency and inflation are excluded unless otherwise indicated.

** Ten percent contingency is included.

*** The constant level of recurrent costs after the end of the 10 year project is equal to the local cost of personnel and support and operation and maintenance costs. There are no provisions for training, commodities, or civil works.

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Table 6. Data for the Economic Analysis of Increased Production

Year	Project Costs* (without training)	Net Benefits (value of increased output)	Discounted Costs	Discounted Net Benefits
1	922	0	768.33	0
2	2672	0	1855.56	0
3	2939	0	1700.81	0
4	3481	0	1678.72	120.56
5	3688	400	1482.12	160.75
6	2410	500	807.1	167.45
7	2672	650	745.71	181.40
8	2939	1150	683.52	267.45
9	3481	2500	674.64	484.52
10	3688	5250	595.63	847.90
11	2410	9750	324.36	1312.23
12	1096	12250	122.92	1373.92
13	1096	14250	102.44	1331.86
14	1096	15750	85.36	1226.71
15	1096	16750	71.14	1087.71
16	1096	17250	59.28	933.02
17	1096	17750	49.4	800.05
18	1096	18000	41.17	676.10
19	1096	18000	34.31	563.42
20	1096	18000	28.59	469.51
			12004.03	11911.11

* GOZ contributin is converted to dollars at the rate of Z25/$1.

Discount rate - 20 percent

Benefit/Cost ratio - 226.27/226.39: 1.0

Table 7. Estimated Tons of Cassava, Maize and Legumes

Year	Cassava	Maize tons	Legume
1	0	0	0
2	0	0	0
3	0	0	0
4	1609	226	74
5	2574	361	118
6	3218	451	147
7	4183	587	191
8	7401	1038	338
9	16089	2256	735
10	33787	4738	1544
11	62748	8800	2868
12	78837	11056	3603
13	91708	12861	4191
14	101361	14215	4632
15	107797	15117	4926
16	111015	15569	5074
17	114233	16020	5221
18	115842	16245	5294
19	115842	16245	5294
20	115842	16245	5294

Table 8. Estimated Hectares Needed to Generate the Benefit Stream given medium range yield estimate

Year	Cassava	Maize	Legumes
1	0	0	0
2	0	0	0
3	0	0	0
4	322	226	147
5	515	361	235
6	644	451	294
7	837	587	382
8	1480	1038	676
9	3218	2256	1471
10	6757	4738	3088
11	12550	8800	5735
12	15767	11056	7206
13	18342	12861	8382
14	20272	14215	9265
15	21559	15117	9853
16	22202	15569	10147
17	22847	16020	10441
18	23168	16245	10588
19	23168	16245	10588
20	23168	16245	10588

Table 9. Estimated Hectares Needed to Generate the Benefit Stream given low level yield estimates

Year	Cassava	Maize	Legumes
1	0	0	0
2	0	0	0
3	0	0	0
4	536	451	245
5	858	722	392
6	1073	903	490
7	1394	1173	637
8	2467	2076	1127
9	5363	4513	2451
10	11262	9477	5147
11	20916	17599	9559
12	26279	22112	12010
13	30569	25722	13971
14	33787	28430	15441
15	35932	30235	16422
16	37004	31137	16912
17	38078	32040	17402
18	38614	32490	17647
19	38614	32490	17647
20	38614	32490	17647

Table 10. Estimated Hectares Needed to Generate the Benefit Stream given high level estimates

Year	Cassava	Maize	Legumes
1	0	0	0
2	0	0	0
3	0	0	0
4	230	113	123
5	368	181	196
6	460	226	245
7	598	293	319
8	1057	519	564
9	2298	1128	1225
10	4827	2369	2574
11	8964	4400	4779
12	11262	5528	6005
13	13101	6431	6985
14	14480	7107	7721
15	15400	7559	8211
16	15859	7784	8456
17	16319	8010	8701
18	16549	8123	8824
19	16549	8123	8824
20	16549	8123	8824

Table 11. Number of Farm Families Needed to Generate the Benefit Stream given medium yield level estimates

Years	Farm Families		
	Cassava	Maize	Legumes
1	0	0	0
2	0	0	0
3	0	0	0
4	460	226	735
5	736	361	1176
6	919	451	1471
7	1195	587	1912
8	2115	1038	3382
9	4597	2256	7353
10	9653	4738	15441
11	17928	8800	28676
12	22525	11506	36029
13	26202	12861	41912
14	28960	14215	46324
15	30799	15117	49265
16	31719	15569	50735
17	32638	16020	52206
18	33098	16245	52941
19	33098	16245	52941
20	33098	16245	52941

Table 12. Number of Farm Families Needed to Generate the Benefit Stream with low level yield estimates

Year	Cassava	Maize	Legume
1	0	0	0
2	0	0	0
3	0	0	0
4	766	451	1225
5	1226	722	1961
6	1532	903	2451
7	1992	1173	3186
8	3524	2076	5637
9	7661	4513	12255
10	16089	9477	25735
11	29880	17599	47794
12	37541	22112	60049
13	43670	25722	69853
14	48267	28430	77206
15	51332	30235	82108
16	52864	31137	84559
17	54397	32040	87010
18	55163	32491	88235
19	55163	32491	88235
20	55163	32491	88235

Table 13. Number of Farm Families Needed to Generate the Benefit Stream with high level yield estimates

Year	Cassava	Maize	Legume
1	0	0	0
2	0	0	0
3	0	0	0
4	328	113	613
5	525	181	980
6	657	226	1225
7	854	293	1593
8	1510	519	2819
9	3283	1128	6127
10	6895	2369	12868
11	12806	4400	23897
12	16089	5528	30025
13	18716	6431	34926
14	20686	7107	38603
15	21999	7559	41054
16	22656	7784	42279
17	23313	8010	43505
18	23641	8123	44118
19	23641	8123	44118
20	23641	8123	44118

Table 14 Data for Economic Analysis of Training Component ($000)

Year	Training Costs*	Net Benefits: Increased Value of Human Capital	Discounted Costs	Total Discounted Benefits
1	468.2	0	390.67	0
2	1081.2	78.0	750.83	54.17
3	1306.4	176.0	756.02	101.85
4	1032.2	370.6	497.78	178.72
5	557.8	1345.8	224.17	540.85
6	289.8	1629.6	97.05	545.75
7	712.6	1638.6	198.87	457.30
8	1101.2	1736.6	256.10	403.88
9	1274.4	1911.2	246.99	370.40
10	1004.2	2866.4	162.18	462.94
11	513.8	3170.2	69.15	426.67
12	0	3234.2	0	362.74
13	0	3229.2	0	301.81
14	0	3229.2	0	251.51
15	0	3229.2	0	209.59
16	0	3229.2	0	174.66
17	0	3229.2	0	145.55
18	0	3229.2	0	121.29
19	0	3229.2	0	101.08
20	0	3229.2	0	84.23
			3649.81	5295.0

Internal Rate of Return - 29%

Benefit/Cost Ratio at 20 percent - 1.45

Discount Rate - 20%

*GOZ contributions is converted to dollars at the rate of 225 - $1.

Table 15 Value of Benefits from PhD Training ($000)

	Replacement of Ex-Patriate		Additional Personnel		Total	
Year	Number of Graduates	Total Value (1)	Number of Graduates (2)	Value	Qty.	Value
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	4	20	4	20
5	2	131.2	6	30	12	495.6
	4	334.2				
6	6	465.6	9	45	16	594.2
	1	83.6				
7	7	549.2	8 (3)	40	15	589.2
8	7	549.2	8	40	15	589.2
9	7	549.2	8	40	15	589.2
10	7	549.2	6	30	19	1044.8
	2	131.2				
	4	334.4				
11	13	1014.8	13	65	27	1163.4
	1	83.6				
12	14	1098.4	17	85	31	1183.4
13	14	1098.4	16 (3)	80	30	1178.4
14	14	1098.4	16	80	30	1178.4
15	14	1098.4	16	80	30	1178.4
16	14	1098.4	16	80	30	1178.4
17	14	1098.4	16	80	30	1178.4
18	14	1098.4	16	80	30	1178.4
19	14	1098.4	16	80	30	1178.4
20	14	1098.4	16	80	30	1178.4

(1) Unit value varies according to the staff position being replaced.

(2) Unit value - $5,000/year

(3) Attrition rate is assumed to be 1 person after 5 years

Table 16 Value of Benefits from MS training ($000)

	Replacement of Expatriates		Additional Personnel		Total	
Year	Number of Graduates	Total Value (1)	Number of Graduates	Value (2)	Quantity	Value
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	6	30	6	30
4	1	83.6	11	55	12	138.6
5	2	167.2	11	55	18	574.2
	2	155.2				
	3	196.8				
6	7	519.2	11	55	20	705.4
	2	131.2				
7	9	650.4	9 (3)	45	18	695.4
8	9	650.4	15	75	24	725.4
9	9	650.4	20	100	30	834.0
	1	83.6				
10	10	734.0	20	100	36	1269.6
	1	83.6				
	2	155.2				
	3	196.8				
11	16	1169.6	20	100	38	1400.8
	2	131.2				
12	18	1300.8	18 (3)	90	36	1390.8
13	18	1300.8	18	90	36	1390.8
14	18	1300.8	18	90	36	1390.8
15	18	1300.8	18	90	36	1390.8
16	18	1300.8	18	90	36	1390.8
17	18	1300.8	18	90	36	1390.8
18	18	1300.8	18	90	36	1390.8
19	18	1300:8	18	90	36	1390.8
20	18	1300.8	18	90	36	1390.8

(1) Unit value varies according to the staff position being replaced

(2) Unit value - $5,000 per year

(3) Attrition rate is assumed to be 2 people after 5 years

Table 17

Value of Benefits from Short-term and CPU team Training ($000)

Year	Number of Graduates	Total Value*
1	0	0
2	16	24
3	25	30
4	33	50
5	40	60
6	40	60
7	56	84
8	65	98
9	73	110
10	80	120
11	80	120
12	80	120
13	80	120
14	80	120
15	80	120
16	80	120
17	80	120
18	80	120
19	80	120
20	80	120

*Unit value is $1500 per year.

Table 18

Value of Benefits from Technical Training ($000)

Year	Number of Graduates	Total Value*
1	0	0
2	54	54
3	108	108
4	162	162
5	216	216
6	270	270
7	270	270
8	324	324
9	378	378
10	432	432
11	486	486
12	540	540
13	540	540
14	540	540
15	540	540
16	540	540
17	540	540
18	540	540
19	540	540
20	540	540

*Unit value is $1,000 per year

Table 19 Costs and Benefits for Total Project ($000)

Year	Total Costs* (including training)	Total Value of Benefits (Increased output & Human capital)	Total Disct'd Costs	Total Disct'd Benefits
1	1390.8	0	1159.00	0
2	3753.2	78.0	2606.39	54.17
3	4245.4	176.0	2456.83	101.85
4	4513.2	620.6	2176.50	299.29
5	4245.8	1745.8	1706.29	701.60
6	2699.8	2129.6	904.16	713.20
7	3384.6	2288.6	944.58	638.71
8	4040.2	2886.6	939.62	671.33
9	4755.4	4411.2	921.63	854.92
10	4692.2	8116.4	757.82	1310.84
11	2923.8	12920.2	393.51	1738.90
12	1096.0	15484.2	122.92	1736.66
13	1096.0	17479.2	102.44	1633.67
14	1096.0	18979.2	85.36	1478.22
15	1096.0	19979.2	71.14	1296.76
16	1096.0	20479.2	59.28	1107.68
17	1096.0	20979.2	49.40	945.60
18	1096.0	21229.2	41.17	797.39
19	1096.0	21229.2	34.31	664.49
20	1096.0	21229.2	28.59	553.74
			15560.94	17299.02

Internal Rate of Return: 21%

Benefit/Cost Ratio at 20 percent discount rate: 1.11

30% contribution is converted at the rate of Z25 - $1.

ANNEX I

Administrative Analysis

A. Organization:

1. Legal status:

The project will be an entity of the Agronomic Research, Information and Training Division of the Service d'Etude et de Planification of the Department of Agriculture and Rural Development.

2. Financial status:

At the outset, the project will be financed by the following sources:

a. The national budget:

(1) Pro rata share of the Division of Research, Information and Training budget line item.

(2) The National Maize Program budget line item.

(3) The National Manioc Program budget line item.

(4) The National Legume Program budget line item.

b. PL PL480 Title 1 counterpart funds

c. The National Economic Development Fund

d. GOZ contributions in kind

e. USG grant for expatriate advisors, foreign training and imported commodities.

As early as it is administratively feasible, the contributions from the national programs will be consolidated into a single budget line item for the project. The total local currency financing, consisting of GOZ budget line items and PL-480 counterpart funds, will then be reallocated to the operational entitites--each of the research stations and sub-stations, the FSR unit, the outreach/extension unit and the Director/Coordinators' office. The resources provided by AID foreign exchange grant will be allocated by the Director/Coordinator in consultation with the station directors, the FSR unit director and the outreach/extension unit director.

3. Organization:

The project would be organized as follows:

a. Central office:

(1) Central coordinating committee: A central coordinating committee which would respond through the chief of the Division of Research, Information and Training to the director of the Bureau of Studies and Projects The committee would include the following officers:

Ex-office chairman: Chief of the Division Research, Information and Training.

Member: National project coordinator.

Member: Director of PNM.

Member: Director of PRONAM.

Member: Director of PNL.

Member: Directors of other national programs as they are incorporated into the project.

(2) Office of project coordination: The office of the project coodinator will be staffed by a Zairian coordinator and an expatriate coordinator counterpart. They will be assisted by Zairian and expatriate counterpart deputies in charge of management.

(3) Administratve and clerical unit: The central office will have a personnel, administrative and clerical staff, including a personnel administrative officer, clerks, typists and other administrative service persons as needed.

(4) Financial management and accounting unit: The project will employ a financial controller or contract out financial management and control to a private, public accounting firm.

(5) Public Relations and Information Unit: This unit will be responsible for all public relations and information including technical publications reproduction and the project library.

(6) Procurement and logistics support unit: This unit will be responsible for all project procurement and logistical support.

(7) Support Services Unit: This unit will be a responsible for all housing, travel, etc. support to the project.

(8) Farming systems research team: The national coordinating office will include a farming systems research team representing the following disciplines:

(a) agronomy

(b) agricultural economics (production)

(c) rural sociology or social anthropology

(d) agricultural extension (ex-office)

(9) Outreach: The project will provide three Zairians representing the disciplines of agricultural extension methods. This activity would activate certain elements of information and training of the Divison of Research, Information and Training.

b. Regional services:

(1) Research teams, headed by station directors, will be based at three main stations, each with administrative and maintenance support.

(2) One Outreach team, each headed by a regional agricultural services director, will be based at each of the three principal project areas or regions, with administrative and support staff. Where possible, the outreach team will be stationed at the research station to facilitate logistic support.

(3) At the option of the office of coordination, two of the three disciplinary groups of the farming systems research team will be located in the region selected to implement farming systems research.

c. Technical Supporting services:

Plant pathology, plant breeding, entomology and agronomy/soil fertility support personnel will be assigned to individual stations as a function of the workload.

d. Zairian-counterpart mix:

Each principal position would be staffed by three, four or more senior grade Zairian officers and one contract, expatriate advisor, as follows:

Position	Zairian Officer	Contract Counterpart*
Coordinator or Director	1	1
Deputy for Management	1	1
Maintenance, Farm Management	3 or more	1
Agronomy FSR	3	1
Agricultural Economics	3	1
Social anthropology	3	1
Agronomy (general)	4 or more	1
Agronomy (soil fertility)	4 or more	1
Plant breeding (maize)	4 or more	1
Plant breeding (grain legumes)	4 or more	1
Entomology	4 or more	1
Plant pathology	4 or more	1
Outreach - national	1	1
Outreach - regional	3 or more	1

* All positions will not be filled concurrently. The maximum number filled at any one time will be 15 during the 2nd year. This will drop to 13 during years 4, 5 and 6.

B. Management:

1. Delegation of authority to the project:

(1) Authority to operate: Most of the experiment station research conducted by the preceding projects was at INERA stations. Until November 1982, INERA was part of the Department of Agriculture. In 1982 a statute was enacted that assigned the responsibility for all research to the Department of Scientific Research (DSR). This act transferred all INERA properties to the DSR. In discussions between USAID, the DSR, and the DOA, the DSR has indicated that it expects applied research to be carried out by the Department concerned (DOA in the case of agricultural research) while the DSR itself will play a research policy role. In July 1983, the GOZ Executive Council met to consider the question of research station facility support for agricultural research. The Council decided that in the case of the national food crop research programs, those programs themselves would be in charge of the stations at which their research was based.

(2) Aggregation of budget line items : Whereas in the preceding projects each national program pursued its objectives independently of

all others, this project calls for integration at all levels of the national programs and their research and outreach linkages. A coordinating committee, which will include the national program directors, will agree on the distribution of their respective personnel in the regional programs. Each will agree further that an employee of one program could be assigned by the regional directors to support any other national program included in the project (the plant breeders, a highly specialized profession, will be exempted).

2. Delegation of authority within the project:

The project coordinator, with superior approval if needed, will establish a succession of officers in the national coordinating office to act in his absence or for his convenience.

The point of reference for planning and budgeting will be the integrated programs. And the point of delegation will be the station and region. To begin the process, the regional services (research and outreach) will submit annual plans (regional program) and budgets. Once they are approved by the central coordinating office and the central budgeting system, the funds will become available for disbursement. The project coordinator will then delegate the authority to each regional director and each outreach director to disburse against his own approved budget items.

Authority for plan changes, travel, leave, and so on would follow the above pattern of delegation.

3. Experience and capability of managers:

The chief of the DOA Division of Research, Information and Training actively participated in the project design, demonstrating a high level of competence in organizing, negotiating and expediting. The directors and deputy directors of PRONAM, PNM and PNL, all participated in the project design, proving to be capable managers. The GOZ has assured the project design officers that a capable project coordinator and able managers will be assigned to the project. Since second level managers have not experienced the volume of activity required by the project, it is recommended that the project provide an

experienced expatriate deputy manager and an experienced expatriate farm manager and maintenance officer.

C. Issue: The Delegation of Research Property and the Reorganization of Agricultural Research:

The lack of a long-term arrangement for the control of research property is clearly not be conducive to institutional development. Thus, the establishment of a national organization for agricultural research in Zaire cannot be accomplished without dealing with the future of INERA. The GOZ can ill afford the coexistence of two separate approaches to agricultural research. INERA continues an inappropriate role essentially defined by its colonial predecessor agency (INEAC) while the national commodity programs operate independently with very loose and no formal linkages between them.

INERA, a semi-autonomous body under the DOA until November 1982, has functioned almost entirely independently of the DOA, although until 1983, at least, its budget came through the DOA. The status of INERA under the DSR remains to be clarified. In the 1983 DOA budget, INERA accounted for almost 25 percent of the total GOZ resources allocated to agriculture (approximately Z237 million). Yet the amount of effective, applied research being done by INERA is minimal. The budget, much of which is never made available, is required largely to pay salaries and wages (about 80 percent) and the remainder is used for minimal maintenance of physical facilities and maintenance of genetic materials which date mostly to pre-1960. Some limited production of "foundation" seed is carried out.

Since 1972, the DOA, recognizing the need for applied research in support of its programs for food self-sufficiency, and the inability of INERA, as currently constituted, to respond to this need launched the first national commodity program (Programme Nationale Sectoriale) of which there are now five. These programs are largely financed by external assistance. The coexistence of these two research programs results in serious inefficiency in use of capital, land and equipment, financial resources, and probably even more serious, available human resources.

Now that the GOZ has moved to place all research under DSR and the future relationship of the technical departments and the DSR is yet to be defined, it seems appropriate to undertake a structural reorganization of the agricultura research system in Zaire.

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It is clear that the impact of the decree establishing the DSR and placing all research under that department has not received much thought or study by the several departments nor at the higher levels of government. In our discussions at several levels, including that of the agricultural advisors in the Presidency and the Prime Minister's Cabinet, there was expressed a strong desire for suggestions on how to define operational structures and interdepartmental relationships.

This unsettled state has important implications for this project, insofar as the definition of the institutional relationships are concerned. There appear to be five options which could be considered.

1. Postpone initiation of the project until the GOZ has sorted out the interdepartmental relationship.
2. Establish the project within the DOA as the cooperating and responsible department of the GOZ.
3. Establish the project within the DSR as the cooperating and responsible department of the GOZ.
4. Adopt an interim approach in which the project is established in the DOA as a temporary measure while the respective responsibilities of the two departments are resolved and interdepartmental relationships are defined.
5. Same as 4, however, with an additional proviso which would insist on a dispassionate study of the existing agricultural research structures with the objective of formulating recommendations for a national organization which can be responsive to current and changing needs of the country and at a reasonable cost.

Option 1 is clearly not acceptable because of the risk of indefinite delays.

