

EVALUATION
AGRICULTURAL RESEARCH AND OUTREACH
PROJECT 660-0091

SEPTEMBER 1986

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I. Introduction

A. Background

In June 1983, responding to a Government of Zaire (GOZ) request for continuing support after 1984 of the Programme National Manioc (PRONAM), Project 077, and for expansion of the research and outreach program to include maize (Programme National Maize, PNM) and edible legume seeds (Programme National Legumineuse, PNL) a broader project was designed resulting in the Applied Agricultural Research and Outreach, Project 660-0091, which was approved in September 1983. USAID allocated approximately 10.0 million dollars for the first six years of the projected life of project of 10 years. A GOZ contribution for the same period of approximately 267.4 million zaires was stipulated of which the national budget was to contribute approximately 37 per cent. The remaining 65 per cent was to come from local currency generation from PL 480 and from the Zairian Convention Development Fund (CDF).

Implementation of project 091, lagged two years during which time USAID and GOZ continued to fund PRONAM.

B. Purpose of the Evaluation

A mid-term evaluation was provided in the project paper (PP) three years after initiation of implementation, but in actuality implementation began in 1985, some two years late. For this reason the evaluation is concerned for the most part with early implementation without significant technical data on which to judge project outputs.

The purpose of the evaluation is therefore to assess progress towards project objectives, identify specific problems, and to recommend changes in the PP where deemed appropriate for better achievement of the project purpose and objectives.

C. Methods of Evaluation

The Team (Appendix G) evaluated different parts of the project as determined by USAID with the technical evaluation being conducted by the appropriate consultant for each of the commodity programs, maize, legumes, and manioc. The team leader evaluated the managerial and organizational structure and the agriculture economist evaluated farming systems research (FSR) and economic aspects within each program. On station programs were evaluated as well as central project management by interviews, publications, and discussions with USAID staff.

II. The Project (660-0091)

A. Rationale, Purpose, and Objectives

The project provided USAID support to three National food-crop commodity research and outreach programs. Two of these, PRONAM and PNL, are continuing USAID supported activities. PRONAM had been receiving major assistance prior to 1985 while PNL had received only limited assistance through a broader project for assistance to INERA (Project 064). PNM, which was started in the early 70s with assistance from the Centre International de Mejoramiento de Maíz y Trigo, the International Center for Maize and Wheat Improvement (CIMMYT) is added to these.

The three commodity research and outreach programs supported by the project constitute the principal food crops of Zaire with the exception of rice. Since progress had been made in each of the three projects as independent commodity programs, the 091 project design sought advantages by combining the three within a single project as a mechanism for more effective establishment of priorities for research. In addition it was envisioned as a more effective means of dealing with general problems which cut across commodities e.g. soil fertility, weeds and production systems. Moreover, the unification of the three commodity programs in RAV provides a more effective support for extension.

Within the broad goal of national self-reliance for agricultural production, the project purpose is to improve and expand the ability of the DOA to carry out applied research and to transfer improvements in technology increase production of food crops by small farmers. The project has a double focus:

a) through research and outreach activities, to contribute to increasing crop productivity and (b) through technical and managerial assistance and training, to contribute to establishing a self-sustaining research and outreach institution. Therefore, Project 091 is an institution building project.

B. Project Elements

1. AID Inputs

The Project provides the usual inputs included in AID technical assistance projects. Forty five person years of technical assistance are to be provided by the contractor (International Institute of Tropical Agriculture, IITA) or other contractual means at an estimated cost of \$5.99 million. One million eight hundred dollars were provided for long term and short term training and \$1.9 million for procurement of commodities-vehicles, equipment, and materials. Allowing for contingencies of approximately \$262,000 brings total USAID inputs to \$10.0 million over a 6 year period.