Option 5 permits the project as originally conceived to move forward with little risk of provoking a confrontation between DOA and DSR, while providing for an approach to the solution of the INERA problem. Indeed, an official notice from the July 15, 1983 meeting of the Consul Executive supports this option.

The project, in addition to supporting applied crops research, FSR and outreach elements initially included in the PID, will provide some support for

the study proposed in option 5. Preferably, the study would be done under the guidance of ISNAR to avoid biases which are inevitably attached to bilateral programs. The World Bank has recognized the need for such a study and could possibly participate as a follow-up to the recommendation of the Paris meeting of the sub-Consultative Group on Agriculture.

The undertaking proposed is clearly within the mandate of ISNAR. The World Bank has collaborated with ISNAR on similar projects. AID has also established collaborative relations with ISNAR, although for projects of a somewhat different nature.

The study would involve a short-term team (for two months-one month in the beginning of the 4 month study and one month at the end) of two or three persons working closely with several Zairian experts from several institutions including DSR, DOA, INERA and possibly a representative from the Prime Minister's office. The group would provide an in-depth analysis of existing agricultural research structures and programs, propose a structure for a research organization, including proposals for use and/or disposition of INERA facilities, and project short to medium term administrative, technical and financial requirements for implementing the proposed reorganization.

Follow-up assistance would be needed for refining the proposals and for dealing with the practical steps of its implementation, assuming the principal elements are accepted by government.

In addition to the foreign exchange costs, an allocation of counterpart funds would be needed to defray costs of national professionals' local travel, clerical and logistical support.

ISNAR would be expected to field the consultant team leader in the original team. USAID would fund two consultants and provide the necessary local currency.

World Bank participation could include providing short term consultancies.

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ANNEX J

AGRONOMIC RESEARCH IN ZAIRE

Pierre P. Antoine*

June 1983

I. Background:

Before independence, most of the activities of agricultural research in Zaire were under the authority of INEAC and were carried out in a network of over 30 research stations located throughout the country in representative agroecological zones. In the 1950's, INEAC employed several hundred well-qualified agricultural scientists. With the exception of the Yangambi station (where INEAC headquarters were located), research had an applied orientation and focused mainly, but not exclusively, on perennial crops and cotton. It is important to note that before 1960, with the low levels of urban population of that period, food production did not constitute a major problem in the country, being generally sufficient to meet the needs of the population.

The Yangambi station, internationally known as one of the best centers of tropical agriculture, was the major station of the network and was carrying out ambitious programs of basic research in climatology, ecology, botany and soil science in addition to its programs on perennial crops, mostly coffee, cocoa, oil palm and rubber. (The Arabusta cross variety of coffee was developed in Yangambi.)

With the advent of independence, the country inherited the vast network of INEAC research stations; however, due to the difficult times of the young republic in the 1960's, many scientists left Zaire, and despite serious attempts to maintain sound research programs and to support INERA (the Zairian "successor" of INEAC), material, financial and human constraints became increasingly serious and few research objectives were eventually met.

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II. THE PRESENT SITUATION:

A. Agencies or Organizations Responsible for Agricultural Research Programs in Zaire: Mandate and Achievements:

Today, various agencies or organizations are carrying out agricultural research in the country:

1. INERA (Department of Scientific Research):

Programs: INERA, which inherited the complex infrastructure lef by INEAC, still operates about twenty research stations in the country. Most of them have deteriorated and for various reasons are no longer capable of pursuing any sizeable research program. Production rather than research has become the major activity of many of the stations.

Among the limited research activities, one can cite variety trials with rice, soybeans, peanuts, and some legumes and the relative maintenance of genetic material in rice, oil palm, coffee and cocoa. INERA also produces basic seed stocks of corn, rice and cassava.

Constraints: INERA has acquired the reputation of being incapable of meeting major research objectives. There are numerous reasons for this, and each one of the following constraints is probably sufficient in itself to paralyze INERA:

a. The lack of financial resources (operating and investmen budgets, foreign currency):

Although INERA receives a substantial operating budget, as compared to other research or development institutions in the country, the money received is totally insufficient to meet the needs of the present network. In the pas five years over 75 percent of the budget has generally been used to just cove salaries. As a result, maintenance of the present infrastructure and equipment is very poor and there is a slow but steady deterioration of all th facilities, houses, and equipment.

Since the investment budget allocated to INERA is practically nil, used and obsolete equipment can not be replaced and no new buildings can be constructed.

Finally, the lack of foreign currency creates severe problems. It is not unusual that some motors (e.g., electric generators) remain inactive for months or years, due to the lack of spare parts.

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b. The giant size of the network of stations:

INEAC was operating a network of stations with budgets fifty to one hundred times superior to the actual budget of INERA. Yet, INERA is trying to manage about 20 research stations without the appropriate means. Since most stations remain unchanged in size, they each require a maintenance effort that INERA can ill-afford.

c. The very large number of employees:

The size of most stations, requiring the above-mentioned maintenance work and the reluctance of the administration to reduce the number of employees (mostly for social reasons), explain why a major part of the operating budget is used for salaries.

d. The lack of well qualified and experienced research scientists.

INERA employs about forty research scientists for its entire operation (ingenieurs agronomes). Few of them hold a foreign graduate degree (2 Ph.D's and 2 or 3 M.S.'s). Many of the scientists are not directly involved in research activities, but rather, are used in administrtive work or contribute to the production activities of the various stations.

e. The isolation of most stations and the lack of modern facilities:

The quality of roads in Zaire has gradually declined during the 1970's and, as a result, stations which were once of easy access are now isolated, especially during the rainy seasons. Since, unfortunately, INEAC did not build any station close to a metropolis, the problem of isolation presently plagues almost every site of the network, including Yangambi (the only real exception to this is the station of Mulungu, located a few miles from Bukavu).

In addition, very few stations can offer the advantages of modern life, water and electricity and even if they have the proper electricity installations, only a few hours of electricity are available daily, due to the lack of operating budgets.

Under those conditions, it is easy to understand that the recruiting of qualified research personnel (nationals and expatriates) is a difficult task.

f. The weaknesses of the administrative structure and the lack of realism of some programs:

Administrative procedures (planning, evaluation, budgeting) of INERA is very weak. There is generally little coordination with the ministries responsible for funding research, or with implementing agricultural development. (See later section.) Project formulation and research discipline are largely ignored. Despite the gigantic size of the present network as compared to the available budgets, INERA has made little effort to restructure its organization and bring it to manageable proportions.

Conclusions:

INERA has lost much scientific credibility. Most international development agencies and many local officials feel that unless it is completely overhauled and restructured, agricultural research will have to be carried out through other structures or organizations.

2. The "National Programs" (Department of Agriculture):

National programs are "commodity" or "single objective" oriented and are generally supported by international cooperation agencies who see in the programs the possibility of addressing the major priorities of the country and doing more efficient work.

The National Programs do not constitute a solid institutional base. Official links with INERA (in charge of many stations used by the programs) are very loosely defined. Moreover, National Programs generally contain an outreach or extension component in addition to the research objective.

There are presently five national programs in the country:

PNM: National Maize Program, with the support or cooperation of USAID and CIMMYT;

PRONAM: National Cassava Program, with the support or cooperation of USAID;

PNL: National Legume Program, with the support of USAID;

PNR: National Rice Program, with the support of the Chinese Government;

PNE: National Fertilizer Program, with the support and cooperation of AGCD (Belgium) and FAO.

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Constraints:

As mentioned above, "National" programs and INERA programs sometimes take place at the same stations using the same equipment and personnel. Despite that, there is no written contract or memorandum of understanding between the organizations, a situation conducive to personal conflicts, jealousy, interferences, conflicting orders.

a. The isolation of most stations and the lack of modern facilities:

This constraint is valid as well for INERA as for National Programs. Of all the stations used by the programs, only Mulungu can offer modern facilities and proximity to a major city. However, even in the case of Mulungu, the closing of the Bukavu airport applies much pressure on the program and may eventually jeopardize its overall objectives.

b. The lack of well qualified and experienced personnel:

Like in the case of INERA, the Programs employ relatively few local research scientists with the desired experience and qualifications. Although a major effort is placed on the graduate level training of Zairians, results are slow to come, for a large number of the trainees either do not return to their posts or leave after a few years in the Program.

c. The insufficient financial resources:

Although less severe than for INERA, limited financial resources render progress very slow, and programs are fequently paralyzed, contributing to discouragement among personnel. Lack of investment budgets make the modernization of equipment and stations very difficult.

d. The limited scope of the programs and the lack of a clearly defined authority over the programs:

These specific problems are discussed in the following section (B) and the next chapter.

3. The Institute of Agriculture: IPA-Yangambi (Department of Higher Education, DHE):

IPA Yangambi is the only superior level Agricultural Institute in Zaire. It grants the degree of "Ingénieur Agronome" at the end of a five year program. In the past few years, the number of graduates has been about fifty per year.

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The Institute was transferred from Kinshasa to Yangambi in 1973 and was granted a substantial part of the infrastructure of the INERA Research Station of Yangambi (no formal contract is available, however).

Although IFA is an academic institution under the authority of the DHE, with teaching as its major mandate, it is considered by many as having more potential to carry out agricultural research than any other organization in the country. The major reason for this is the high number of well-trained scientists who compose the staff of IFA (about 12 permanent professors with the Ph.D. or equivalent degree and 15 to 20 assistants with an "Ingénieur Agronome" degree). In no other place in the country does one find such a critical mass of agricultural scientists.

Conscious of the presence of IFA staff next to the INERA station and aware of the national significance and past research achievements of the Yangambi Center, the Zairian Government and numerous bilateral or multilateral cooperation agencies have attempted to contribute to the development of the site and to enable the scientific community to make a contribution to the national research goals. So far, there has been too little coordination of support between the various cooperation agencies, while the Zairian Government has not been in a position to dramatically improve the material and psychological conditions for the community. As a result, the staff is discouraged, and almost no research work is taking place at IFA.

Major Constraints:

The constraints plaguing IFA are essentially those mentioned earlier for INERA, excepting for the presence of a critical mass of well-trained scientists.

a. Isolation of the site:

During the major part of the year, roads are in a very poor condition and the only possible means of transportation to Kisangani is by truck or Land

Rover. Since IFA and INERA have a very limited number of such vehicles, the population is virtually isolated in Yangambi.

b. Lack of water and electricity:

There is no water network and most cisterns are heavily polluted (nematodes, protozoa). Electricity is theoretically available but with the almost non-existent operating budgets, the generators function for 3 to 6 hours a day only. The lack of water and electricity in laboratories makes the implementation of research programs a difficult task.

c. Insufficient financial resources:

To function normally, IFA would require budgets between 5 and 10 times the amount presently allocated. At present, the quality of education is in jeopardy (lack of chemicals, impossibility of making field trips) and the institution is plagued with debts and is virtually bankrupt.

d. Psychological pressure:

Given the above constraints, the staff is discouraged and wishes IFA to be transferred to another part of the country. Most of them, on a personal basis, also contemplate a transfer to other campuses where social and family life can be easier and professional activities more rewarding.

4. IRAZ (Research Institute for Agronomy and Animal Sciences):

Recently created, the Research Institute for Agronomy and Animal Sciences is supposed to be the agricultural research coordinating body for the Great Lake Community (Zaire, Rwanda, Burundi). However, due to a serious lack of financial resources, insufficient manpower and little coordination between the three countries, IRAZ is not in a position to contribute to agricultural research in Zaire.

5. Miscellaneous:

Among the other organizations potentially involved in agricultural research or in closely related research work (ecology, botany, wildlife), are the three universities of Kinshasa, Lubumbashi and Kisangani, and the Regional Nuclear Energy Center of Kinshasa (CREN-K).

6. Conclusions:

The present situation of research in Zaire cannot call for overwhelming optimism, to say the least. Except for some minor work and the maintenance of some genetic stock, INERA does not function as a research organization. Despite its considerable potential, IFA staff barely manages to direct limited work done by the students ("theses"). Only National Programs can claim some contribution to research, because they are better supported by external donors, better financed and easier to manage. However, as will be discussed later, the positive results of National Programs cannot hide the deficiencies elsewhere and the need for complementary types of research activities.

B. Authority (tutelle) over agricultural research programs in Zaire.

1. Introduction:

As mentioned earlier, the 3 major institutions actively or potentially responsible for agricultural research in Zaire are in different government departments. The new Ordinance Law of November 5, 1982, created the Department of Scientific Research (DSR). This new Department is officially responsible for all activities of agricultural research in the country and has direct authority over INERA.

The situation concerning the "National Programs" and the Institute of Agriculture (IFA/Yangambi) is less clear, and has been the subject of many interpretations. Theoretically, the DSR has the authority over the National Programs, insofar as those programs are concerned with research. However, National Programs have been created to constitute one of the major vehicles of agricultural development and since they also contain some key objectives linked with extension work, the present status remains uncertain. Until now, no text has been released concerning the modalities of application of the statute. A similar uncertainty exists with IFA, since much of the research (or potential research) conducted in that institution can be considered a teaching tool.

2. Critical issues related to the authority over agricultural research

a. What is the composition of the committees selected to define national priorities, research goals, and to do the evaluations?

b. What are the official linkages between INERA and the National Programs when there is an input from both the DOA and the DSR? Specifically, what are the DOA contracts with INERA and the DSR when National Programs use INERA land, equipment, facilities and personnel?

c. Who prepares the research budgets and controls the finances?

d. Who introduces the research programs to the Executive Council?

e. Who has the overall authority over the National Programs?

f. What is the authority of DSR over the research conducted by professors of the University and IFA?

g. Can the Technical Departments implement research programs? How? What is the nature of their mandate?

III. Critical issues to be resolved in Agricultural Research:

As seen in Chapter II, constraints and limitations are such that little agricultural research work is presently being done in Zaire, especially outside of the "National Programs". There is also a severe lack of coordination between various programs and an almost total absence of overall definition of specific objectives on research needs and programs, and the institutionalization of research.

During the past few years, with the realization that the overhaul of INERA was a most difficult task (for a variety of reasons, including historical and social arguments), attempts were made to bypass and ignore the INERA problem and to create single commodity oriented programs placed under an authority other than INERA. Experience indicates that these attempts yielded some positive results and could at least address part of the most pressing needs of the country in the area of food production.

However, commodity oriented programs alone cannot resolve the problems of agriculture in the country because they are too specific and cannot cover all the important areas of necessary investigative agricultural work, especially seen from the standpoint of basic research or even farming systems research.

Whatever the present success of National Programs is, it remains necessary to prepare for a step further and to prolong the effort aimed at establishing a system that can answer most of the major agricultural needs of the country.

Seen from that perspective, and to guarantee the efficiency of the global system, it becomes necessary to resolve the following issues:

1)Definition of a course of aciton for the preparation of a reorganization project for agricultural research in Zaire, by a clearly defined authoirty mandated for that purpose.

This authority would have the capacity to review all the research programs and activities and to coordinate the planning, programing, financing, and evaluation of research in light of the national priorities. This authority would appoint and supervise various committees who could make the necessary proposals and recommendations as approppriate (programming, planning, budgeting, synthesis, evaluation, coordination...).

As seen earlier, the situation remains very unclear concerning the respective roles and responsibilities of the departments of Scientific Research (DSR), and the Technical Departments, e.g. Agriculture , Higher Education and Environment, in the area of research. Clearly, the DSR has the official authority since the statute of November, 1982, but it would be unrealistic not to associate at least the DOA (and the DHE in the case of IFA) in the planning and implementation process.

However, so fat no body or committee has been set up to study the necessary linkages and provide the necessary coordination.

The DSR does not have the capacity (manpower) nor the agricultural expertise to implement these functions alone. On the other hand, the present INERA, which has become an institution of research, among others, is too plagued with its own problems and needs for internal reorganization to be in a position to efficiently assume the overall role of the needed authority. Indeed, there must be an authority above INERA to enforce the necessary reorganization of that institution in light of the potential contribution to research by the various agencies and institutions in the country. It is also that authority which will eventually be responsible for the major reorganization of not only INERA, but of the entire system which will design the global master plan for research.

2) Once the authority is in place, the composition of committees established and the terms of reference of their mandate clear, attention would focus on the definition of national priorities, the planning of research programs, and the mechanisms of evaluation of research activities.

The definition of priorities and programs made by the appropriate committee will:

- take into account the major political options and goals selected by the Government (self-sufficiency...)

- take into account the desires of the rural population and their interest or ability to accept and adapt to agricultural innovations, new cultural practices, varieties (A realistic estimate of the chances of acceptance of research results by the farmers and the consumers will be made)

- take into account the relative importance of the problems as they are perceived by the scientists, businessmen, politicians, farmers and consumers to make sure that none of these groups is favored at the expense of others and that a valid and realistic compromise is reached.

3) Besides the planning and programming of research programs, a strategy and selection of systems of approach to research must be made: It is essential that the programming of research will rest on different systems of approach and that the proposed overall program will not be short-sighted. In this context comes the frequently cited "dichotomy" between basic research and applied research, which has not always been very well understood in Zaire and which has been widely used by various officials for a multitude of reasons to justify their policies or their priorities.

Basically, agricultural research tends to resolve problems of agricultural production by means of various scientific tools and approaches. Strictly speaking, there is therefore little basic research in the agricultural sector. However, one can consider "basic research" investigations which contribute to better scientific understanding of mechanisms and processes which regulate plant and animal growth, the evolution of landscapes and the equilibria between climate, soils, plants and animals. "Applied research" in this context can then be defined as adapting the mechanisms and processes to resolve specific problems. Needless to say, both

"basic" and "applied" research are essential and complementary. Deliberately favoring one at the expense of the other can have detrimental effects on long-term goals.

A master plan for research at the national level will also include facets of "exploratory" or "prospective" as well as of "preventive" research, an insurance against the unexpected.

At present, there are two main systems of approach for agricultural research in Zaire. The first system corresponds rather closely to the INERA structure and emphasizes work on various crops and themes in different ecological zones. The second system of approach is that of National Programs, concentrating on one crop (commodity) or theme on a countrywide basis (cassava, corn, fertilizers...). It has been shown that given the present situation in Zaire and the gigantic constraints plaguing INERA, National Programs represent a more realistic approach for the time being. However, a global master plan and strategy for research cannot restrict themselves exclusively to the commodity oriented approach. Given the proper opportunities, a realistic balance would be to combine the systems of approach along three main lines:

- approach by "commodity" or "theme", like in the case of National Programs, e.g. rice, cassava, fertilizers, in which the commodity is the program.

- approach by "scientific field", aimed at providing basic information on soil fertility, inventory of natural resources...

- approach by "farming systems" in which multidisciplinary teams tackle problems of development in the rural world, involving the farmers themselves and analyzing the potential for acceptance of new technology and practices by the local population.

4) Another major critical issue has been the lack of a clear definition of equivalences of statutes for the research personnel among different departments or institutions. Until now, better salaries and higher social prestige have been on the side of the university staff. This probably explains the disparity between the number of Zairian personnel holding graduate degrees at INERA, IFA and National Programs. The development of an

efficient global program of agricultural research must therefore be preceded by the definition of equivalent attractive, statutes for the personnel of each organization.

5) Programming, planning and defining respective duties and responsibilities are futile exercises if financial resources are not allocated in sufficient amounts to each organization holding a mandate. Similarly, there is a need to provide sufficient financial autonomy and management flexibility to the research entities.

Financial support (operating and investment budgets) has been well below the minimum requirements in the past few years despite the rather high sums given to INERA, expressed in relative terms (IFA, on the other hand, did not receive any research subsidy from the DOA nor the DHE in 1982). A rationale must be developed that shows the return that can be expected from research, both in economic and in social terms. Without such a rationale, there is a serious danger that financial requests will never be fully accepted and that research will remain at a standstill.

6) Justification of research needs, however persuasive, probably have little chance to result in major support from the Government and most cooperation agencies if a deep reorganization of the research system and of the individual institutions engaged in research does not take place. More than one option exists for that reorganization and numerous proposals have been written on the subject. The steps to be taken may be as follows:

a) Step 1: The establishment of structural links and a definition of the major rights, responsibilities and duties of the various institutions engaged in research. At present, there are no structural links nor any organizational structure of any kind in agricultural research in Zaire. INERA is in the DSR, IFA in the DHE and National Programs in the DOA. These institutions work independently and despite the fact that they coexist and share facilities in many stations, no formal agreement nor contract exists between them. Numerous difficulties have arisen in the

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past, due to this unclear situation. A proper definition of rights, responsibilities, and duties will therefore include:

- the definition of the mandate of each organization and its responsibilities in the field of research:
  What is the exact scope of work of INERA, National Programs, IFA and other institutions?
- the official definition of the respective rights on land, infrastructure, equipment and personnel when there is some overlapping between various programs or projects in any given sight. Are these rights established on a permanent basis? Renewable? Associated only with the life of a specific project?

b) Step 2: Internal reorganization of each institution in light of the course of action and programming decisions proposed by the various committees, the national priorities, the financing available and the official mandate of each institution (comments will only consider the 3 major institutions engaged in research):

-INERA

As seen earlier, the difficulty of reorganizing INERA has plaqued the development of agricultural research in Zaire in the past few years and has probably facilitated the emergence and development of National Programs.