2. GOZ Inputs

The GOZ inputs are not segregated by programs excepting for salaries and allowance for personnel, and for construction and civil works. For the project overall the GOZ personnel total of 39 professional and senior administration posts, 30 research and extension assistants, 78 clerical, service and administrative posts and 360 laborers are projected at an total cost of 39.7 million zaires. Slightly over 25 percent (10.5 million) was allocated to each of the programs and 8.1 million was allocated to headquarters in Kinshasa.

Overall costs for training, commodities and other costs contributed by the GOZ were respectively approximately 25.4, 59.2 and 31.1 million zaires.

Overall cost for construction and civil works was projected at 9.7 million. Adding 102.3 million zaires for contingencies and inflation brings the total GOZ contribution to 267.4 million zaires. These contributions of local currency were to come from the Zaire Ordinary Budget, the GOZ Convention Fund, and USAID generated counterpart funds.

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C. Covenants and organization and operational modalities

A number of covenants were proposed in the Project Paper, and included in abbreviated form in the Project Authorization document, some of which implied significant impact on project implementation. A thorough discussion of the honoring of these covenants by the GOZ is presented in Appendix C, the Evaluation of PRONAM, Appendix A concerning project management, and Appendix F.

III. Project Implementation

A. Overall Status

Implementation of the project (091) was delayed until September 1985, some two years after the PP was officially signed. This lag in acquiring a technical contractor has resulted in delays in establishing expected level of operation. Considering the length of time the project has been in operation and the inherent difficulties in program start-up, the project can be considered to be off to a good start.

1. Technical Assistance

With exception of two technical assistance positions all technical assistants proposed in the PP are in place. Of the remaining two, one person has been proposed for the research agronomist position, and the other, a legume plant breeder, is expected to join the project in the near future.

2. Training (Annex A)

Of 34 persons to be nominated for long term training (20 MS and 14 PhD) 13 degree candidates, 4 PhD and 9 MS, are currently in training in the US. An additional (11) nominees have been selected and await assignment.

Short term training at IITA-Ibadan was undertaken by 23 persons during 1985-1986. A total of 155 staff participants are expected in short term training courses in the period 1986-1989, mostly conducted at IITA.

3. Commodities

Acquisition of commodities is proceeding slowly, especially those which are required as US purchases. The lack of an USAID procurement officer necessitates that an assistant project officer is required to draw up the necessary procurement documentation and this causes delays. There is now a Zairois being trained to conduct local procurement.

4. Infrastructure Development

The development of a satisfactory infrastructure with regard to managerial and organizational project management and fiscal responsibility is discussed in Appendix A. Progress is being made in the development of management, accounting, and inventory procedures. It will be sometime before the system of accounting will operate smoothly.

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Renovation and/or new construction will provide adequate working facilities for PNL and PNM. Minor construction is under way at M'Vuazi. In addition the research farm for PNM will have significant land preparation and construction costs.

In general the libraries of each of the three programs, especially PNL, and PNM are inadequate for major research stations and should be of high priority in considering future budgeting. It is absolutely necessary to increase the literature base for the scientists.

IV. Project Evaluation

A. Organization and Management (Appendix A)

An organizational structure for the Coordinator's office has been adopted and is in place. It includes the responsibilities of each of the respective parties, including those of the contractors, IITA.

There appears to be some difficulties in management with regard to the role of expatriate advisors and Program Directors. Part of the difficulty is due to a lack of understanding by the expatriates that they are serving as advisors in building a functional research institution. Productive dialogue between management and the partners at all levels and across Programs could alleviate a stressful situation.

The Director of PRONAM meets separately with senior and junior staff at least once monthly. Minutes are kept of these meetings and copies are forwarded to RAV Coordinator. These meetings serve two purposes. (1) they help staff morale and (2) the minutes sent to RAV keeps the RAV Coordinator aware of management problems. This management technique seems appropriate for the other two programs to more fully utilize the RAV coordination office as well as for morale among staff.