The reorganization of INERA will undoubtedly be a lengthy process which will have to be gradual because of the potentially explosive nature of some of the decisions to be taken.

However difficult some of the decisions may be, INERA must take a realistic approach and focus on the future and the national constraints rather than on a glorious past.

Major decisions and analysis will be concerned with:

- the number of stations
- the size of the stations
- the number of INERA employees
- the mandate of the institution, including the relation-

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ships with Education and Agriculture

- the systems of approach for implementing national goals(functional basis, agroecological basis...)
- the degree of involvement in production vs. research activities vs. maintenance of g .etic material
- the manpower needs and needs for additional training of the personnel
- the infrastructure and equipment needs, including realistic recommendations for potential new stations, substations, or land, in light of what the country can afford now, in 10 years in 20 years.

In the recent past, many attempts at reorganizing INERA were made from "outside" the institution. None of those, so far has been accepted by all interested parties. Given that situation, it seems logical to recommend that the Board of directors and personnel be intimately involved in the study and recommendations, as well as any other interested party.

- IFA

The organization and structure of IFA is rather well-defined at present but is not adapted to research objectives. The professors and assistants generally have excessive teaching loads which prevent them from devoting much time to research. Although the mandate of IFA staff clearly mentions research activities, there is little enforcement of the rule and little evaluation of the work (since there is almost no financing available for research, these remarks are essentially academic for the time being).

In conclusion, if IFA is to fulfill its potential of contributing to research work, modifications will have to be made concerning the mandate and the professors, and the problem of the financing of research will have to be resolved (this includes the general needs for infrastructure, equipment and the removal of the many constraints listed in Part I).

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- National Programs

The organization of National Programs has been more or less satisfactory, but major questions have arisen after the responsibility for agricultural research was officially given to the DSR in November 1982. Another problem has been the lack of linkages and clear agreements with INERA on many research sites.

Another major problem to be resolved in the future will be the degree of autonomy of the Programs, their linkages to each other, the statute governing the scientific personnel and personnel requirements in terms of equipment and infrastructure.

c) Step 3:

Once realistic internal reorganization of the various institutions is completed or well under way, one of the various options studied and developed by the planning committees and the authority in charge of research would be implemented. The varous scenarios could be as follows:

- an organization scheme in which emerges a single national institution responsible for agricultural research, which regroups officially all the research activities of all the institutions active in the country ("IRAZ" or "INERA" for example), with National Programs absorbed and integrated into this new insitution with IFA research work also placed under the authority and evaluation of the new institution.

- an organizational scheme which basically is in line with Step 1: autonomous or semiautonomous organizations whose activites and programs are coordinated by varous committees for planning, programming and evalutation.

- an organizational scheme intermediate between the two above options.

IV. JUSTIFICATION FOR A RESEARCH MANAGEMENT COMPONENT IN THE PROJECT:

The Zaire Applied Agricultural Research Project Paper (660-0091) is being prepared at a time when a most total uncertainty concerning the authority over agricultural research activities prevails, especially seen from the angle of implementation.

Clearly, the statute of November 5, 1982, gives the authority over all research activities to the Department of Scientific Research (DSR). However, the procedure for applying the statute is not yet available, and the DSR is not in a position to undertake major coordination nor negotiations related to present or future projects.

In the case of National Programs--and Project 091 is in fact a project of support for the National Programs--the situation is even less clear for two major reasons:

1) in the past, National Programs have been clearly dissociated from INERA, an institution now under the authority of the DSR, and
2) National Programs contain components related to both agricultural research and agricultural development (outreach-extension).

Proposing structural and management scenarios for an important project without knowing where the main authority lies and who the coordinating bodies are, seems therefore rather unrealistic and premature.

However, conversations with officials of the Departments of Agriculture, Scientific Research and Prime Ministry and various projects or programs seem to indicate that the signature of Project 091 is quite feasible, despite the uncertainty existing at the level of authority. Those contacts indicated the desirability of including as an additional component in the project a study of issues discussed in Part I, above (authority and reorganization of the agricultural research system).

The general consensus on the matter is that the time is ripe for such action. It was also noted that the nature of Project 091, covering a wide geographical area and focusing on many of the top national priorities in the agricultural sector, makes it an ideal vehicle for an elaborate study of the organizational structure of the agricultural sector and of the needed institutional links between institutions and departments.

V. RECOMMENDATIONS

A. The initial Options for Project 091:

In order to initiate Project 091 in the near future, according to the initial plans, the design team faces three major options:

(1) ignore the broad institutional issues and potential conflicts resulting from the lack of definition of the authority responsible for the project,

(2) resolve all the potential conflicts, eliminate the major constraints and implement institutional reforms before the beginning of the project, or

(3) adopt an interim institutional arrangement with the DOA and the DSR (as well as between National Programs and INERA) while reforms are being studied and carefully proposed with the contribution and cooperation of the major parties involved.

Option (1) presents the danger of continuing conflicts and confrontation. Option (2) takes the risk of postponing the beginning of the project by a few months or, most likely, even a few years if institutional reforms are not implemented rapidly. Option (3), although also gambling on a relatively quick passage of institutional reforms, enables the project to begin in a non-emotional atmosphere and appeals to the various interested parties: the DOA could pursue the implementation of National Programs and pave the way for a smooth transition with the new project; the DSR would have time to study its new responsibilities in the field of agricultural research and the potential institutional links with the DOA (including the possibility of contracting with the DOA for the implementation of some projects); INERA is given the opportunity to participate in a study of reforms which can affect it very deeply; the bilateral donor agency, USAID, is given the opportunity to contribute to one of the most critical problems facing Zairian agriculture and to start its Project 091 as planned.

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B. Specific recommendations Concerning a Study of the Organizational Structure:

Given the above arguments, it is recommended that option (3) be selected and that a major effort be placed on a study of the needed institutional reforms and linkages within and between the various Departments and institutions.

It is proposed that the study be conducted in two successive phases and involve the participation and the collaboration of representatives for the DSR, the DOA, INERA, National Programs and eventually IFA and major interested parties, as appropriate.

Given the fact that the DOA has been fully in charge of the National Programs until now and that the proposed interim arrangement implies the DOA as the principal Department responsible for the coordination and the implementation, it is proposed that the Government Service responsible for the study be the "Division des Etudes et Projets" of the DOA.

C. The Two Phases of the Proposed Study:

a. It is proposed that the first phase of the study be the responsibility of a team of two or three agricultural research management experts with solid experience in organizational work and structural linkages, and with a good understanding of Zairian agriculture and national priorities. During that phase (which can last from one to three months), the team in cooperation with representatives of the various Departments, would study the basic options leading to a global course of action, institutional reforms and general strategy in the area of agricultural research.

The team would focus particularly on the alternatives in terms of:

- the mechanisms to be adopted for planning, defining national priorities, evaluating research results and programming research activities,
- the mechanisms of delegation of responsibilities for implementation of programs to other Departments,
- the types of necessary "contracts" or "agreements" between INERA, National Programs and IFA to ensure a smooth implementation of programs,

- the potential internal reorganization of the major research institutions in light of the proposed courses of action and strategies,
- the potential evolution with time of one or more autonomous or semi-autonomous intitutions and the feasibility or desirability of creating, at some stage, a new overall intitution responsible for the entire agricultural research sector ("INERA" or "IRAZ"...),
- the projected linkages between research, education and extension.

b. The second phase would be the responsibility of a long term consultant (one or two years), preferably a member of the phase I team.

The role of the consultant would be to help implement the recommendations and options which would have been made by the Phase I team and selected by the authority responsible for the reorganization of the research sector. The successful implementation of this task would require a major effort of coordination and cooperation with the interested parties and a rigorous logical approach to precisely define the structural linkages and mechanisms of action.

D. What organization can implement the proposed study?

Although various universities, private firms and agricultural centers have acquired solid experience in agricultural research problems, it seems that the objectives of the study presented above fall well within the mandate of ISNAR (International Service for National Agricultural Research).

Since its creation in 1979, ISNAR has participated in similar studies in almost all parts of the world, including Africa. Its international staff is familiar with structural problems similar to those of Zaire. Analyses of the agricultural research have recently been made in other francophone countries (e.g. Upper Volta, Madagascar, Senegal and Ivory Coast) and the Republic of Zaire itself is not unknown to some of the staff members of ISNAR.

If it is judged desirable, however, that the study be implemented by a U.S. based organization, well qualified contractors (private firms or universities) may also be found in the United States. Many university professors have been associated with research planning and management and many universities have accumulated a solid expertise in this sector.

ANNEX K

FINANCIAL PLAN TABLES

A. Summary of Total Costs

Table K-1 is a summary of the costing of project outputs and inputs on a project year basis as compiled from the subsequent more detailed Tables K-2 thru K-10.

TABLE K-1 COSTING OF PROJECT OUTPUTS/INPUTS

PROJECT YEAR BASIS

Project Inputs	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
			Project Outputs (US$1,000)				
USAID							
Tech. Ass't	98.6	1,029.1	1,343.3	994.9	608.4	294.7	4,369.0
Training	396.8	765.4	970.6	728.4	282.0	58.0	3,201.2
Commodities	489.2	262.4	97.2	-	254.0	-	1,102.9
Cont/Infl(7%)	-	144.0	337.6	361.9	320.4	163.0	1,326.9
Subtotal	984.6	2,200.9	2,748.7	2,085.2	1,464.8	515.7	10,000.0
			Project Outputs (Z1,000)				
GOZ							
Personnel	-	6,962.3	6,962.3	7,898.5	8,750.0	9,080.0	39,653.1
Training	1,800.0	6,367.5	6,867.5	4,846.0	3,473.5	2,086.5	25,441.0
Commodities	-	17,945.0	12,605.0	10,355.0	9,425.0	8,825.0	59,155.0
Civil Work	9,692.0	-	-	-	-	-	9,692.0
Support/Etc.	1,150.0	6,920.0	7,610.0	6,800.0	4,960.0	3,650.0	31,090.0
Sub-total	12,642.0	38,194.8	34,044.8	29,899.5	26,608.5	23,641.5	165,031.1
Cont 10%	1,264.2	3,819.5	3,404.5	2,989.9	2,660.8	2,364.2	16,503.1
Total 10%	13,906.2	42,014.3	37,449.3	32,889.4	29,269.3	26,005.7	181,534.2
Infl 20%	-	7,010.4	13,414.2	18,193.4	22,029.5	25,190.8	85,838.3
Total 20%	13,906.2	49,024.7	50,863.5	51,082.8	51,298.9	51,196.4	267,372.5

B. Cost Coefficients and Calculation of USAID & GOZ Contributions

1. Technical Assistance (Table K-2, K-5)

There will be 16 expatriate positions for a total of 45 person years. Cost per expatriate staff year ranges from $65,600 to $83,600; these figures are based on those provided by IITA. The contract overhead is 18%. There will be 93 Zairian counterparts funded by the GOZ. Details on numbers of personnel, person months, and job descriptions can be found in Annexes E-4, P and Table K-3.

2. Participant Training (Table K-3, K-6)

A total of 99 participants will be trained with US funds. 370 participants will be trained with GOZ funds. Details on participant training can be found in Annex O-1.

3. Commodities (Annex L)

a. Vehicles: U.S. funds will provide $336,000 for 24 4WD vehicles (Table K-4). The GOZ will contribute in-kind the equivalent of Z2,025,000 for 100 ATC 3-wheelers, cycles, and bikes, (Table K-7) as well as in-kind contributions of 9 Japanese tractors and 15 British Landrovers (Table K-8).

b. Research/Outreach equipment and supplies: An estimation of foreign exchange costs (Table K-4).

c. Support & Other Costs: Housing, vehicle, and travel support costs are included (Table K-10).

d. In-kind contributions of land, buildings, and vehicles: The total for the 7 project locations is calculated at Z73,984,000 (Table K-8).

e. Construction Costs: Renovations at the 7 locations are estimated at Z9,692,000 (Table K-9).

4. GOZ Financing

Proposed project outputs indicated in Table K-1 (Z49,024,680 in Year 1) may be compared to 1983 GOZ funding of INERA (Z37,087,102); PNM (Z5,675,710); and PRONAM (Z2,300,000).

5. Contingency/Inflation

The figures given in Table K-1 represent estimations based on current information and past experience. In the case of the U.S., contingency and inflation are combined and calculated at 7%, beginning in Year 1 and compounded annually. The contingency and inflation factor for Year 5 is slightly more than 7%, taking the dollar funding amount to an even $10 million. For local currency costs, unpredictable expenses and errors in estimations necessitate a 10%, non-compounded contingency factor. Inflation is calculated at 20%, beginning in Year 1 and compounded annually on all items except personnel costs. It was assumed that personnel costs (salaries) would not be increased to keep up with inflation, especially since the project assumes a higher pay scale in the beginning. The inflation formula is (1+r) (Total Costs - Personnel Costs) + Personnel Costs.

TABLE K-2

USAID INPUTS - TECHNICAL ASSISTANCE (U.S. DOLLARS)

Position	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Project Coordinator (COP)		41,800	83,600	83,600	83,600	83,600	376,200
Management Specialist, Deputy	83,600	83,600	83,600	83,600	83,600		418,000
Farm Manager, Services & Equipment		41,800	83,600	83,600			209,000
Plant Breeder (maize)		77,600	77,600	77,600			232,800
Plant Breeder (legumes)		38,800	77,600	77,600	36,800		232,800
Agronomist, Research (2)		65,600	131,200	131,200			328,000
Agronomist, FSR		83,600	83,600				167,200
Agronomist, Soil Fertility		41,800	83,600	83,600	83,600		292,600
Production Economist		83,600	83,600				167,200
Rural Sociologist/Social Anthro		83,600	83,600				167,200
Outreach Specialist, National		32,800	65,600	65,600	65,600	65,600	295,200
Outreach Specialist, Regional (2)				65,600	131,200	65,600	262,400
Plant Pathologist		65,600	65,600				131,200
Entomologist		32,800	65,600	32,800			131,200
Short Term		99,167	70,000	58,333	29,167	35,000	291,667
SUB-TOTAL	83,600	872,167	1,138,400	843,133	515,567	249,800	3,702,667
ITA Overhead 18%	15,048	156,990	204,912	151,764	92,802	44,964	666,480
TOTAL	98,648	1,029,157	1,343,312	994,897	608,369	294,764	4,369,147

TABLE K-3

USAID INPUTS - TRAINING (US $1,000)

Training	Participants	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
Research Management	2		56.0	56.0	56.0			168.
FSR/Orientation	20	22.0						22.
FSR/Training-CPU Team +	10	42.0	30.0	30.0	30.0	30.0	30.0	192.
Participant training PHD	14	112.0	280.0	392.0	280.0	112.0		1176.
Participant training M.Sc	20	168.0	336.0	420.	308.	140.	28.	1400.
Participant training IITA	2			6.				6.
Short Term Training								
IITA	15	21.6	21.6	21.6	16.2			81.
CIMMYT	3		12.6	12.6	12.6			37.8
CIAT	3			24.0	12.0			36.
ICRISAT	3		8.4	8.4	8.4			25.2
U. of Fla	3	31.2	15.6					46.8
Other	4		5.2		5.2			10.4
TOTAL		396.8	765.4	970.6	728.4	282.	58.	
GRAND TOTAL	99							3201.2

TABLE K-4

USAID INPUTS - COMMODITIES (US$1,000)

ITEM	No.	UNIT COST	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
4WD Double cab Pickup	20	14,000	280.				196.6*		
4WD Pass Utility	4	14,000	56.				39.2*		
Research/Outreach equip.		27.	63.	45.					135.0
Materials and Supplies			45.	135.	45.				225.0
Misc. Equip.									
(water pumps, etc.)		45.	45.						
Sub-Total			453.	243.	90.		235.2		1,021.2
8% Commission			36.2	19.4	7.2		18.8		81.7
TOTAL			489.2	262.4	97.2		254.		1,102.9

*70% REPLACEMENT INCLUDING SPARE PARTS

TABLE K5A

GOZ INPUTS - PERSONNEL COSTS (Z1,000)

POSITIONS	FY83			FY86			FY87		
	LEVEL	NUMBER	PAY/BENE	LEVEL	NUMBER	PAY/BENE	LEVEL	NUMBER	PAY/BENE
I.KINSHASA									
COORDINAT	MS	1	117.4	MS	1	117.4	PHD	1	126.4
MGT.DEPUT	BA	1	92.6	BA	1	92.6	BA	1	92.6
FIN.DEPUT	BA	1	92.6	BA	1	92.6	BA	1	92.6
FSR DEPUT	MS	1	99.4	MS	1	99.4	PHD	1	108.4
PROD/EXT DPT	MS	1	99.4	MS	1	99.4	PHD	1	108.4
FSR AGRON	MS	2	180.75	MS	2	180.75	MS	3	271.0
EXT.AGRON	MS	2	180.75	MS	2	180.75	MS	2	180.75
OTHERS	-	24	612.40	-	24	612.40	-	24	612.40
SUB-TOTAL			1,475.30			1,475.30			1,592.55
II.MAINST									
STA/DIRS.	MS	3	230.6	MS	3	230.6	MS	3	230.6
RESEAR.DP	1PHD/2MS	3	239.6	1PHD/2MS	3	239.6	PHD	3	257.6
BREEDER	MS	3	203.6	MS	3	203.6	MS	3	203.6
AGRON/RES	MS	3	203.6	MS	3	203.6	MS	3	203.6
PHYTOPATH	MS	3	203.6	MS	3	203.6	MS	3	203.6
ENTOMOLOG	MS	3	203.6	MS	3	203.6	MS	3	203.6
EXT.AGRON	MS	3	203.6	MS	3	203.6	MS	3	203.6
ASST	AO	9	489.4	AO	9	489.4	AO	9	489.4
ASST	A1	6	245	A1	6	245	A1	6	245
ASST	A2	9	165.4	A2	9	165.4	A2	9	165.4
ASST	A3	15	208	A3	15	208	A3	15	208
LABORERS	-	240	1,602	-	240	1,602	-	360	2,403
OTHERS	-	54	1,289	-	54	1,289	-	54	1,280
SUB-TOTAL			5,487			5,487			6,306
TOTAL			6,962.3			6,962.3			7,898.55

TABLE K5A (CONTINUED)

POSITIONS	FY88			FY89			
	LEVEL	NUMBER	PAY/BENE	LEVEL	NUMBER	PAY/BENE	TOTAL
I.KINSHASA							
COORDINAT	PHD	1	126.4	PHD	1	126.4	614
MGT.DEPUT	BA	1	92.6	PHD	1	108.4	478.8
FIN.DEPUT	BA	1	92.6	PHD	1	108.4	478.8
FSR DEPUT	PHD	1	108.4	PHD	1	108.4	524
PROD/EXT.DPT	PHD	1	108.4	PHD	1	108.4	524
FSR AGRON	PHD	3	298	PHD	5	496.85	1,427.35
EXT.AGRON	PHD	2	198.75	PHD	3	298	1,039
OTHERS	-	24	612.4	-	24	612.4	3,062
SUB-TOTAL			1,637.55			1,967.25	8,147.95
II.MAINST							
STA.DIRS.	PHD	3	257.6	PHD	3	257.6	1,207
RESEAR.DP	PHD	3	257.6	PHD	3	257.6	1,252
BREEDER	PHD	3	230.6	PHD	3	230.6	1,072
AGRON.RES	PHD	3	230.6	PHD	3	230.6	1,072
PHYTOPATH	PHD	3	230.6	PHD	3	230.6	1,072
ENTOMOLOG	PHD	3	230.6	PHD	3	230.6	1,072
EXT.AGRON	PHD	3	230.6	PHD	3	230.6	1,072
ASST	A0	15	815.6	A0	15	815.6	3,099.4
ASST	A1	6	245	A1	6	245	1,225
ASST	A2	15	275.6	A2	15	275.6	1,047.4
ASST	A3	30	416	A3	30	416	1,456
LABORERS	-	360	2,403	-	360	2,403	10,413
OTHERS	-	54	1,289	-	54	1,289	6,445
SUB-TOTAL			7,112.4			7,112.4	31,504.8
TOTAL			8,749.95			9,079.65	39,652.75

TABLE K-5B

GOZ INPUTS - TECHNICAL ASSISTANCE SALARIES AND ALLOWANCES (Z1,000)

STATIONS	Year 1	Year 2	Year 3	Year 4	Year 5	TOTAL
1. KINSHASA	1,475	1,475	1,592.5	1,637.5	1,967	8,147
2. M'VUAZI	1,829	1,829	2,102	2,371	2,371	10,502
3. KANIEMESHI	1,829	1,829	2,102	2,371	2,371	10,502
4. GANDAJIKA	1,829	1,829	2,102	2,371	2,371	10,502
TOTAL	6,962	6,962	7,898.5	8,750.5	9,080	39,653