Program directors are overworked - all have research responsibilities as well as administrative responsibilities. They often have insufficient time for their most important function of research planning and facilitating multi-disciplinary collaboration to achieve research goals. The addition of a competent Administrative Assistant to each program could lessen the load of day to day logistical work currently done by the Directors.

Procurement purchases of FX items is too slow. Lack of an USAID procurement officer is a bottleneck. Monthly status reports are maintained on major equipment items until received. After receipt records are maintained on their location. Records are maintained on expendable and non expendables accrued. No inventory system currently exists but will be developed utilizing a Price Waterhouse consultant. Price Waterhouse is also currently developing accounting programs for RAV headquarters and each of the Programs. Training of accounting procedures will be done by the RAV Administrative Officer and the Adjoint Administratif. Audit recommendations made by Price Waterhouse have for the most part been put in place and others are in the implementation process.

There is a budgeting cycle which corresponds to USAID requirements. Budget development normally is initiated in each program and passed to RAV for further consideration and development with USAID-ARD. Some budgeting problems exist with certain line items in the current budget year. A lack of dialogue between RAV and USAID has probably played a major role in overspending. RAV needs to be thoroughly aware that they have to honor certain USAID budget restrictions. On the other hand USAID-ARD should attempt to be more flexible in budgeting by allowing innovative budgeting in line items and ceasing arbitrary budget changes without consultation with RAV.

Line item budgeting is new in the Zairian management system and will require time and trained personnel to function smoothly. It appears that the system is acceptable to the Zairois with exceptions regarding flexibility and budget formulation.

Technical job descriptions for all technical personnel within each of the programs should be developed and placed on file with RAV. This includes specific description of duties of the expatriate staff. Currently there are no detailed descriptions available.

The project is developing the necessary personnel and procedures to be capable of managing the program before the PACD. The Zairian staff appreciate the goals of the project and are enthusiastic about making progress in building an agricultural research institution based on high quality production research to alleviate the pressing food deficits in Zaire.

B. Technical Programs

I. National Manioc Program, PRONAM (Appendix C)

The manioc program was implemented in 1980 by USAID, with IITA as the contractor, to develop means of controlling pests and disease and to improve manioc production. The total professional staffing of PRONAM is now 23, four of which are in training in the US, supported by 34 technicians, A2 and A3 level. Total staffing includes individuals with M.S. and PhD degrees and 8 Ingenieur agronomes. PRONAM was folded into 091 already well established with 7 IITA technical advisors. This number has been reduced to 4, an agronomist/soils specialist, an outreach specialist, a farm manager at M'vuazi and an outreach specialist at Kiyaka (Host Country Contract). The farm manager/technical support specialist is responsible to serve each of the three programs (PRONAM, PNM, PNL). Only two expatriates remain as heads of divisions. Total employees for the Program are 497, fifty seven of which are directly involved in research.

The project director has nominated 7 individuals for training (5 for PhD and 2 for the M.S.) in the U.S. Eleven other potential nominees are available for training, but this is dependent upon agreement with USAID for a provision for training Ing Agronomes to BS equivalency. Current organization, staffing and projected training places PRONAM on a solid institutional base, which should be self sustaining after the current PACD.

No farm or laboratory equipment has been procured and received by PRONAM from 091 project funds. Twelve new vehicles have been acquired by the project, some donated by a grant from the UK. Most of the vehicles

and farm equipment procured under Project 077 are in need of major repair or replacement. A request has been made for procurement of equipment and supplies at an estimated cost of \$750,000, but this purchase will be utilized across the three programs as required.

PRONAM (M'vuazi) has a well established physical plant and housing. Water and electricity have recently been installed, a training center established along with a recreation center and new construction will provide additional laboratory and office space. Satisfactory arrangements have been reached with INERA on the use of land at Mvuazi and Gandajika (20 ha). No agreements have been made regarding land at Kiyaka. In addition, there are 200 ha, 100 of which are contiguous to Mvuazi station and will be developed for research use. The other 100 ha are used for multiplication of planting stock.