TABLE K-6

GOZ INPUTS - TRAINING (Z1,000)

TRAINING	PARTICIPANTS	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Total
FSR/E Orientation	75		645	645	430	244	258	2,322
FSR/E Training								
Researchers	15		255	255	170	102	102	884
Researcg Technicians	15		510	510	340	204	204	1,768
Extension workers	40		1,360	1,360	1,020	850	680	5,270
Participants	80		520	520	325	195	195	1,755
Managers	14		360.5	360.5	206	154.5	154.5	1,236
Short-term technical	35		217	217	155	124	93	806
Overseas Air Fares		1,800	2,500	3,000	2,200	1,500	400	11,400
TOTAL		1,800	6,367.5	6,867.5	4,846	3.473.5	2,086.5	25,441

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TABLE K-7

GOZ COMMODITIES (z1,000)

ITEM	UNITS	UNIT COST	FY84	FY85	FY86	FY87	FY88	FY89	TOTAL
ATC-3WHEEL	15	45	0	675	0	0	0	0	675
BIKES	60	3	0	225	0	0	0	0	225
CYCLES	25	45	0	1,125	0	0	0	0	1,125
EXT.SUPPL	0	0	0	500	400	300	300	200	1,700
FSR EQUIP	0	0	0	1,000	400	300	300	200	2,200
STAT.EQUIP	0	0	0	1,750	500	500	450	300	3,500
APPL/FURN	30	210	0	3,150	2,520	630	0	0	6,300
OFFIC EQUP	40	25	0	500	300	200	0	0	1,000
FUEL	0	0	0	6,000	7,360	7,400	7,500	7,600	35,860
TECH PUBL	0	0	0	20	25	25	25	25	120
OFFICE SUP	0	0	0	1,250	500	500	450	300	3,000
MISC EQUIP	0	0	0	1,500	500	400	300	100	2,800
MISC. SUPP	0	0	0	250	100	100	100	100	650
TOTAL	170		0	17,945	12,605	10,355	9,425	8,825	59,155

TABLE K-8

GOZ IN-KIND CONTRIBUTIONS (Z1,000)

LOCATION	UNIT (HA)	FY84	FY85	FY86	FY87	FY88	FY89	TOTAL
MVUAZI	2,000	0	14,000	0	0	0	0	14,000
GANDAJIKA	3,050	14,572	0	0	0	0	0	14,572
KIYAKA	1,500	0	8,952	0	0	0	0	8,952
KANIAMA	1,500	12,650	0	0	0	0	0	12,650
MULUNGU	1,500	0	1,280	0	0	0	0	1,280
KINSHASA	1	30	0	0	0	0	0	30
KANIEMESHI	200	9,000	0	0	0	0	0	9,000
EQUIPMENT ITEMS		0	0	0	0	0	0	0
TRACTORS	9	8,100	0	0	0	0	0	8,100
L. ROVERS	15	5,400	0	0	0	0	0	5,400
TOTAL		49,752	24,232	0	0	0	0	73,984

TABLE K-9

GOZ CONSTRUCTION AND CIVIL WORKS (IN THOUSANDS OF ZAIRES

LOCATION	FY84	FY85	FY86	FY87	FY88	FY89	TOTAL
CONSTRUC.							
KANIAMESH	4,442	0	0	0	0	0	4,442
GANDAJIKA	1,150	0	0	0	0	0	1,150
MVUAZI	1,500	0	0	0	0	0	1,500
KINSHASA	500	0	0	0	0	0	500
UTIL SYS							
KANIAMESH	450	0	0	0	0	0	450
GANDAJIKA	800	0	0	0	0	0	800
MVUAZI	500	0	0	0	0	0	500
KINSHASA	350	0	0	0	0	0	350
TOTAL	9,692	0	0	0	0	0	9,692

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TABLE K-10

GOZ SUPPORT AND OTHER COSTS (Z1,000)

ITEM	UNITS	UNIT COST	FY84	FY85	FY86	FY87	FY 88	FY89	TOTAL
POSITIONS									
VEH. MAIN	40	20	0	600	800	800	800	400	3,400
HOU. MAIN	40	50	0	2,000	1,000	500	300	200	4,000
BLD. MAIN	10	80	0	800	400	200	200	200	1,800
RD. MAIN	5	100	0	400	500	300	300	200	1,700
ULT. MAIN	5	100	0	300	400	300	300	200	1,500
TRAN.DOM	150	3	100	300	300	450	450	300	1,900
PDIEM A0	0	500	50	100	150	250	250	200	1,000
PDIEM A1	0	400	0	60	60	100	100	80	400
P.RELATI	4	0	0	100	500	500	500	400	2,000
INSUR/LE	0	0	0	500	600	500	500	400	2,500
AIR CHAR	12	190	0	760	1,900	1,900	760	570	5,890
ROAD/RAIL	0	0	1,000	1,000	1,000	1,000	500	500	5,000
TOTALS			1,150	6,920	7,610	6,800	4,960	3,650	31,090

ANNEX L

PROCUREMENT PLAN

by A.T. Bilecky, REDSC

June 24, 1983

A. Responsibilities:

The Department of Agriculture (GOZ) will be the implementing agency for this project. Procurement will be performed as follows:

1. Commodities so identified will be procured through a procurementservices agent (PSA) who will act on behalf of the GOZ. PIO/Cs will be issued to the selected PSA as the procuring entity.

2. Vehicles will be procured directly from the manufacturer as it is expected that a vehicle standardization plan will be in effect by the time procurement for this project takes place.

3. Local procurement, if any, will be in accordance with the shelf-item procurement rules outlined in Chapter 18, AID Handbook 1. Supp B.

4. Approximately $500,000 have been set aside for research/extension equipment and materials and supplies to be procured directly by the technical assistance for this project.

5. The project officer will be responsible for coordinating and overseeing the procurement processes of all entities involved in this project.

B. Commodity List: (Prices shown are on a CIF basis)

1. Offshore Manufactured:

a) Vehicles

Item	No	Unit	Total
4 WD Doublecap Pickup Diesal	20	14,000	280,000
4 WD Pass Utility vehicle	4*	14,000	56,000
Plus 70% replacement of vehicles in years 4+5 (including spare parts)			235,000

* Assumes contribution of 15 Landrovers by British Overseas Development Administration.

b)*	Research/Outreach Equipment	135,000
c)	Materials and Supplies	225,000
d)	Misc Equipment (Water pumps, etc)	90,000
	Sub-total	1,021,200
	8% Commission to PSA	81,700
	TOTAL AID FINANCED COMMODITIES	$1,102,900

* Assumes contribution of 9 Shibaura 83 HP tractors with basic implements by Japanese Government through GOZ Department of Agriculture.

2. Local Purchases: See Annex Table K-7 "GOZ Commodities" for acquisition list and prices.

C. Commodity Eligibility

All commodities listed above are eligible for AID financing and will be procured from AID Geographic Code 0[illegible] countries, except for items designated for local procurement.

D. Source/Origin

Except as otherwise indicated in the equipment list, all commodities are from AID Geographic Code 000 source/origin.

E. Title of Commodities

Title to commodities procured through AID financing normally rests in the cooperating country. Exceptions may be made to the policy of titling commodities in the cooperating country if the commodities are procured for a project, specifically for use by, or in direct support of an AID-financed technician. Commodities falling in this category will normally be confined to:

(a) motor vehicles for transportation

(b) household and furnishings and appliances

(c) office furnishings and equipment

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Preferably, title to AID-financed commodities should be fixed in the project Agreement.

F. Waivers

1. Equipment Compatibility

No waiver for commodities or services are contemplated except as noted below, in d & e. However, for items listed in B b & c, all equipment to be purchased must be compatible with equipment already purchased. Detailed specifications will be written upon arrival of the TA team.

2. Transportation

A transportation source waiver will be required to permit the financing of transportation costs on Code 899 flag vessels. Requests for such waivers will be forwarded by USAID/Z to AID/W SER/COM. There is no regularly scheduled US flag liner service available nor is 941 flag service available between the authorized source and Zaire. Requests for a transportation waiver will be processed when actual freight costs can be reasonably estimated.

3. Technical Assistance

IITA is currently the implementing contractor for the Cassava Outreach project (660-0077) and is uniquely qualified to be the contractor for this project.

4. Procurement

A separate, single source/nationality procurement waiver has been prepared for action and approval by the AID Administrator for the IITA.

G. Technical Assistance Contractor

The International Center for Tropical Agriculture (CIAT) is the only other institution known to do research on cassava. Both are multidonor supported, non-profit institutions, and although both negotiate and implement technical contracts, neither will bid against the other one. The prospect of responsive service and the potential value of a long-term institutional relationship by virtue of proximity suggest that IITA is an appropriate technical assistance implementing agent. The total estimated dollar cost of this contract is to be financed by USAID. A host-country contract of the cost reimbursement without fee contract type is proposed. The contract will be administered by the GOZ/DOA.

H. Responsibilities of the Contractor

The general responsibilities of the contractor will include recruitment and support of technical advisors, commodity specifications, assistance with the training program, and overall project management. The IITA Deputy for Management, with the support of the IITA administration, has advisory responsibilities for development of project management systems.

ANNEX M-1

FARM MANAGEMENT AND EQUIPMENT

P.V. Hartley, IITA Farm Management Engineer

June 1983

A. M'Vuazi:

1. Flooding Problems in Mankewa:

a. Canal headworks must be repaired and a proper control structure installed.

b. Depressions in the riverbank must be filled to avoid breeching.

c. Canal tail race must be improved and a proper control structure built.

d. All obstructions of logs and branches must be removed.

e. A gradual improvement of the riverbanks must be undertaken, when time allows, to increase the freeboard between land level and river height during flooding.

It is not recommended to undertake expensive earthworks to continue the protection of the research plots in Mankewa, but rather to move the research plots to a better area and to use Mankewa for multipling stock material.

2. Land Between Mankewa and G.E.R.:

a. Topographical survey of this land should be made.

b. Small areas are subject to flooding. These may be isolated and, if not useable, should be grassed over and maintained.

c. Land use agreements must be concluded.

3. G.E.R. Land (MPALURIDI):

a. A topographical survey should be made.

b. Land not in use should be returned to a controlled fallow.

c. All the land should be clearly defined.

4. Parc A Bois:

a. A topographical survey should be made.

b. The perimeter roadway should be improved.

c. Low points should be improved.

5. Land Near Muela:

a. Before any commitment is made, an agreement must be reached with regards to land tenure.

b. The land should be fired to clear it.

c. A topographical survey should be made.

d. Special attention should be paid to the water already passing through the land and to the static waters/springs found on the land.

6. Farm Equipment:

a. The Ford 5600 tractors in service are suitable for the conditions.

b. The material strength of the equipment is poor.

c. The general condition of the equipment is fair.

d. A lot of equipment remains unassembled.

e. After the reorganization of the workshops, all the garage equipment needs to be installed.

f. A proper inventory of spares should be made.

g. A complete set of parts books must be made up.

7. CONCLUSIONS:

a. Effort should be made to make the station more autonomous wherever possible.

b. Land planing should be carried out after a topographical survey has been made.

c. The connection of the station to the national electrical supply grid network is a priority.

d. The rehabilitation of the water supply is essential.

e. A re-allocation of housing for junior staff should be made, as all PRONAM staff have to he transported daily.

f. The garage must be made more autonomous.

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8. MAJOR CONSIDERATIONS:

a. The support of two main stations - M'Vuazi - Lubumbashi.

b. Assistance to two other stations - Kiyaka - Gandajika.

c. The formulation of support and assistance policies.

d. Formulation of an equipment policy - i.e., suppliers.

e. The placing of contract/PVO's mechanical engineers on sites as farm managers and equipment controllers as an initial step.

f. The appointment of an overall project engineer.

g. Standardization of equipment wherever possible to limit supply sourcing.

h. Establishment of a full radio communications network.

B. Gandajika:

1. Land	50 ha	experimental
	1000 ha	used by tenants 500 ha of which classified as good land
	2000 ha	fallow land

The majority of the land is classified as heavy clay loam with high concentrations sandy-clay and sand dominant in some areas.

Except for the 20 ha of experimental trials, of which 10 ha are in cassava multiplication, the land is in fallow.

The fallow state consists of large areas of Sudan grass, which in places has been burnt, allowing Imperata grass to establish. Some of the fallow area has extensive patches of Titania flower cover, as do the majority of headlands, road verges and border blocks.

As an initial measure, at least, the research area should be cleaned up by the extensive use of tractor-mounted slashers to encourage grass establishment, hopefully not-Imperata, which appeared to be a result of burning.

In an effort to reduce fallow land maintenance, thought should be given to the establishment of a legume cover, such as Mucuna. Although Mucuna would not be able to survive the dry seasons, it would be hoped that it would

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be able to re-establish itself during the rains before the indigenous grasses dominante.

Experimentation in the application of herbicides, either by spraying or application by wick wipers, should be investigated.

On the whole, no major constraints are foreseen in recovering the land for experimental purposes, provided that equipment is available and operational.

2. Equipment:

The situation of equipment at the station can only be regarded as desperate. Although some equipment is operational, it is extremely old and very unreliable. Needless to say, there are large piles of scrap littering the workshop areas. However, some of this equipment could be recovered and made operational again at a fairly nominal input of spare parts if they were directly ordered from overseas.

3. Irrigation:

During the review of the area, it was implied that irrigation would be possible during the dry season and a visit was made to the "river" to investigate the supply of irrigation water. The "river" is in fact a 'hydromorphic' area with no apparent running water, but a high water table. It may be possible to irrigate one or two ha. by using shallow wells and a sprinkler system. However, a well must be dug and test pumped for yield before any commitment could be made.

A bore hole was recently drilled near Gandajika, and it would be of major interest to know its dynamic details and whether or not it is in the same aquifer.

C. Lubumbashi - Kaniemesha Farm:

The farm is located approximately three kms outside Kipushi on the Lubumbashi road. The total farm area is in the region of 200 Hectares.

The best land, approximately. 30 ha, is yellow clay loam of good physical structure, low bulk density on an undulating land form with a long, mid-slope situated in a saucer shaped valley. This land, being highly uniform would be ideal for trials.*

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A further area of approximately 40 ha of gravel loam, bordering in places toward a lateritic gravel loam with laterite/ironstone caps, is situated across the Kaniemesha river on a slope of four to five percent. This land would be better suited to seed multiplication.

Approximately half the farm is dominated by giant termite hills, but extensive areas of yellow clay loam are available between the hills and would be ideal for multiplication plots.

The rest of the land, approximately 30 ha, is a clay hydromorphic swamp which could be productive, but expensive to bring under cultivation.

The area rainfall is in the region of 1200 mm annually.

D. Major Considerations:

1. The formulation of support and assistance policies.
2. Formulation of an equipment policy - i.e., suppliers.
3. The appointment of an overall project engineer.
4. Standardization of equipment wherever possible to limit supply sourcing.
5. Establishment of a full radio communications network.

E. Other Considerations:

1. Three consultative trips to be made by IITA farm management/engineer staff: one to review equipment requirements and specifications, one to formulate requests and identify suppliers, and one to review existing equipment spare purchases for ongoing servicing and to review land use plans for M'Vuazi after the topographical survey.

Spare parts supplies should be estimated at 25 percent of purchase price or at least 20 percent.

The rehabilitation of the farm in terms of finance should not be expensive. The need for fancing, for example, should not be necessary as there are no dwelling in the area. However, if Kipushi were to expand it would be towards the west boundary of the farm and a small settlement, which could expand is approximately two kms, from the east boundary.

* The soil survey given to an earlier contingency of the design team is not entirely in agreement with this observation.

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A central road runs partway through the farm and this should be extended to the southern boundary and along the boundary side to the west and east corners. Another Road - outside the boundary by approximately 25 meters passes on the west side. This road crosses the Kanemesha river by steel culvert where a small pond has been developed by local people outside the farm boundary.

Two cross roads should be constructed. One should divide the farm into two plots of approximately 50 ha and the other as nearly as possible should divide the 50 ha of termite hills into two 25 ha blocks.

ANNEX M-2

ESTIMATED COST OF REHABILITATING EXISTING STRUCTURES AT KANIEMESHI FARM

1. ADMINISTRATION BUILDING UPGRADING COST ESTIMATES

By Cit. Mulamba-Wa-Kabasele

No.	ITEM DESCRIPTION	UNIT	QUANTITIES	UNIT COST(Z)	TOTAL COST(Z)
1.	Demolition	M3	18	85	1530
2.	Wall Erection	M3	16	1900	30400
3.	Wall Concrete Coating	M2	154	70	10780
4.	Wooden Ceiling Installation	M2	103	975	100425
5.	Furnish and Install New Wooden Doors	EACH	2	5700	11400
6.	Furnish and Install Window Glass	M2	56	975	54600
7.	Furnish and Paint Interior Walls (Water Paint)	M2	1122	80	89760
8.	Furnish and Paint Ceilings (Water Paint)	M2	559	80	44720
9.	Furnish Oil Paint and Painting Toilet Rooms	M2	110	145	15950
10.	Furnish and Install Toilet Equipment	EACH	4	6500	26000
11.	Furnish and Install Local Toilet Room Floor Tiles	M2	24	1100	26400
12.	Furnish and Install Local Toilet Wall Tiles (1 M High)	M2	21	750	15750
13.	Furnish and Install Metallica Windows	M2	6	1800	10800
14.	Furnish and Install Anit-Theft Protection	M2	7	1500	10500
15.	Take Down and Transport the Drying Area Structure	EACH	1	15000	15000
16.	Erecting the Drying Area Structure	EACH	1	10000	10000
17.	Furnish and Install Laboratory Lavatories	EACH	2	13000	26000
18.	Furnish and Install Septic Tanks (15 PRS Capacity)	EACH	4	36000	144000
19.	Furnish and Install Light Switches and Outlets	EACH	73	315	22995
20.	Furnish and Install Light Bulb Fixtures	EACH	36	316	11340
21.	Furnish and Construct 2" Water Line (Galvanized Steel)	L M	3000	284	852000
	TOTAL				1530350

II. WAREHOUSE BUILDING UPGRADING COST ESTIMATES (EX-POULAILLER II)

No.	ITEM DESCRIPTION	UNIT	QUANTITIES	UNTI COST(Z)	TOTAL COST(Z)
1.	Demolition	M3	6	85	510
2.	Wall Erection	M3	6	1900	11400
3.	Wall Concrete Coating (Inside and Outside)	M3	612	70	42840
4.	Furnish and Install New Metallic Doors	M2	17	2100	35700
5.	Furnish Water Paint and Painting Interior Walls	M2	334	80	26720
6.	Furnish Water Paint and Painting Exterior Walls	M2	278	80	22240
7.	Furnish and Install New Wooden Ceilings	M2	263	975	256425
8.	Furnish Water Paint and Painting Ceilings	M2	263	80	21040
9.	Furnish and Install Air Conditioners	EACH	6	30000	180000
10.	Furnish and Install Light Bulb Fixtures	EACH	6	315	1890
11.	Furnish and Install Light Switches and Outlets	EACH	8	315	2520
	TOTAL				601285

No.	ITEM DESCRIPTION	UNIT	QUANTITIES	UNIT COST(Z)	TOTAL COST(Z)
	RES. No. 1				
1.	FURNISH AND INSTALL WOODEN CEILINGS	M2	68	975	66300
2.	FURNISH AND INSTALL METALLIC DOORS	M2	2	2100	4200
3.	FURNISH AND INSTALL WOODEN DOORS WITH ORD. LOCKS	EACH	3	1600	4800
4.	FURNISH AND INSTALL WINDOW CLASSES	M2	5	975	4875
5.	FURNISH WATER PAINT AND PAINTING WALLS	M2	156	80	12480
6.	TOTAL				92655
	RES. No. 2				
1.	FURNISH AND INSTALL WOODEN CEILINGS	M2	225	975	219375
2.	FURNISH AND INSTALL METALLIC DOORS	M2	11	2100	23100
3.	FURNISH AND INSTALL WOODEN DOORS	EACH	9	1600	14400
4.	FURNISH AND INSTALL WINDOW GLASSES	M2	9	975	8775
5.	FURNISH WATER PAINT AND PAINTING WALLS	M2	412	80	32960
6.	TOTAL				298610
	RES. No. 3.				
1.	FURNISH AND INSTALL WOODEN CEILINGS	M2	66	975	4950
2.	FURNISH AND INSTALL METALLIC DOORS	M2	9	2100	18900
3.	FURNISH AND INSTALL WOODEN DOORS	EACH	3	1600	4800
4.	FURNISH AND INSTALL WINDOW GLASSES	M2	8	975	7800
5.	FURNISH WATER PAINT AND PAINTING WALLS	M2	122	80	9760
6.	TOTAL				46210
7.	FURNISH AND INSTALL SEPTIC TANKS	EACH	3	36000	108000
8.	GRAND TOTAL				545475

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OFFICE BUILDING II UPGRADING COST ESTIMATES (EX-POULAILLER I)

No.	ITEM DESCRIPTION	UNIT	QUANTITIES	UNIT COST(Z)	TOTAL COST(Z)
1.	DEMOLITION FOR 10 EXTRA-WINDOWS (1.80) (10)(0.25)	M3	5	85	425
2.	EXTERIOR CONCRETE COATING	M2	111	70	7770
3.	FURNISH AND INSTALL WOODEN CEILINGS	M2	264	975	257400
4.	FURNISH AND INSTALL METALLIC WINDOWS	M2	71	2100	149100
5.	FURNISH AND INSTALL WINDOW GLASSES	M2	74	975	69225
6.	FURNISH AND INSTALL METALLIC DOORS (WITHOUT GLASSES)	M2	26	2100	54600
7.	FURNISH AND PAINT INTERIOR WALLS (WATER PAINT)	M2	632	80	50560
8.	FURNISH WATER PAINT AND PAINTING CEILINGS	M2	264	80	21120
9.	EXTERIOR ROUGHCASTING (CONCRETE)	M2	111	70	7770
10.	FURNISH AND INSTALL EXTERIOR METALLIC DOORS	M2	26	2100	54600
11.	WALL ERECTION	M3	1	1900	1900
12.	FURNISH AND INSTALL TOILET ROOM EQUIPMENT	EACH	10	6500	65000
					739470

No.	ITEM DESCRIPTION	TOTAL COST(Z)
1.	Administration building	1530350
2.	Warehouse Building	601285
3.	Worker's Residences	545475
4.	Office Building KK	739470
5.	Installation of Field Offices and Equipme-	100000
6.	Sub-Total	3516580
7.	Contingency (30%)	1054974
8.	GRAND TOTAL	4571554
	$1 : Z6.0	$761926
	$1 : Z30.0(	$152385

ANNEX M-3

Physical Plant Review

John G. H. Craig, IITA Asst. Physical Plant Services

June 13, 1983

A. General:

The writer arrived in Zaire on Thursday, June 9, 1983, as part of the IITA team to assist with the formation of the Applied Agricultural Research Project No. 660-0091 at the request of the Director of USAID/Kinshasa. His brief was to review the physical plant and buildings, etc., at Kanyameshi Station near Lubumbashi and Gandajika Station near Mbuji-Mayi. On a previous visit he had completed a similar assignment at M'Vuazi Station.

Unfortunately, due to commitments at Ibadan he could only allocate a total of seven days for the assignment. Attempts were made to arrange visits to these stations and allow time for writing the report before departing, but due to cancellation of several air services the physical inspection could not be arranged. The writer therefore had meetings with Citoyen Mukendi Mkashami and Citoyen Mulamba Kabasele, maize breeder with PNM, and Engineer, U.S.A.I.D., respectively. Both were in positions to give details of the stations together with maps and sketches of buildings from which the report was compiled. This together with information from the previous mission to M'Vuazi Station, is the basis from which it is formulated. It is therefore not a full, in-depth study; however, it is hoped that it may contribute to the project.

B. Kanyameshi Station (near Lubumbashi in Shaba Region):

1. General:

There are certain elements of the farm that favor it as an agricultural research site:

(a) It was a former commerical farm.

(b) Several good sized buildings are in existence.

(c) It has an electricity supply from the national grid and possibility of potable water from Kipushi.

(d) It is close to a good sized town, Kipushi, where adequate housing might be rented for principal staff and where school and medical facilities are also established.

(e) It is within 15 minutes by road from the major town of Lubumbashi which is served by an international airport and a railway line serving Shaba ! the two Kasais.

(f) The cost of reconstructing buildings and other physical services would therefore likely be less due to its proximity to a major town where reliable contractors are established.

2. List of existing buildings - (See attached sketch.):

(a) House/Offices and diary complex	- Floor area	-	995 m2
(b) 2 - Poultry houses	- "-"	-	528 m2
(c) 2 - Piggeries	- "-"	-	786 m2
(d) 1 - Garage	- "-"	-	90 m2
(e) 1 - Guard house	- "-"	-	32 m2
(f) 3 - Junior staff houses	- "-"	-	284 m2
	TOTAL	-	2,715 m2

3. Accommodation needs for new use:

(a) Offices, library, conference/meeting room

(b) Laboratories

(c) Fertilizer, insecticide, pesticide, seed, farm materials and tools

(d) Workshops/garages

(e) Threshing and processing unit

(f) Junior staff housing

(g) Guard house

(h) Dispensary

(i) Transformer/generator house

(j) Screen-houses

4. Suggested conversion of buildings:

(a) The present buildings shown on the sketch as House VII and Dairy IX should form the offices, stations manager's office, conference room and laboratory complex, being the central building. All of this unit would require ceilings.

(b) Poultry unit, Building IV, to become fertilizer, insecticide and pesticide store.

(c) Poultry unit, Building V, to become farm machinery shed and parts store.

(d) Piggery unit, Building VIII, to become vehicle workshop, carpentry shop, welding shop, machine shop and tire repair shop. If space permits, it should also include oil and grease store.

(e) Piggery, Building VI, to become threshing and crop processing. It is understood the prevailing wind is from the west/south west and dust from the unit would not blow into offices/labs.

(f) Garage, Building X, to become seed store.

(g) Guard house to remain as such.

(h) Houses I, II, and III to remain as junior staff houses.

(i) A dispensary/first aid clinic could be incorporated in the former dairy IX area.

5. Electric Power:

The station is already connected to the national power grid at Kipushi which is from a very reliable hydro source. Power is received at 30 KVA and stepped down by an on-station transformer to 220/380 Volt x 50 HZ x 3 Phase supply. The overhead cable from Kipushi requires replacement/correct poles.

6. Potable Water:

At present there is no water supply on site. Use is made of a small well on-site, although quality is poor and no treatment/filteration is applied. It is understood that a proper supply could be obtained from Kipushi, where there is a plant. This would require installation of an approximately 3-Km long water main of approximately 8-Cm diameter. No details are available of elevations to know if the supply could be by gravity or would require a booster pump.

7. Sewage:

Assuming a good water supply is provided and that new toilet facilities are installed in the office/lab complex, it would be necessary to build a septic tank for effluent. The same would be required at the existing junior staff housing, which is too far away to connect to this one. It is suggested that a shower/toilet facility be provided for station staff, conveniently located to workshop and processing activities.

8. Fuel Storage

An underground tank for fuel should be provided for safety purposes as well as to allow fuel to settle before use. This can avoid considerable breakdowns due to dirty carburetors, etc.

9. Access:

The station is extremely well situated, as it adjoins the main, paved road from Kipushi to Lubumbashi. This is a major favorable consideration when estimating development costs.

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10. Equipment:

Apart from farm machinery and transport, a considerable amount of equipment will be required for this station. It should include the following main items:

a. Office equipment: desks, tables, chairs, bookcases, typewriters, photocopy machines, filing cabinets, plan storage - drawer type unit, communication transceiver and all smaller office items.

b. Laboratory equipment, including some work benches, stools, etc.

c. Threshing machinery, seed cleaning machinery, dryers, preferably oil burning types, air conditioners for seed stores.

d. Complete set of workshop hand tools plus individual mechanic's tool kits, welding sets - oxy - acetylene and arc welding sets, bench grinder and pedestal grinder, pillar drilling machine, circular saw and set(s) carpenters tools, hydraulic jacks, battery charger, vulcanizer, compressor, etc.

11. Costs:

It is extremely difficult to estimate rehabilitation/conversion costs at this point, not knowing exactly what services and extent are required. From the building cost aspect this can be roughly divided into two types of work a) for office/laboratory use and b) for workshop, storage, crop processing. Assume the conversion of buildings follows the foregoing plan the round figure costs would be as follows:

a. Conversion/Rehabilitation

Office/Lab	-	Nos. VII and IX	- U.S.	$300,000
Fertilizer store, etc.	-	No. IV	-	15,000
Farm machine shed, etc	-	No. V	-	30,000
Workshops	-	No. VIII	-	45,000
Threshing and processing	-	No. VI	-	35,000
Seed storage	-	No. X	-	20,000
Junior Staff House	-	Nos. I, II, & III	-	40,000
Guard house	-		-	10,000
Transformer/Generator	-	(new building)	-	65,000
				$560,000

b. Electrical installation to above: Rewiring, additional power points, and lighting, site distribution (overhead) $ 60,000.

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c. Plumbing: Additional outlets, toilets, roof storage tank in main building, connection to staff housing, etc. $ 60,000.

d. Water supply main - approx. 3-Km from Kipushi - assuming booster pump station required and 7.5 cm I/D galvanized pipe, trench excavation, laying, backfilling, valves $ 75,000.

e. Electric power cable and pole replacement to Kipushi - approximately 3-Km. 40 No. poles at 80 meters spacing, bearer arms/insulators, stays, etc. $ 90,000.

$845,000.

Notes

1) No allowance was included for fencing of site or roadworks as these, if required, will be included in the research station land development estimates.

2) It is understood that national electricity power supply is reliable and that it may not be necessary to install a standby generator. In view of maintaining important seed stores, laboratory work, etc., it may be deemed desirable. If this is so, it is suggested a 100 KVA diesel set be procured, the cost of this plus installation would be approximately $25,000, including control gear and automatic starter facility.

C. GANDAJIKA STATION (near Gandajika in Kasai Oriental Region)

1. General

As in the case of Kanyameshi station the writer did not visit the station and the following is again based on details obtained from individuals.

Gandajika is a well established station with solidly constructed buildings. The main requirement is therefore for rehabilitation work.

2. Existing Structures

10 - Principal staff houses
1 - Main office block containing 8 offices and laboratories. etc..
5 - Green Houses/screen houses
1 - Generator house
1 - Pump station.

The station is about 90 km by road from the region capital Mbuji-Mayi which has an airport but no rail connection. Due to poor state of the roads, it can take 4 hours to reach Gandajika. Gandajika is also about 60 km from Mwenu-Ditu which is on the railway to Lubumbashi. Location and access-wise this station is not so well placed as Kanyameshi. It also is not connected to

the national electric grid and depends on one shallow well for the complete station water supply. Unlike Kanyameshi there is no possibility of a mains water supply.

There was up until about 1977 a pump station near the river which was the water source and this fed directly into a main to the station. There are no underground storage tanks at staff houses except at the Guest House, nor at the main Buildings. It is not known if a high level water storage tank existed so that supply was by gravity when pump station was not working.

All the houses require rehabilitation. In particular they need to be completely rewired and considerable re-plumbing/modernisation work executed. Roofs and ceilings also require considerable attention.

From information given, the overhead supply cables from the generator house to various houses/buildings require replacement. There is a fairly old generator at the station and this can not be relied upon. In addition there are long periods when it can not be operated due to lack of diesel fuel. All fuel has to come in drums from Kinshasa and this can take up to two months. The station has no bulk storage for this fuel. Another constraint is that funds for fuel are intermittently provided.

3. Recommended Rehabilitation Works and Costs

a. Housing

(1) All roofs to be checked over and doubtful sheets replaced. Exterior of roofs to be repainted.

Allow for 10 at $700 Ea. $ 7,000

(2) Repairs to ceilings in all houses. Many in poor state. Suggest Re-Ceiled with all new materials.

Allow for 10 at $2,500 Ea. 25,000

(3) Rewiring of houses with additional power points and replacement of consumer/fuse panels..

Allow for 10 at $2,500 Ea. 25,000

(4) Repairs to water system including replacement of toilets. Showers etc. Installation of electric water heaters to serve kitchen, laundry and bathrooms.

Allow for 10 at $2,600 Ea. 26,000

(5) Various carpentry repair works in houses and minor masonry work.

Allow for 10 at $5,000 Ea. 5,000

(6) Complete internal redecoration of all houses including painting of exterior of windows and doors

Allow for 10 at $1,200 Ea. 12,000

b. Offices and Laboratories

B/FWD 100,000

(1.) Checking roof and replacing sheets as necessary and repainting exterior. Estimated 20,000

(2.) Complete: Redecoration of interior and exterior of windows and doors.

Estimated 15,000

(3.) Repainting of floors Estimated 3,000

(4.) Checking, rehabilitating water and gas lines in laboratories

Allow for 3 labs at $500 Estimated 1,500

(5.) Ceiling repairs Estimated 15,000

c. Greenhouses/Screenhouses

(1) Repairs to glass roofs, replacement of side wall insect screening with aluminised material

Allow for 5 at $3,000 Estimated 15,000

(2) Repainting steel framing after cleaning/preparation/under coating with red oxide paint.

Allow for 5 at $400 Estimated 3,500

d. Water Supply System

(1) Replacement of old pump with new diesel direct drive unit.

Allow 7,000

(2) Repairs to pump house, intake system, fuel tank installation etc...

Allow 3,000

(3) Rehabilitation of main water line to station building etc..

Allow 40,000

(4) Supply and erection of one sectional steel elevated water storage tank c/w all valves and fittings (this preferable to individual house tanks)

Allow 30,000

(5) Supply and installation of one package type water treatment/ purification plant of approximately 20,000 U.S. gallons capacity/day

Allow 25,000

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e. Electricity Supply System and Generators

(1) Supply and installation of 2 250 KVA caterpillar diesel driven generator sets c/w control panels, cooling systems, batteries etc. Generators to be 220/400 volt x 50 HZ x 3 phase

Allow 2 units at $50,000 Ea.	100,000
Installation $ 5,000 Ea.	5,000
(2) Rehabilitation/expansion of generator house	10,000
(3) Supply and installation one U.S. 1000-gallon diesel storage tank c/w water trap and filter	10,000
	10,000
(4) Repairs/renewal of all overhead distribution lines and poles	30,000
	$443,000

Notes

1) No estimates have been included for up-grading on-station roads as they will be included in the station/land development estimates or for boundary fencing. It is understood however the road from the station to nearest adjoining town is unpassable during the wet season except by four-wheel drive vehicles. Some funds may be required for this.

2) In conclusion, the writer has tried to be as objective and precise as possible in preparing these notes/estimates as circumstances permitted. Some items may not be required, others may need increasing/decreasing but from experience of facilities and services necessary on such stations they will come very chose to meeting requirements.

It should be remembered that to attract and keep staff of the correct calibre on these research stations it is essential to provide the services to make their life as near to present day standards in their homes and work places as is possible. This applies to both indigenous and expatriate staff and in particular to their wives and families. The writer would recommend the inclusion of funds to create some recreational facilities at both stations.

ANNEX N

Implementation Plan

ACTION	RESPONSIBILITY AID	GOZ	TECH.SERV. CONTRACTOR	PROCURE-MENT CONTRACTOR	USDA
FY 83:					
4th quarter:					
(1) PP approved	X				
(2) Grant agreement assigned	X	X			
(3) Waivers prepared	X				
(4) Recruit Mgt. Specialist; Deputy	X				
FY 84:					
1st quarter					
(1) Commodity specifications completed			X		
(2) Covenants discussed	X		X		
(3) Request for proposals to purchase commodities	X	X			
(4) First group long term participants nominated		X			
(5) Request for tech. proposal to implement the project	X	X			
(6) Purchasing proposals received				X	
(7) Technical proposal received			X		
(8) FSR short term participants nominated		X			
(9) Procurement contract negotiated	X	X			
(10) Zairian project coordinator named		X			
(11) Request for bids to design/rehabilitate the Kaniemesha Farm		X			
(12) Negotiate contract to rehabilitate M'Vuazi		X			
(13) Complete project financial arrangements		X			
2nd Quarter					
(1) Technical services contract negotiated		X	X		
(2) Staffing pattern developed		X	X		
(3) Personnel recruitment started		X			
(4) Participants processed through the GOZ system		X			
(5) Mgt. Specialist/Deputy COP arrives	X	X	X		
(6) PIO/Ps for long-term participants forwarded	X				
(7) PIO/Ps for FSR participants issued	X				
(8) Short term participants for IARC's nominated		X			
(9) PIO/Cs for major commodities	X	X			

Implementation Plan

ACTION	RESPONSIBILITY AID	GOZ	TECH.SERV. CONTRACTOR	PROCURE-MENT CONTRACTOR	USDA
(10) Call forward for FSR participants for English language training		X			
(11) Procurement of contractor's commodities started			X		
(12) Request for bids to design rehabilitation of Gandajika station		X			
(13) Procurement and shipment begins					
(14) Place long-term participants arrange for English training					
(15) Request for bids to rehabilitate Kaniemesha		X			
3rd Quarter					
(1) Call forward of long term participants	X				
(2) Call forward of short term participants for IARC and CRSP programs	X	X	X		
(3) Request for bids to rehabilitate Kaniama Kasesse		X			
(4) Negoiate contract to rehabilitate Kaniemesha		X			
(5) Negotiate contract to rehabilitate Gandajika		X			
(6) Complete Kikwit farm plan		X	X		
(7) Complete organization of head quarters office		X	X		
(8) Participants depart for language training and short term training	X	X			
(9) Recruitment continued		X			
(10) Procurement continues			X		
(11) French language training for contractors personnel			X		
(12) Short term technical assistance on project organization	X		X		
4th Quarter					
(1) FSR training in-country		X	X		
(2) Rehabilitation of Kaniemesha completed		X			
(3) Kikwit farm rehabilitated		X	X		
(4) Recruitment continues		X			
(5) Rehabilitation at Gandijika completed		X			

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Implementation Plan

ACTION	RESPONSIBILITY AID	GOZ	TECH.SERV. CONTRACTOR	PROCURE-MENT CONTRACTOR	USDA
(6) Vehicles and office equipment arrive		X	X		
FY 85:					
1st Quarter					
(1) Contractor's research agronomist arrives			X		
(2) Second group, long term participants nominated		X			
2nd Quarter					
(1) Long term participants processed through GOZ		X			
(2) PIO/Ps executed	X				
(3) Language tests and training		X			
(4) Farm machinery arrives					
(5) Extension methods course, Project Coordinator/COP arrives		X	X		
(6) Participants placed in universities					
(7) Monitor seed production		X	X		
(8) Contractors Farm Mgr., Plant Breeder, Soil Fertility Agronomist, National Outreach Specialist arrives			X		
(9) Orientation for contract team			X		
(10) Assign and place contract team		X	X		
(11) Annual work plans		X	X		
(12) Research requirements study organized		X			
(13) Arrangements made for interim arrangements for start-up seed production		X			
3rd Quarter					
(1) Project property inventory completed		X	X		
(2) Call forward long term partici-					
(3) Monitor seed production		X	X		
4th Quarter					
(1) Equipment inventories up to date		X	X		
(2) Technical and operational reporting system functioning		X	X		
(3) Nomination of third year participants		X			

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Implementation Plan

ACTION	RESPONSIBILITY				
	AID	GOZ	TECH.SERV. CONTRACTOR	PROCURE-MENT CONTRACTOR	USDA
(4) FSR courses, in-country		X	X		
(5) Research overviews completed		X	X		
(6) Research programs designed		X	X		
(7) FSR/E orientation in Gov't		X	X		
(8) Ag. research requirements study completed	X	X			

ANNEX O-1

TRAINING

Approach

The common thread among alternative approaches to farming systems research and extension (FSR/E) is the selection of relatively uniform sets of conditions for conducting research and implementing change. It allows, firstly, an intensive opportunity to investigate individual farmer conditions, and secondly, to impact on them with improved research options due to established receptivity and relationships.

The approach of FSR/E is certainly true of other forms of agricultural research and development programs that have been carried out for decades. However, the contribution that distinguishes FSR/E from others is its systems orientation, that is, the agricultural researcher studies the farmers' conditions at the outset, keeps these conditions in mind during research and implementation, and uses the knowledge of these conditions in evaluating the results.

FSR/E, therefore, departs from traditional reductionist philosophy of agricultural research which breaks the whole into parts and studies each part more or less independently. FSR/E may be summarized as an agricultural research system that is responsively farmer-based, problem solving, comprehensive, interdisciplinary, complementary, iterative, dynamic, and responsible to the society of agriculturalists.

The guiding philosophy of project 091 is the FSR/E approach, in which research, extension and the farmer are integrated in a holistic system perspective and operate as a team. This approach generates appropriate technology in response to actual farmer needs and with the active involvement of the farmer. It is a novel approach in Zaire, and requires a careful and controlled introduction with few early successes to gain acceptance with all parties concerned. The initiation of such a new program hinges crucially on the availability and appropriateness of training as the catalyzing agent for developing the necessary capabilities.

The training program should satisfy a number of requirements. First, it should build a research management capability with the research division of the Department of Agriculture (DOA). Second, it should introduce the FSR/E philosophy, concepts and practices to all staff directly concerned with the project and actively involved with its implementation. Third, it should provide adequate training in the FSR/E approach for the key implementors; training activities should be tailored to the specific requirements of researchers, research technicians, and extension workers. Fourth, training should emphasize the building of multidisciplinary teams to work as partners with farmers in on-farm research and outreach, the supreme requirement on which the entire FSR/E program is based. Fifth, training in technical specializations should be provided to upgrade skills of existing staff, to allow for staff expansion as a result of project growth, and to groom staff to succeed departing expatriates. Sixth, a slightly larger number of candidates than required should be trained to compensate for normal staff attrition.

And finally, a range of short-term training activities should help maintain the staff's professionalism, interest, and capabilities in its work; it should also act as a motivator and abet the staff's development.

Program

The proposed training program consists of six components: research management, FSR/E orientation, FSR/E training, team-building, participant training, and short-term training. While each component is largely independent of the others and can thus be implemented with little effort at coordination, the training program should be executed in its entirety to offer the needed support for successful project implementation. Training should be viewed as the determining factor between project success and failure; in the long-term, institutional sustainability is ensured by training national cadres and initializing them in decision-making positions.

Research Management-A research management capability would be installed in the DOA; it would be situated in the Service d'Etude as a new division. Its

purpose would be to manage and coordinate all agricultural research efforts at the national level. The research management unit would likely be operational after Year 4 of the project. It would consist of two senior staff, assisted by a staff of planners, evaluators, and financial specialists, directing the unit under the overall supervision of the Permanent Secretary of Agriculture. The two senior staff would obtain an advanced degree in research management at American universities; care should be taken to pursue research management at universities which have adopted the FSR/E philosophy.

FSR/E orientation-All staff associated with the project should be exposed to an orientation course on FSR/E concepts; staff would include DOA personnel dealing with the project--senior ministry officials, research management unit, central coordinating and planning unit (CPU); research station personnel--researchers, research technicians, extension workers; senior regional officials; and USAID personnel--division chiefs and selected staff from the ARD, DEO and HRD offices. Training would be phased over time; DOA and USAID staff would be exposed as early as possible, preferably in Year 0; research station staff and officials of the corresponding region would be trained at the pace of one station per year over the five-year period. For each station, the FSR/E orientation would precede all subsequent FSR/E training and team-building/management training. Initial orientation could take place in a third country; for example, FSSP offers an eleven-day FSR/E seminar in Upper Volta in late September 1983.

(1) Later introductory training courses would be held in-country possibly by the same FSSP team; several offerings per year may be required to cover all concerned research station and extension staff.

FSR/E training-The FSR/E training would address four different audiences: the CPU, the researchers, the research technicians, and the extension workers. While the core of the training course would cover common material, specialized components would respond to the specific requirements of each audience.

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(1) The Farming Systems Support Project (FSSP) is USAID project 936-4099 manged by the University of Florida.

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The role of the CPU would be to supervise and monitor the application of the FSR/E concept in each research station, and to provide technical assistance throughout the introductory process which might extend over up to nine months of a year during a crop season. The CPU would be mobile and attend to one station per year according to a program that would be determined in Year 0. The CPU team would undergo extensive training at an American university offering farming systems courses, such as University of Florida's courses for FSR/E practitioners and that for administrators and managers of farming systems programs; such courses are expected to take typically between six and nine months. It would be desirable to train the CPU team during Year 0.

Training of the entire research station staff would consist of two three-week courses; the first three-week course would be the common in-country training covering a two-week practitioner course followed by a one-week administrator/manager course; the second three-week course would be tailored to the specific audience. Researchers would be trained subsequently in special topics relevant to their work; that training could take place at IITA as part of its farming systems training program. Research technicians would be trained for three weeks in-country in subjects such as data collection, record keeping, setting up field trials, sampling of yields and related tasks. Extension workers would be offered in-country a modified, three-week USDA extension methods course. It is important that the research station staff attend the three-week core program prior to the introduction of the FSR/E concept by the CPU team. The specialized components could be offered during the introductory process. Site-specific adaptations of the training materials and course contents would be provided by the CPU team.

Team-building/management-The very concept of FSR/E is built on multidisciplinary teams cooperating with various actors in a vertically integrated research and extension program actively involving the small farmer in research and outreach work. Hence a deliberate effort should be made to facilitate their cooperation by building coherent teams;

training would consist of a mandatory one-week, abbreviated standard team-building/management seminar dispensed in-country by CENACOF to all research station personnel and the CPU team. (1) The training program would cover basics such as interpersonal skills and attitudes, leadership, delegation, communication and cooperation. Research station staff would be trained during the introduction of the FSR/E concept by the CPU team. Moreover, key managerial staff in each research station would be offered additional in-country training in selected subjects of management. On the average, this training would consist of three one-week courses dispensed by CENACOF, ISNAR or similarly qualified institutions capable of delivering practically oriented courses.

Participant training-The building of a Zairian research institution calls for a gradual replacement of all expatriates with equally qualified national staff. Moreover, some research stations would need to expand their current staff to be able to assume the increased work load resulting from the multi-crop research. Finally, the skills level of some current staff workers needs to be upgraded. Training would range from advanced degree programs in the U.S. to short-term U.S. and third country programs. The project design team has estimated the need for 14 Ph.D. level programs of three years each, with four, six and four candidates starting in Years 0, 1 and 2, respectively; and the need for 20 M.Sc. level programs of two and one half years each, with six candidates each starting in Years 0, 1 and 2, and two candidates starting in Year 3. Two of these M.Sc. candidates would supplement their studies immediately thereafter with three-month training at IITA in recent methods and disciplines.

Short-term training-The design project team has estimated the need to train a total of 24 staff at IARCs, and 7 staff at U.S. universities for various periods in short courses. IITA would offer a three-month course to 15 staff (four each in Years 0, 1 and 2 and three in Year 3). CIMMYT

(1) CENACOF is funded by USAID project 660-0068, Manpower Development Training.

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would offer a six-month course to three staff (one each in Years 1, 2, and 3). CIAT would offer a six-month course to three staff (two in Year 2 and one in Year 3). ICRISAT would also offer a six-month course to three staff (one each in Years 1, 2 and 3). Two staff in Year) and 1 in Year 1 would attend a six-month course at the University of Florida; four staff (two in Year 1 and two in Year 3) would attend a one-month course at other U.S. universities.

In addition, short-term technical in-country training would offer research station staff an opportunity to participate in workshops, seminars and professional meetings designed to sustain their interest in their work and to provide a career development incentive. Some of these seminars would concern periodic foodcrop technical seminars organized to discuss new varieties and techniques developed during the preceding period. Budgetary provisions might be made to accommodate 50 participants each year for a one-week training activity.

Organization

The administration of the multifaceted training program requires a single, central coordinator. This mission should be entrusted to CENACOF, the Zairian national training center. CENACOF's responsibility would consist of cooperating closely with USAID/ARD in the planning, coordination and execution of the training program. It is well suited for the task by its current mandate to coordinate all national training related to development. In addition to dispensing its own team-building/management courses and to providing logistics support, CENACOF would administer (1) the participant training program with USDA as executing agency; (2) all training that requires the services of IARCs in general, and those of IITA as prime technical assistance contractor in particular. The Government of Zaire's DOA would be its main client by providing the majority of trainees. USAID/ARD would act as project director.

Budget

Yearly costs of the training program and costs of individual training program components are given in Financial Plan Tables K-3 and K-6. Unit costs and transportation costs are given in Table 1 which follows.

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Table 1

COST ASSUMPTIONS OF TRAINING
(per participant)

Advanced degrees		
Tuition and expenses, per year (assumes 90% of participants will be accompanied by spouse with two children)		$ 28,000
Roundtrip airfare		$ 6,000
Length of stay - Ph.D.		3.0 yrs
- M.Sc.		2.5 yrs
FSR/E orientation		
(1) Third-country course	Per diem (per day)	$ 100
	Roundtrip airfare	1000
(2) In-country course	Per diem (per day)	Z 600
	Transportation costs	Z 2,000
FSR/E training		
(1) CPU team	Tuition and expenses	$ 14,000
	Roundtrip airfare	$ 6,000
(2) In-country programs	Per diem (per day)	Z 600
	Transportation costs	Z 2,000
(3) Researcher component	Per diem (per day)	$ 120
	Roundtrip airfare	$ 500
Team-building/mangement		
Tuition		Z 150
Per diem (per day)		Z 600
Transportation costs		Z 2,000
Participant/short-term training		
Expenses (per month)		$ 800
(1) IITA	Tuition (per month)	$ 1,000
	Roundtrip airfare	$ 500
(2) CIMMYT	Tuition (per month)	$ 1,300
	Roundtrip airfare	$ 3,000
(3) CIAT	Tuition (per month)	$ 1,200
	Roundtrip airfare	$ 3,000
(4) ICRISAT	Tuition (per month)	$ 600
	Roundtrip airfare	$ 3,000
(5) U.S. University	Tuition (per month)	$ 1,800
	Roundtrip airfare	$ 3,000

USAID financed participant training

Over the years, USAID has financed advanced degree training for Zairian nationals in various disciplines. The table below summarizes the status of the M. Sc. and Ph.D. programs for six projects currently under implementation.

		M. Sc.			Ph.D.		
Project Number	Project Name	Completed thru 82	In process	Total	Completed thru 82	In process	Total
052	Ag. Economic Devt.	24	9	33	-	1	1
059	North Shaba	5	-	5	3	-	3
064	INERA Support	-	6	6	-	-	-
068	Manpower Devt.	-	8	8	-	1	1
070	Ag. Sector studies		7	7	-	1	1
077	Cassava Outreach	10	5	15	1	1	2
Total		39	35	74	4	4	8

For every Ph.D. candidate, nine Zairians pursue a Masters Degree. Slightly more than half of the 74 masters study programs were completed at the beginning of 1983, with most graduates returning to their jobs or working for their old organization. Four of the eight Ph.D. candidates had completed their studies by March 1983.

Under project 052, Agricultural Economic Development, 50 scholarships have been awarded; 1 Ph.D., 36 M.Sc. and 13 Diploma-I.S.P.C. scholarships. Five candidates did not complete or do not intend to complete their studies three Masters and two Diploma level students.

Under project 059, Project North Shaba, eight scholarships were awarded--three Ph.D. and five M.Sc. At present, all M.Sc. candidates plan to complete their studies; the Ph.D's have all completed their studies.

Under project 064, INERA Support, six M.Sc. scholarships have been awarded; none has terminated his program yet.

Under project 068, Manpower Development, nine scholarships have been awarded--one Ph.D., four M.Sc. and four M.P.H.; none has terminated his program yet. The current Ph.D. will have his first academic year under 068; subsequent years under 091; the four M.Sc. will be carried under 091. The four M.P.H. will complete degrees at Tulane by August 1983.

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Under project 077, Cassava Outreach, 54 scholarships are scheduled to be awarded--6 Ph.D., 16 M.Sc., and 32 technician level. Only 2 Ph.D. candidates have started their studies; 1 of which has now finished; 4 remain to be identified. Of the 32 technicians receiving para-professional training at IITA, 27 have successfully terminated their training.

ANNEX O-2

INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE

Oyo Road, PMB 5320, Ibadan, Nigeria • Telephone: 413244/413315/413440 • Cable: TROPFOUND, IKEJA
Telex: TROPIB NG 31417 and TDS IBA NG 20311 (Box 015)

IITA TRAINING PROGRAM

The International Institute of Tropical Agriculture (IITA) is a non-profit, non-governmental organization that was established on 27 July 1967 by official decree of the Federal Military Government of Nigeria. It constitutes one of the principal parts of a world-wide complex of centers created for agricultural research and training. The Government of Nigeria provided 1,000 hectares of land adjacent to the city of Ibadan as a site for the Institute while The Ford Foundation furnished the initial investment for its construction and development.

Financial support for the Institute (as with the other centers) is, for the most part, assured through the Consultative Group for International Agricultural Research (CGIAR), a non-governmental body composed of various donors, including governments, foundations, development banks and other agencies. Additional funds are granted directly to the Institute by various bodies for specific activities of research or training.

A Board of Trustees, composed of representatives of many nations, including developing nations served by IITA, presides over the affairs of the Institute.

The mandate that has been conferred upon the International Institute of Tropical Agriculture, by agreement and arrangement with the twelve other members of the family of International Agricultural Research Centers (IARCs), is to conduct research and training on the principal food crops and the farming systems of the world's humid and sub-humid tropics in view of increasing both the quality and quantity of food produced in these regions.

Lagos/Ikeja Office: Plots 531 & 532 Ogba Road, Ogba Estate P.O. Box 145, Ikeja Telephone: Lagos 933931

The Institute has organized its activities around five major programs, four research programs and the Training Program. Each of the research programs is composed of an integrated team of scientists representing several disciplines:

The Cereal Improvement Program has been assigned the responsibility for the improvement of maize and rice in Africa.

The Grain Legume Improvement Program has assumed responsibility for the improvement of cowpea world-wide and the improvement of soybeans in the tropics, with emphasis on Africa.

The Root and Tuber Improvement Program has assumed responsibility for such tropical roots and tubers as cassava, cocoyam, sweet potatoes and the African yams.

The Farming Systems Program that assists the other programs by communicating information obtained through research in such areas as agroclimatology, agricultural economics and socio-economics, agricultural engineering, soil chemistry, soil fertility, soil physics, soil microbiology, farming systems agronomy and weed science.

In addition to the major research programs cited above, the Institute operates a Genetic Resources Unit and a Virology Unit to provide services for the crop improvement programs and to maintain a genebank for the crops for which the Institute is responsible under its mandate and for other tropical crops of interest or potential interest for human consumption or soil improvement.

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The fifth major program is the Training Program. From its creation in 1967, IITA established as goals to increase the number of scientists with competence in tropical agriculture and to augment the professional capital of developing countries of the tropics to assist them in solving food production problems with their own expertise. Training is, perhaps, the most effective and durable of all available means to accomplish these goals and to create cooperative links between national and international programs.

From the earliest days of the Institute, the staff of IITA, through the Training Program, have taken up the challenge of reinforcing national programs for agricultural research and food production. Over the period of thirteen years since training activities began, they have trained more than 2,500 persons, citizens of 82 countries of the world.

To facilitate the attainment of the training goals cited above, for diverse populations of agricultural research and extension personnel, the Institute has created five categories of training:

The Degree-related Research Training Program through which graduate students conduct at IITA the research portion of their degrees under the supervision of Institute scientists working as adjunct members, either formally or informally, of the student's graduate program committee.

The Non Degree-related Training Program through which arrangements are made for individuals to be trained to higher levels of competency in a broad spectrum of subject matter areas.

The Vacation Student Research Scholarship Program by which scholarships are offered to final year students of faculties and university-level schools of agriculture in Africa. The students conduct three to four months of research at IITA during their last long vacation as undergraduates, working under the supervision of Institute scientists. Through this program, IITA has established first contacts with many of the young universities of Africa, has identified students with talent in agricultural research and has motivated them toward further studies and careers in this field.

The Senior Research Fellowship Program that was started in later years to meet the needs of doctoral-level researchers in Africa, to provide the opportunity to conduct, for short periods of several months, research at IITA in areas of common interest and to become familiar with the Institute's program and personnel.

The Group Courses Program under which many courses in a wide range of subject matter areas are offered each year in both French and English for groups of from ten to forty persons with common training needs and goals. Typically, the Institute offers three long-term training courses each year in crop production technology and extension, one in grain legumes, one in tropical roots and tubers and one in either rice or maize, plus shorter, intensive, courses in crop production or aspects of crop production and courses in various technical areas.

An assortment of announcements for various training courses to be offered in 1984 is attached as Appendix I.

An informational brochure, "La Formation à l'IITA, is attached as Appendix II. The areas in which the Institute is competent to offer high-level training for agricultural workers is the subject of a list attached as Appendix III.

During 1982, the Institute provided research supervision for 64 M. Sc.-level and doctoral students from fourteen universities of Africa, Europe and North America. In addition, it received 26 persons for non degree-related training, eleven Vacation Student Reserch Scholars and 554 group course participants. Twenty-one group courses were offered during the year,of which two were conducted in Cameroon and one in Upper Volta.

Facilities at the Institute's Ibadan site to accommodate training activities and training program participants include an office block, two classrooms for bi-lingual instruction, a workshop area, dining and recreational facilities and single and double rooms that can accommodate up to 130 participants at one time. The Institute employs, in addition to two training officers, four persons who work as translator/interpreters to assure high quality simultaneous or consecutive interpretation of all lectures, presentations and discussions and translation of training materials. A director of training, employed at the Assistant Director level, assures the coordination of IITA's training activities.

The Institute does not charge tuition for training program participants. To cover costs of those residing at IITA during training, there is a monthly Training In-residence Rate that is applied. This covers the following benefits and allowance:

- food, lodging and laundry services through the IITA residence halls complex
- accident insurance (modest group coverage);

- limited local transportation and training-related transportation;
- training supplies and materials;
- medical care in Nigeria through the IITA Medical Unit;
- a monthly stipend for personal expenses of eighty Nigerian naira for group course participants and the naira equivalent of US$150 for postgraduate students.

The current amount of the Training In-residence Rate is US$1,000 or equivalent monthly. The Rate is subject to change, as the cost of providing goods and services in Nigeria requires.

In addition to the training activities that are conducted at the IITA site at Ibadan, the Institute's Training Office, by arrangement, assists postgraduate students to find research locations in particular ecological zones. It is also open to assisting with group courses that are organized at the IITA site by international organizations or universities and with in-country training courses that are organized for national programs. Concerning the latter, though no consultant fees are charged, the sponsoring agency is expected to cover all travel and local costs of IITA personnel involved in the course.

CROP PRODUCTION TECHNOLOGY AND EXTENSION

The Institute's crop production technology and extension courses are designed for research workers and extension supervisors nominated by national governments, international organizations, universities, commercial companies and private agencies that are involved in improvement programs for the crop(s) on which training is offered. The subject matter covered by the crop courses includes all aspects of the production, protection and improvement of the crop(s) as well

as units on economic considerations, statistics, extension methodology and communications techniques. During the course, the participants plan and establish applied research trials. They organize and conduct a farmers' field day to present and discuss the results of their applied research trials and demonstration plots and, for the longer courses, they plan and conduct a week-long intensive training course in the crop(s) for Nigerian extension personnel, nominees from World Bank agricultural development projects and progressive farmers. From 1984, the Institute is considering the addition of a week-long unit in research management, to be conducted by representatives of the International Service for National Agricultural Research (ISNAR).

The length of the crop production technology and extension courses offered by IITA is, at present, eight weeks for cowpea/soybeans, eleven weeks for tropical roots and tubers and thirteen to fifteen weeks for the cereals, rice and maize. The length of each course would be increased by one week if the Institute is successful in including in the subject matter of the courses a unit in research management.

The current 1984 training schedule provides for a course in cowpea/soybeans to be conducted from 9 January through 2 March (see announcement attached), the 11th annual training course in tropical roots and tubers, to be offered from May to July, and a course in rice production technology and extension, to be offered from September to December.

The 1985 program will probably include courses in cowpea/soybeans, tropical roots and tubers and maize, the latter tentatively to be offered early in the year.

CONSIDERATIONS REGARDING TRAINING UNDER THE PROPOSED USAID/ZAIRE PROJECT No. 660 - 0091, "APPLIED AGRICULTURAL RESEARCH".

Practical Training for M. Sc. Graduates. IITA is in a position to receive M. Sc. graduates under the project for practical training in research. Institute scientists have expressed the opinion that the length of stay in Nigeria should be, as a minimum, the length of the cropping season, to permit the graduate to plan and complete an applied research project under the supervision of an Institute scientist.

Postgraduate Research Supervision for Ph. D. Candidates. The Institute possesses the capacity to receive numerous candidates from universities all over the world to conduct the research portion of their doctoral programs. A list of areas in which research supervision is available at IITA is attached as Appendix III.

Short-term Training. The Institute is open to providing short-term training in group courses for qualified candidates that may be nominated for crop production technology and extension training under the Project. It is also open to providing non degree-related individual courses of training in subject matter areas that are not covered under the group courses.

Tentatively, the Institute may reserve places in each of its 1984, 1985 and 1986 crop production technology and extension courses for as many as seven Project nominees, providing they meet the minimum qualifications for admission (see Appendix IV,"Selection Procedures for Training Program Participants".)

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In-country Training. The IITA Training Office is willing to assist with the planning of training courses to be held on Project main stations, should it be requested to do so and as time permits. In addition, it is willing to provide, at cost, all relevant training materials that are available for distribution.

Ingénieur Agronome Research Study Supervision on Central Stations. The opportunity exists from Year Zero for Ingénieur Agronome candidates at the Institut Facultaire d'Agronomie (IFA), Yangambi, to conduct the research portion of their degrees at Project central stations under the supervision of Project scientists. Provision for the financing of such IFA/Project collaboration could perhaps be made with counterpart funds.

Housing at IITA for Married Students. In the Institute's residence halls complex, there are 24 one- and two-bedroom apartments for short-term personnel and for doctoral students who are conducting at IITA the research portion of their degrees and who can arrange to be accompanied by their families.

Apartments must be reserved well in advance. The Institute discourages students from bringing their families to IITA in the absence of available housing. In cases where apartments are available for assignment to postgraduate students, there are no budgetary implications for the sponsoring agency. Rent is covered under the Training In-residence Rate. The amount of the Rate that is for food is remitted directly to the student monthly, in advance, for the purchase of food, to be prepared in the apartment kitchen.

Appendix III. AREAS OF TRAINING COMPETENCY AT IITA

Cereal Improvement Program (Rice and maize)	Agronomy Breeding Entomology Pathology	
Grain Legume Improvement Program (Cowpea and soybeans)	Agronomy Breeding Entomology	Microbiology Pathology
Root and Tuber Improvement Program (Cassava, cocoyam, sweet potato, yams)	Agronomy Breeding Entomology/Biological Control of Insect Pests	Nematology Pathology
Farming Systems Program	Agricultural Economics Agricultural Engineering Agroclimatology Farming Systems Agronomy Microbiology	Socio-economics Soil Chemistry Soil Fertility Soil Physics Weed Science

Agricultural Librarianship*

Agricultural Machinery/Maintenance and Repair*

Agricultural Photography and Graphic Representation*

Agricultural Writing*

Farm Management*

Genetic Resources Conservation

Soil and Plant Analysis*

Virology (across crops)

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*Postgraduate degree supervision not available.

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Appendix IV. SELECTION PROCEDURES FOR TRAINING PROGRAM PARTICIPANTS

Individual Programs.

Degree-related.

1. Applications are received through university authorities. The applicatio is expected to state the degree pursued by the student and the area in which the research would be conducted.
2. If the area in which research is to be conducted is an area of supervisory competency for IITA, the file is referred to the most appropriate scientist in the area of study with a request to review the file and react to it.
3. If the scientist does not agree to supervise the student, a "regrets" letter is written.

   If the scientist agrees to supervise the student, he or she corresponds with the student and the university concerning the research project proposal.
4. When the research project proposal is well-defined and acceptable to all parties (student/university/IITA), the file is submitted to the appropriate IITA program leader and Director of Research for approval.
5. Arrangements are made for receiving the student.

Non Degree-related.

1. Applications are received through the employer or other body representing the employer. The applicant and the employer both are required to state the nature and extent of the training deficiency for which additional training is sought.

2. If the area in which training is required is not an area of supervisory competency, a "regrets" letter is written.
   If the area is an area of competency for the Institute, the most appropriate potential supervisor is identified and requested to review and react to the application/nomination. If he or she agrees to supervise the candidate, he or she is expected to submit a program that would attain the objectives of the training,as made clear in the description of the training deficiency, and to suggest a time frame, including starting date and length of the proposed training program.
3. The proposed program is submitted to the supervisor's program leader for review and approval, and, subsequently, to the nominating agency for review and reaction.
4. If/when the program and time frame are acceptable to all parties, arrangements are made to receive the candidate at the Institute.

Group Courses.

1. Course announcements are distributed widely and applications solicited.
2. Applications, accompanied by letters of nomination from the employer or his representative are filed until the closing date for applications.
3. Shortly following the closing date, a committee composed of scientists and training personnel reviews the applications and decides on those to be offered admission to the course.
4. Letters of admission or regrets are mailed. Letters of admission include travel and arrival information and additional information concerning the course.

In general, the level of qualification required for crop production technology and extension courses is from two years of post secondary agricultural studies to Master of Science (Ingénieur Agronome) in agriculture. In its consideration of applications/nominations, the Selection Committee pays particular attention to the field experience of the applicant,or the lack of it, and to the project to which the applicant would return following training. In this regard, it seeks to admit for training those who would have the opportunity to exercise their training in their places of employment following the course. In its considerations, it also assesses the possibility that the training, if offered, would result in increased collaboration between IITA and the project respresented by the candidate.

When applications/nominations are expected to be received from IITA International Programs project personnel, special concessions are accorded regarding numbers of candidates to be admitted. Also, the selection of candidates for training under the project is left to the IITA project representatives. Nevertheless, applications/ nominations must be submitted for each candidate.

The above thirteen pages of text, entitled "IITA TRAINING PROGRAM", were submitted on 25 June 1983 by Dr. Wade H. Reeves, Assistant Director of the International Institute of Tropical Agriculture, Head of Training.

Annex P

Job Descriptions

In a joint effort, The Government of Zaire (GOZ) and the United States Agency for International Development (AID) are contracting to provide technical support and germ plasm to local extension/outreach organizations engaged in assisting farm families in the amelioration of their socio-economi circumstances. The contracted services include farming systems research, "traditional" applied research, and "outreach" or extension support. Project headquarters will be in Kinshasa. Applied biological and soils research will be conducted at three or more agricultural experiment stations. Adaptive research will be conducted both at the stations and on private, small-scale farms.

Farming systems research and extension support will be included in the regional efforts. The extension support or "outreach" service will be locate in the capitol city of the region.

Housing is considered comparable with American middle-class standards. Schools are adequate in Kinshasa, but are likely to be inadequate or non-existent at the regional posts. Health facilities in the remote areas ma be limited.

A. Chief of Field Party (54 Person Months (PM))

1. Purpose: To provide administrative and professional management of the contractor's efforts; to provide technical counsel to the Zairian counterpart project co-director; and with him or her, to implement the project.

2. Duties and Responsibilities:

a. Act as the chief project implementation officer and resident representative to the GOZ on behalf of the contractor and USAID.

b. Delegate tasks to members of the contractor's personnel assigned in-country to the 091 project; provide counseling and supervision for these employees; assume responsibility for each employee's work and conduct.

c. Bear the contractor's responsibility for the orderly implementation of the project.

d. Share the post of Project Director with the appointed GOZ official and work in cooperation with this individual to successfully implement the project.

e. With the Co-director, jointly approve and take responsibility for project local currency expenditures.

f. Share the overall accountability for project property with the Co-director.

g. Assist the Co-director in improving his or her skills in the administration of agricultural development services through day-to-day, on-the-job training activities.

3. Working Conditions: The Chief of Party will be based in Kinshasa; 25 percent travel.

4. Controls over Work: The Chief of Party must adhere to both the general standards of conduct for US Government employees abroad and the personnel co of the contractor. The Chief of Party responds to the contractor.

5. Qualifications:

a. Citizenship: US citizen.

b. Education: Ph.D. in agronomy, soils or agricultural economics (production).

c. Experience: Five years of notably successful experience in agricultural development project management. Overseas experience highly desirable.

d. Language: Bi-lingual in English and French with French at the FSI S-3 level.

B. Agronomist (Research) (2): (48 PM & 96 PM)

1. Purpose: To design and supervise integrated cropping systems research including maize, manioc and grain legumes in five regions of Zaire.

2. Duties and responsibilities:

a. Collaborate with the farmings systems and soil fertility agronomists i conceptualizing the general cropping systems research programs.

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b. Advise and assist the project research teams in the design and implementation of the regional agronomic research of the project, including integrated cropping systems and soil fertility maintenace.

c. Devise and implement on-the-job training activities for the professional improvement of Zairian counterparts.

3. Working Conditions: The Agronomist will be based in Kinshasa; 30 percent travel.

4. Controls over work: The Agronomist must adhere to both the general standards of conduct of US government employees abroad and the personnel code of the contractor. The Agronomist responds to the field Chief of Party.

5. Qualifications:

a. Citizenship: US citizen.

b. Education: Ph.D. in agronomy with emphasis on soil fertility and crop physiology.

c. Cultural-emotional disposition: Able to share responsibilities and honors with peer and junior host citizen colleagues.

d. Experience: Notable accomplishments in tropical agronomy.

e. Language: Bilingual in English and French with French at the FSI S-2 level. (60 PM)

C. Agronomist (Soil Fertility) (42 PM)

1. Purpose: To provide expert consultation on economically significant soil problems within the scope of the project and to assist in the design and implementation of the regional cropping systems research programs.

2. Duties and responsibilities:

a. At his or her resident location, design and supervise a soil fertility research program with the objective of fertility maintenance through low level inputs.

b. Participate in the design and supervision of cropping systems sub-projects to be carried out on and off the regional research stations.

c. Consult on the technology and propriety of soil classification within the scope of the project.

3. Working conditions: 50 percent travel; based in Kinshasa.

4. Controls over work: (same as 4 above).

5. Qualifications

a. Citizenship: US citizen.

b. Education: Ph.D. in Agronomy with emphasis in soil fertility and plant physiology. Alternatively, M.S. in soils and a Ph.D. in general agronomy, or a M.S. in general agronomy and a Ph.D. in soils.

c. Cultural-emotional disposition: Able to share responsibilities and honors with peer and junior host citizen colleagues.

d. Experience: Three years of successful experience in the study of tropical soils and crop management.

e. Language: Bi-lingual in English and French with French at the FSI S-2 level.

D. Plant breeder (Maize): (30 PM)

1. Purpose: To act as a plant breeder and to assist host country scientists in gaining adequate experience to "take over."

2. Duties and responsibilities:

a. Assist in evaluating and updating the PNM maize breeding program.

b. Responsible for maize improvement research programs in one primary and four secondary stations.

c. With the Zairian maize breeders, lead the implementation of an integrated crop improvement research program (including maize, grain legumes and manioc.) at the resident station.

d. Provide regular and special consultation on crop improvement and farming systems research in the four other regions.

e. Design and monitor the on-the-job training activities of Zairian counterparts and subordinates.

3. Working conditions: 30 percent travel; based in Lubumbashi.

4. Controls over work: The Plant Breeder must adhere to both the general standards of conduct for US government employees abroad and the personnel code of the contractor. The Plant Breeder responds to the contractor.

5. Qualifications:

a. Citizenship: US citizen.

b. Education: M.S. degree in plant breeding with special emphasis in maize.

c. Experience: Three years of successful experience as a lead maize breeder and experience with composites.

d. Cultural-emotional disposition: Ability to share responsibilities and honors with peer and junior host citizen colleagues.

e. Language: Bi-lingual in English and French with French at the FSI S-2 level.

E. Plant Breeder (Grain Legumes): (42 PM)

1. Purpose of the position: To act as the grain legumes plant breeder while host country citizens are in training.

2. Duties and responsibilities:

a. Continue to develop a plant breeding and improvement research program for grain legumes including, but not restricted to, soybeans, edible beans (*Phaseolus*) and cowpeas (*Vigna*).

b. Give attention to pertinent secondary crops included in cropping systems research at the station.

c. Design and implement a practical means of preserving pertinent germ plasm.

d. Recommend cultivars for "release".

e. Produce the appropriate quantities of breeder seed for the cultivars to be "released."

f. Devise and conduct systematic, on-the-job training programs for host citizen counterparts and junior officers.

3. Working Conditions: 30 percent travel; based in Lubumbashi.

4. Controls over work: The Plant Breeder must adhere to both the general standards of conduct for US government employees aboard and the personnel code of the contractor. Responds to the contractor.

5. Qualifications:

a. Citizenship: US citizen.

b. Cultural-emotional disposition: Able to share responsibilities and honors with counterpart and junior host citizen colleagues.

c. Education: M.S. degree in plant breeding with special emphasis in grain legumes.

d. Experience: Three years of notable accomplishments as a lead plant breeder in a grain legume improvement project.

e. Language: Bi-lingual in English and French with French at the FSI S-2 level.

F. Entomologist: (24 PM)

1. Purpose of the position: To act as the project entomologist while a host country citizen is in training.

2. Duties and responsibilities:

a. Design and implement integrated pest management research programs in each of the project's operating regions. This may include selection for resistance, biological control, crop management, selection of chemical interventions and other procedures with the objective of an acceptable level of pest damage with minimal cash input.

b. Evaluate on-farm, post-harvest losses of maize and grain legumes; design, test and recommend integrated pest management precedence for pest control.

c. Devises and conducts a systematic, day-to-day, on-the-job training program for host country counterparts and juniors.

3. Working Conditions: 40 percent travel; based in M'Vuazi.

4. Controls over work: The Entomologist must adhere to both the general standards of conduct for US Government employees aboard and the personnel code of the contractor. The Entomologist responds to the contractor.

5. Qualifications:

a. Citizenship: U.S. citizen.

b. Cultural-emotional disposition: Able to share responsibilities and honors with counterpart and junior host citizen colleagues.

c. Education: Ph.D. in economic (agricultural) entomology.

d. Experience: Three years of successful experience in integrated agricultural pest management.

e. Language: Bilingual in English and French with French at the FSI S-2 level.

G. Plant Pathologist: (24 PM)

1. Purpose: To act as the project plant pathologist while host country citizens are in training.

2. Duties and responsibilities:

a. Assist the regional project research teams in designing disease resistance studies and crop improvement programs; perform comparative evaluations and screening of nursuries.

b. Monitor the implementation of programs described above.

c. Design and implement a such programs at the resident station.

d. Participate in recommendations to "release" varieties.

e. Devise and conduct a systematic, on-the-job training program for host country counterparts and juniors.

3. Working conditions: 40 percent travel; based in M'Vuazi.

4. Controls over work: The Plant Pathologist must adhere to both the general standards of conduct for US Government employees abroad and the personnel code of the contractor. The Plant Pathologist responds to the contractor.

5. Qualifications:

a. Citizenship: U.S. citizen

b. Cultural-emotional dispostion: Able to share responsibilities and honors with counterpart and junior host citizen colleagues.

c. Education: Ph.D. in plant pathology.

d. Experience: Three years of notable accomplishments as the lead pathologist in a plant improvement project. Tropical experience and experience with grain legume and maize disease control is desirable.

e. Language: Bi-lingual in English and French with French at the FSI S-2 level.

H. Agronomist (FSR): (24 PM)

1. Purpose: To act as the project agronomist on a mobile farming systems research and extension team charged with introducing and institutionalizing the FSR/E approach in Zaire.

2. Duties and responsibilities:

a. Lead and participate in multidisciplinary farming systems diagnostic surveys.

b. Assist in designing and testing technology for small farmers, involving both on-station research and on-farm research where trials will be established and monitored.

c. Advise and train employees in all aspects of the farming systems approach to research and extension. Work closely with at least two other members of a farming systems team (a social anthropologist or rural sociologist and an agricultural economist) in preparing and delivering short courses in FSR/E methods.

d. Provide informal training and consultation to regional and subregional research and extension personnel.

3. Working Conditions: Based in Kinshasa; 50 percent travel.

4. Controls over work: The FSR Agronomist must adhere to both the general standards of conduct for US government employees abroad and the personnel cc of the contractor. The FSR Agronomist responds to the contractor's Chief of Party.

5. Qualifications:

a. Citizenship: U.S. citizen.

b. Education: Agronomy in a broad spectrum; Ph. D. preferred. FSR/E training or recognized subsitutable experience required. Multidisciplinary training desirable.

c. Experience: African experience highly desirable. Demonstrated ability to work on multidisciplinary teams.

d. Language: Bi-lingual in English and French with French at the FSI S-3 level.

I. Agricultural Economist (Production, Farm Management): (24 PM)

1. Purpose: Act as the Economist on a mobile farming systems research and extension team charged with introducing and institutionalizing the FSR/E appraoch in Zaire.

2. Duties and responsibilites:

a. Participate in and lead multidisciplinary farming systems in administering diagnostic surveys.

b. Analyze and compare alternative technology using economic analysis during on-farm trials of the technology alternatives.

c. Advise and train employees in the economic aspects of the farming systems approach to research and extension. Work closely with at least two other members of a farming systems team (a social anthropologist or rural sociologist, and an an agronomist) periodically preparing and delivering shc courses on FSR/E methods.

d. Provide informal training and consultation to local research and extension personnel.

3. Working Conditions:

Based in Kinshasa; 50 percent travel.

4. Controls over work: The Agricultural Economist must adhere to both the general standards of conduct for US government employees abroad and the personnel code of the contractor. The Agricultural Economist responds to the contractor.

5. Qualifications:

a. Citizenship: U.S. citizen.

b. Education: Ph.D. in Agricultural Economics (production), multidisciplinary studies preferred (i.e. including agromony, social anthropology or rural sociology). In place of substitutable experience, special training in farming systems research and extension is desirable.

c. Experience: Effective work as a member of a multidisciplinary team. African experience desirable. On-farm research and simple practical research necessary.

d. Language: Bi-lingual in French and English with French at the FSI S-2 level.

J. Social Anthropologist or Rural Sociologist: (24 PM)

1. Purpose: To act as the project anthropologist or rural sociologist on a mobile technical farming systems research and extension team charged with introducing and intitutionalizing the FSR/E approach in Zaire.

2. Duties and responsibilities:

a. Participate in and lead multidisciplinary farming systems diagnostic surveys.

b. Assist in designing and testing technology for small farmers; interact with farmers to monitor their reactions to new technology as it is developed and refined through on-farm testing.

c. Advise and train in all anthropological/sociological aspects of the farming systems approach to research and extension. Work closely with at least two other members of a farming systems team (a general agronomist and an

agricultural economist) and periodically prepare and deliver short courses on FSR/E methods. The courses should communicate both the holistic systems perspective and diagnostic survey (the ethnographic interview and methods for eliciting farmer decision criteria) and subsequent monitoring process.

d. Give informal training and consultation to local research and extension personnel.

3. Working conditions: Based in Kinshasa; 50 percent travel.

4. Controls over work: (See above job description.)

5. Qualifications:

a. Citizenship: U.S. Citizen.

b. Education: Ph. D. in Social Anthropology or Rural Sociology preferred. Special training in farming systems research and extension methods or comparable verifiable experience. Multidisciplinary background (i.e. agronomy on agricultural economic) desirable.

c. Experience: Long-term work experience at African village level, preferably Zaire. Demonstrated ability to work on a multidisciplinary team.

d. Language: Bi-lingual in French and English with French at the FSI S-2 level.

K. Outreach Specialist, National: (54 PM)

1. Purpose: Plan, lead and implement the outreach program.

2. Duties and responsibilities:

a. With Zairian couterparts, act as the outreach program representative to the project director and other national and regional government officers.

b. Assist Zairian counterparts in designing and implementing annual and life-of-project work plans for the outreach service.

c. Participate in the planning and implementation of farming systems research and extension.

d. Make a long term, in-country training plan for change agents; write syllabi and develop teaching materials; counsel and supervise trainers in indigenous communication systems organization and other extension methods.

e. Monitor the implementation of the outreach service and assist in revising the outreach "package" as experience may necessitate.

f. Supervise one to four expatriate regional extension advisors.

3. Working conditions: 50 percent travel; based in Kinshasa.

4. Controls over work: The Outreach Specialist must adhere to both the general standards of conduct for US government employees abroad and the personnel code of the employing contractor. The Outreach Specialist responds to the contractor's Chief of Party.

5. Qualifications:

a. Citizenship: U.S. citizen.

b. Education : B.S. degree in agricultural education or applied plant science; M.S. or M.Ed. degree with a major or minor in extension education.

c. Experience: Five years of notably successful experience in the U.S. agricultural extension system. Although experience in the U.S. foreign service is important, it is not necessarily a qualifying factor.

d. Language: Able to teach extension methods in French.

L. Outreach Specialist, Regional (2): (24PM),(24PM)

1. Purpose: To serve as the regional extension advisor.

2. Duties and Responsibilities:

a. With Zairian counterparts, represent the regional outreach program to the officers of the regional government and other interested parties in the region.

b. Assist Zairian counterparts in designing and implementing the project's outreach services in the assigned region.

c. Participate in the implementation of farming systems research and extension.

d. Assist in devising one or more "packages" of procedure that may be followed by cooperating groups to receive project services.

e. Monitor the implementation of the regional outreach service.

f. Assist in training of those individuals who will teach extension methods to change agents in the regions.

3. Working and living conditions: Based in the regional capital.

4. Controls over work: The Outreach Specialist must adhere to both the general standards of conduct for US government employees abroad and the personnel code of the contractor. The Outreach Specialist responds to the National Extension Advisor.

5. Qualifications:

a. Citizenship: U.S. citizen.

b. Cultural-Emotional disposition: Able to share responsibilities and honors with peer and junior host citizen colleagues.

c. Education: B.S. degree in agricultural education or applied plant science; special training in extension methods offered by a U.S. land grant university.

d. Experience: Two years of notably successful experience in agricultural extension. Although prior foreign service is important, it is not necessarily a qualifying factor.

e. Language: Bi-lingual French and English with French at the FSI S-2 level.

M. Farm Manager, Physical Plant Services and Maintenance Specialist: (30PM)

1. Purpose: To implement farm development and improvement on the project's main and substations; to be responsible for all aspects of project mechanization, transport and research vehicles, including fixed processing machinery, procurement of spares, and maintenance of inventory.

2. Duties and Responsibilities:

a. Maintain and service physical plant and all equipment used on both mai and substations of the project, including electricity, water, etc.

b. Implement or organize the maintenance of all buildings, including residences, offices and stores; check all construction to conform with contracted specifications.

c. Design and install any irrigation or drainage systems which may be required.

d. Install soil and water conservation structures when and where required to stablize research plots.

e. Impart on-the-job training in research station development, management, and agricutural mechanization to engineers, supervisors, and technicans.

f. Control the movement of equipment, technical personnel and supplies between research station.

g. Organize and manage site staff to carry out maintenance services in support of research activities.

3. Working Conditions: 50 percent travel; based in M'Vuazi.

4. Controls over work: The Farm Manager must adhere to both the general standards of conduct for US Government employees abroad and the personnel code of the contractor. The Farm Manager responds to the contractor's Chief of Party.

5. Qualifications:

a. Citizenship: U.S. citizen.

b. Cultural-emotional disposition: Able to share responsibilities and honors with host citizen counterparts and junior personnel.

c. Education: B.S. in Agricultural Engineering or equivalent training.

d. Experience: Physical plant management experience and service in a tropical experiment station are highly desirable.

e. Language: Technically conversational in English and French.

N. Management Specialist, Deputy: (60PM)

1. Purpose: To provide supplementary assistance in creating self-sustaining administrative, financial management and logistics systems in the Zairian counterpart institution.

2. Special Concerns:

a. Adminstration: policy and procedures, personnel, communciations (secretarial/clerical, radio/telex, library).

b. Financial management: budget, payroll, disbursements, records.

c. Logistics: inventory, procurement, shipment, transporation, travel.

3. Duties

a. Development, publication, and implementation of administrative management policies, regulations and procedures.

b. Development and operation of systems and procedures for contracting and procuring of goods, services, supplies, facilities, and equipment.

c. Development of personnel management systems comprising staff development, employee services, employee classification, employee compensation, and recruitment and staff selection.

d. Analysis of management requirements and development of budgetary systems.

e. Development of procedures, controls, and resources necessary to: acquire and maintain housing, research facilities and office space; provide warehousing; perform personal property acquisitions; and, provide or arrange for repair and maintenance of equipment and vehicles.

f. Development and operation of a financial management system comprised of, for example, a comprehensive accounting system and appropriate systems of internal regulation including those pertinent to all aspects of disbursement and collection of monies, control of receipts, and payrolling systems.

g. Development and operation of public relations and information systems.

h. Provide administrative/logistical services to Contract Team and serve as Deputy Team Leader.

4. Working Conditions: Stationed in Kinshasa; 20 percent travel.

5. Controls over Work: The Management Specialist must adhere to both the general standards of conduct for US government employees abroad and the personnel code of the contractors. The Management Specialist responds to the contractor's Chief of Party.

6. Qualifications:

a. Citizenship: U.S. citizen.

b. Experience: Demonstrably successful experience in performing the above stated duties.

c. Cultural-emotional disposition: Ability to be understanding and sympathetic with unskilled persons in cross-cultural environments. African experience highly desirable.

d. Language: Bi-lingual in English and French with French at FSI S-3 level.

ANNEX Q

Terms of Reference for a Study of the Reorganization of Agricultural Research in Zaire

By: Lloyd Clyburn

I. INTRODUCTION:

A. The Problem:

The Republic of Zaire inherited 30 large, well-equipped agricultural experiment stations from its Belgian colonial government in 1960. This system, the Institut National pour l'Etude et la Recherche Agronomic (INEAC), subsequently renamed INERA, has for the most part attempted to continue the Belgian programs with severely reduced budgets and numbers of scientists. Since 1972, the Department of Agriculture has pursued applied and adaptive research in single commodities (maize, manioc, rice and grain legumes) administratively estranged, although not entirely separate from INERA; that is, for the most part the "national programs" have used INERA land and facilities although without an inter-office agreement.

L'Institut Facultaie d'Agronomie (IFA), Yangambi, has had a latent national mandate to conduct agricultural research, as has l'Institut des Recherches Agronomique et Zootechnique (IRAZ). The latter exists only on paper.

Of all four efforts, for various reasons, the national programs are producing about the only effective research outputs. Obviously, the approaches of the national programs are by far too narrow to respond to the complete needs or necessarily the most important needs of the agricultural sector. (The problem is described in detail in Annexes H and I, USAID Project Paper 660-0091.)

At least two plans to reorganize INERA have been made by expatriate organizations in recent years. It is proposed that this be a Zairian (ie GOZ) undertaking.

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B. Objective:

1. A financially feasible estimate of the agricultural research requirement of Zaire for the period 1985-2005.

2. A conceptualization of the appropriate government organization(s) and linkages to achieve the requirements, that is politically socially, financially and administratively feasible.

The critiria of political, financial and administrative feasibility are obvious. Social feasibility refers to values within the existing research systems that may be held by concerned government officials.

C. Commission:

Representative of -the Prime Minister, Chairman
-the Presidence
-the Department of the Plan
-the Department of Scientific Research
-the Department of Education
-the Department of Agricultural
-and Rural Development.

D. Staff:

Executive Secretary
Agricultural economist (macro)
Research Administrator
Farming systems research specialist
Administrative and logistics personnel

E. Consulting Services:

Public administration with specialities in organization, internal communication and institutional linkage. Systems analyst: Two months.

Agricultural Research Adminstrator with experience in managing national or large state agricultural research programs: Two months.

Farming Systems Research Outreach Specialist: Two months.

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F. Terms of Service:

All the above Zairian personnel would be funded by this project and detailed exclusively to the study for four months. The expatriate team leader would be provided by ISNAR and two consultants would be provided by USAID for the initial month and the final month.

II. PROCEDURE:

A. Approach:

The systems analysis approach will be used. The study will estimate the required output of the agricultural sector for the period, 1985-2005, which will be its output, and work backward, first to throughputs, then to inputs.

INPUTS	THROUGHPUTS	OUTPUTS
LAND	AGRICULTURAL	CONSUMPTION
LABOR		(+)
CAPITAL	SECTOR	EXPORTS
MANAGEMENT		(-)
RESEACH		IMPORTS

B. Estimation of the Requirement of the Agricultural Sector:

1. Estimation of consumption:

Estimate the requirements of the agricultural sector over the projected period, 1985-2005 (suggested). The critical numbers are:

(a) volume of imports by commodity

(b) volume of exports by commodity

(c) assumptions on population growth

(d) estimates of rural-urban population shifts

(e) national dietary targets.

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That is, does the national policy call for maintaining the national nutrition level at status quo, refraining from intervening, or improving it, and if so, by how much.

By this approach, a useful estimate of current year consumption, hence production, if imports and exports are known, may be derived for the base lin of the projection. The value of this approach is that it makes national estimates feasible without the aid of a national crop sampling system. The baseline merely says that all of the agricultural sector output was either consumed or exported, hence future requirements are functions of consumption (increased population, and/or improved dietary level). A falacy in this approach is that it assumes that on-farm food consumption is inelastic. However, there is casual evidence that it is highly elastic. Increased per capita, on-farm consumption in post-baseline years would be interpreted as improved nutrition.

By virtue of the participation of the Department of Plan in the commission, it is implicit that the projection would be reconciled and accepted by them.

2. Targeting exports:

Working with the responsible officers in the Department of Plan and in the Department of Agriculture, the commission would project exports by commodity over the target period.

3. Targeting production:

Working with price policy, marketing and agronomic specialists, the commission would project feasible production by commodity over the project period, with appropriate assumptions. For example, it is known that it is no feasible, using existing PRONAM outputs, to increase area manioc yield by, say, 15 percent over the base year with lesser increments early in the series provided that PRONAM work is continued at about its present level.

4. Targeting imports:

The commission would request clearance of the projection with the Departments of Plan and Finance, including the completion of the import projections, thus completing the sector requirements for the target period.

C. Research Requirements:

Estimate the geographic and disciplinary distribution of research, by magnitude, required to render the projected sector output technically feasible. The following display is suggested:

1. By Region:
   a. Consumption and surplus targets
   b. Research requirements
      (1) Outputs
      (2) Inputs
         (a) personnel
         (b) land
         (c) capital buildings and equipment
         (d) annual capital investment
         (e) annual operating cost

D. Inventory of Research Resources:

At the outset, the project would request from the government a complete inventory of research land, buildings, equipment and personnel in the entire country. The commission staff would follow up and get the completed inventories. The commission would evaluate the inventories in terms of the research requirements above and discount or appreciate them accordingly.

E. Establish Research Priorities:

It is assumed that the combined inventory of research resources plus future financial resources will be less than adequate to implement the research required to support the sector targets. Thus, the commission would negotiate a prioritized list or package of research that, when approved, would constitute the national agricultural research program for the target period.

Since it is assumed that a reduction in the "required" research effort would reduce sector output, imports would be increased accordingly. (To the extent that the increased imports were U.S. P.L. 480 financed commoditities, the local currency generated by them could be dedicated to agricultural research.)

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F. Conceptualize A National Program:

Conceptualize a unified or inter-institutionally compatible agricultural research system with the following considerations:

1. Financial feasibility
2. Political feasibility
3. Social feasibility
4. Technical feasibility (relates to availablity of personnel)

whether the proposal is socially feasible, given the values held by the interested government officers in relation to the present research system and given the conditions under which employees would live an work.

5. Responsiveness to the needs of most farmers:

(This would be designed into the program by the farming systems research expert.)

6. Responsiveness to the National Plan:

Being responsive to Plan objectives and targets, directly or by delegation.

7. Linkages with public, semi-public and non-governmental change agencies.
8. Internal communication and controls.
9. Qualities of institutionalization.

Get approval of final draft.

G. Propose an Organization Plan with Viable Options:

Following the criteria above, propose a structural organization of the proposed research system with appropriate linkages, with viable options. The plan would include the following:

1. Designation of the responsible government office.
2. Mandate or description of the responsibilities and tasks.
3. Designation of other government offices and institutions showing their relationships (linkages) to the responsible government office.
4. Description of relations (linkages) of the executing office to other offices in the National Government and to the Regional Government Offices.
5. Internal lines of communication and control.
6. Real property control.

H. Obtain a government decision on the proposal.

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5C(1) - COUNTRY CHECKLIST

Listed below are statutory criteria applicable generally to FAA funds, and criteria applicable to individual fund sources: Development Assistance and Economic Support Fund.

A. GENERAL CRITERIA FOR COUNTRY ELIGIBILITY

1. FAA Sec. 481. Has it been determined that the government of the recipient country has failed to take adequate steps to prevent narcotic drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully? — YES

2. FAA Sec. 620(c). If assistance is to a government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) the debt is not denied or contested by such government? — NO

3.	FAA Sec. 620(e)(1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?	NO
4.	FAA Sec. 532(c), 620(a), 620(f), 620D; FY 1982 Appropriation Act Secs. 512 and 513. Is recipient country a Communist country? Will assistance be provided to Angola, Cambodia, Cuba, Laos, Vietnam, Syria, Libya, Iraq, or South Yemen? Will assistance be provided to Afghanistan or Mozambique without a waiver?	NO
5.	ISDCA of 1981 Secs. 724, 727 and 730. For specific restrictions on assistance to Nicaragua, see Sec. 724 of the ISDCA of 1981. For specific restrictions on assistance to El Salvador, see Secs. 727 and 730 of the ISDCA of 1981.	N/A
6.	FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction by mob action of U.S. property?	NO

7. FAA Sec. 620(l). Has the country failed to enter into an agreement with OPIC?	N/A
8. FAA Sec. 620(o); Fishermen's Protective Act of 1967, as amended, Sec. 5. (a) Has the country seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters? (b) If so, has any deduction required by the Fishermen's Protective Act been made?	NO
9. FAA Sec. 620(q); FY 1982 Appropriation Act Sec. 517. (a) Has the government of the recipient country been in default for more ~~than~~ six months on interest or principal of any AID loan to the country? (b) Has the country been in default for more than one year on interest or principal on any U.S. loan under a program for which the appropriation bill appropriates funds?	NO
10. FAA Sec. 620(s). If contemplated assistance is development loan or from Economic Support Fund, has the Administrator taken into account the amount of foreign exchange or other resources which the country has spent on military equipment? (Reference may be made to the annual "Taking into	THIS IS COVERED IN THE ADMINISTRATOR'S YEARLY "TAKING INTO CONSIDERATION" MEMO

Consideration" memo: "Yes, taken into account by the Administrator at time of approval of Agency OYB." This approval by the Administrator of the Operational Year Budget can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)

11. FAA Sec. 620(r). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption? — NO

12. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget? (Reference may be made to the Taking into Consideration memo.) — TAKEN INTO ACCOUNT

13. FAA Sec. 620A; FY 1982 Appropriation Act Sec. 520. Has the country aided or abetted, by granting sanctuary from prosecution to, any individual or group which has committed an act of international terrorism? Has the country aided or — NO

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Consideration" memo: "Yes, taken into account by the Administrator at time of approval of Agency OYB." This approval by the Administrator of the Operational Year Budget can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)

11. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption? — NO

12. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget? (Reference may be made to the Taking into Consideration memo.) — TAKEN INTO ACCOUNT

13. FAA Sec. 620A; FY 1982 Appropriation Act Sec. 520. Has the country aided or abetted, by granting sanctuary from prosecution to, any individual or group which has committed an act of international terrorism? Has the country aided or — NO

to disassociate itself from the communique issued? If so, has the President taken it into account? (Reference may be made to the Taking into Consideration memo.)

17. ISDCA of 1981 Sec. 721. See special requirements for assistance to Haiti. N/A

D. FUNDING SOURCE CRITERIA FOR COUNTRY ELIGIBILITY

1. Development Assistance Country Criteria.

a. FAA Sec. 116. Has the Department of State determined that this government has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, can it be demonstrated that contemplated assistance will directly benefit the needy? NO

2. Economic Support Fund Country Criteria

a. FAA Sec. 502B. Has it been determined that the country has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, has the country made such significant improvements in its human rights record that furnishing such assistance is in the national interest? N/A

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to disassociate itself from the communique issued? If so, has the President taken it into account? (Reference may be made to the Taking into Consideration memo.)

17. ISDCA of 1981 Sec. 721. See special requirements for assistance to Haiti. N/A

B. FUNDING SOURCE CRITERIA FOR COUNTRY ELIGIBILITY

1. Development Assistance Country Criteria.

a. FAA Sec. 116. Has the Department of State determined that this government has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, can it be demonstrated that contemplated assistance will directly benefit the needy? NO

2. Economic Support Fund Country Criteria

a. FAA Sec. 502B. Has it been determined that the country has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, has the country made such significant improvements in its human rights record that furnishing such assistance is in the national interest? N/A

b. ISDCA of 1981, Sec. 725(b). If ESF is to be furnished to Argentina, has the President certified that (1) the Govt. of Argentina has made significant progress in human rights; and (2) that the provision of such assistance is in the national interests of the U.S.?	N/A
c. ISDCA of 1981, Sec. 726(b). If ESF assistance is to be furnished to Chile, has the President certified that (1) the Govt. of Chile has made significant progress in human rights; (2) it is in the national interest of the U.S.; and (3) the Govt. of Chile is not aiding international terrorism and has taken steps to bring to justice those indicted in connection with the murder of Orlando Letelier?	N/A

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 funds, B.2. applies to 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 1982 Appropriation Act Sec. 523; FAA Sec. 634A; Sec. 653(b).

   (a) Describe how authorizing and appropriations committees of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that amount)?

   THE LEGISLATIVE HAS APPROVED OUR FY 1983 CONGRESSIONAL PRESENTATION WHICH DESCRIBED THIS PROJECT AND ESTABLISHES THE FUNDING LEVELS FOR FY 1983

2. FAA Sec. 611(a)(1). Prior to obligation in excess of $100,00, 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?	YES
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 FURTHER LEGISLATION REQUIRED IN ZAIRE.
4. FAA Sec. 611(b); FY 1982 Appropriation Act Sec. 501. If for water or water-related land resource construction, has project met the standards and criteria as set forth in the Principles and Standards for Planning Water and Related Land Resources, dated October 25, 1973? (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

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6. FAA Sec. 209. Is project susceptible 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 project will encourage efforts of the country to: (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.	THIS PROJECT IS DESIGNED TO IMPROVE TECHNICAL EFFICIENCY OF AGRICULTURE.
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).	THERE WILL BE AN OPPORTUNITY FOR U.S. COMPANIES TO BID TO PROVIDE TECHNICAL ASSISTANCE.

9.	FAA Sec. 612(b), 636(h); FY 1982 Appropriation Act 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.	SET FORTH IN GRANT AGREEMENT
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?	NO
11.	FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?	YES
12.	FY 1982 Appropriation Act Sec. 521. 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?	N/A
13.	FAA 118(c) and (d). Does the project comply with the environmental procedures set forth in AID Regulation 16? Does	YES

the project or program take into consideration the problem of the destruction of tropical forests?	YES
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)?	N/A

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(b), 111, 113, 281(a). Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and

THE PROJECT IS DESIGNED TO DEVELOP NEW STRAINS OF HIGHER YIELDING DROUGHT AND DISEASE RESISTENT CROPS THAT WILL NOT REQUIRE ADDITIONAL APPLICATIONS OF COSTLY, IMPORTED CHEMICAL FERTILIZERS. THIS PROJECT IS DESIGNED TO HELP THE SUBSISTANCE FARMER WITHOUT INCREASING HIS PRODUCTION COSTS.

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otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries?

b. FAA Sec. 102, 103A, 104, 105, 106. Does the project fit the criteria for the type of funds (functional account) being used? YES

c. FAA Sec. 107. Is emphasis on use of appropriate technology (relatively smaller, 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 activitiy 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)? YES

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e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"? (M.O. 1232.1 defined a capital project as "the construction, expansion, equipping or alteration of a physical facility or facilities financed by AID dollar assistance of not less than $100,000, including related advisory, managerial and training services, and not undertaken as part of a project of a predominantly technical assistance character.

N/A

f. 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

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

THE PROJECT WILL ENHANCE THE GOVERNMENT'S CAPABILITIES OF MOBILIZING THE INTELLECTUAL AND TECHNICAL RESOURCES OF THE COUNTRY TO FOSTER THE EXPANSIO OF FOOD PRODUCTION AMONG THE SUBSISTANCE FARMERS.

institutional development; and supports civil education and training in skills required for effective participation in governmental processes essential to self-government.

2. Development Assistance Project Criteria (Loans Only)

a. FAA Sec. 122(b). Information and 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

c. ISDCA of 1981, Sec. 724 (c) and (d). If for Nicaragua, does the loan agreement require that the funds be used to the maximum extent possible for the private sector? Does the project provide for monitoring under FAA Sec. 624(g)? N/A

3. Economic Support Fund Project Criteria

a. FAA Sec. 531(a). Will this assistance promote economic or political N/A

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stability? To the extent possible, does it reflect the policy directions of FAA Section 102?

b. FAA Sec. 531(e). Will assistance under this chapter be used for military, or paramilitary activities? N/A

c. FAA Sec. 534. Will ESF funds be used to finance the construction of the operation or maintenance of, or the supplying of fuel for, a nuclear facility? If so, has the President certified that such use of funds is indispensable to nonproliferation objectives? N/A

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

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? — N/A

4. FAA Sec. 604(e); ISDCA of 1980 Sec. 703(a). If offshore procurement of agricultural commodity or product is to be

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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.)	N/A
5. FAA Sec. 604(g). Will construction or engineering services be procured from firms of countries otherwise eligible under Code 941, but which have attained a competitive capability in international markets in one of these areas?	N/A
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 that such vessels are available at fair and reasonable rates?	WILL BE COMPLIED WITH
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	YES

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Federal agencies will be utilized, are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?

8. International Air Transport. 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 1982 Appropriation Act 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

Construction

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

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? — YES

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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

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 administed 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 1982 Appropriation Act Sec. 525: (1) To pay for performance of abortions as a method of family	YES

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 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. 620(c). To compensate owners for expropriated nationalized property?	YES
c. 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
d. FAA Sec. 662. For CIA activities?	YES
e. 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?	WAIVERS WILL BE REQUIRED FOR ALL PURCHASES OF MOTOR VEHICLES MANUFACTURED OUTSIDE THE U.S.
f. FY 1982 Appropriation Act, Sec. 503. To pay pensions, annuities, retirement pay, or	YES

adjusted service compensation for military personnel?	
g. FY 1982 Appropriation Act, Sec. 505. To pay U.N. assessments, arrearages or dues?	YES
h. FY 1982 Appropriation Act, Sec. 506. To carry out provisions of FAA section 209(d) (Transfer of FAA funds to multilateral organizations for lending)?	YES
i. FY 1982 Appropriation Act, Sec. 510. To finance the export of nuclear equipment, fuel, or technology or to train foreign nationals in nuclear fields?	YES
j. FY 1982 Appropriation Act, Sec. 511. 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?	YES
k. FY 1982 Appropriation Act, Sec. 515. To be used for publicity or propaganda purposes within U.S. not authorized by Congress?	YES