Overall Evaluation

PRONAM is now a well established Program/Institution. With few exceptions staffing is well balanced. Personnel are well trained and doing a commendable job. Weaknesses in agronomy/soils will be overcome by the recent assignment of an IITA soils specialist. Training to strengthen national capability in soils as well as weed science is urged. Extension (outreach) and Service Technique d'Aménagement (STA) are the weakest links in PRONAM structure. With no training programmed or in sight for nationals in those divisions, the future of putting them on a solid basis is doubtful.

At M'Vuazi large investments have been made in infrastructure eg. electricity, running water, recreation facilities in addition to premium pay (PRIMES) and these have contributed to better staff morale. Staffed largely with trained Zairois, further upgrading of staff by training in process or projected, PRONAM can now be considered to have reached the state of being self-sustaining from the technical and managerial standpoint. Nevertheless, the program will continue to depend heavily upon external sources of financial assistance.

Further projected expansion by undertaking work at other stations, sub stations and far flung trials is cause for concern, particularly in view of management and budgetary implications. Rather than further expansion, consolidation of progress already made is advisable.

Substantial contributions have been made towards understanding the problems and constraints on production. This understanding has been utilized in the breeding program eg. resistance to pests and diseases. Two new cultivars, Kinuani and F-100, have been distributed widely. Some reassessment of the breeding program selection criteria is needed as new cultivars need to be more rapidly identified, tested on On-Farm trials, and multiplied.

Outreach has been carried out through organized agricultural development projects, commercial entities, private voluntary organizations, and other entities in agricultural extension. In 1985, 675,000 meters of planting material of the Kinuani cultivar were distributed, bringing the total distribution to over 1.5 million meters since its release in 1983. 75,000 meters of cultivar F-100 were distributed in Bandundu in 1985. Ninety ha of Kinuani are in multiplication (M'Vuazi) and 35 ha of F100 at Kiyaka. Four promising cultivars will be distributed at Gandajika. Collaboration with the

National Fertilizer Program (PNE) has been in place since 1985. Nevertheless, there is inadequate feedback from these various organizations on the performance of the new cultivars on farmers fields.

PRONAM is thus carrying out a multidisciplinary research and extension program dealing with the principal cassava production constraints. There are, however, several suggestions for further strengthening PRONAM. On-Farm trials of new cultivars and improved agronomy are being incorporated as the final stage of research in the breeding program before multiplication and extension. The economist should be directly involved in this evaluation.

Field information on the extent of the diffusion of Kinuani and F-100 needs to be collected including a systematic analysis of the differences between farms and farmers adopting and not adopting the new cultivars.

FSR on-farm trials have been moving largely through the efforts of one agronomist. Team FSR approach has been lacking and needs to be built up. The economist in the FSR team needs to have his own budget for field research. .

PRONAM is the "star" of the 091 project and the program has been highly successful in the past and is expected to continue on this path.

II. National Maize Program, PNM (Appendices B and D)

The national staff consists of sixteen persons, 1 PhD (Director) and 2 MS degree holders. The latter, one of whom is stationed at Gandajika, have been or will be nominated for additional study leading to the PhD degree. Four potential candidates for training resigned from the program to take employment in the private sector. Information on the total number of employees was not provided. PNM has currently 3 technical assistants, an IITA plant breeder, an entomologist, and an IITA agriculture economist-FSR specialist. An agronomist is yet to be hired. The plant breeder serves as the expatriate advisor to the Program Director.

Presently there are five students in the US working on advanced degrees in Agronomy (MS) and Entomology (PhD). Training, especially the identification of more candidates should be one of the principal priorities of PNM at the present.

PNM research thrusts include a substantial breeding program designed to develop more productive cultivars from already established populations and lines, as well as streak disease resistance and insect resistance. Some work will be conducted on hybrid lines. An active program in entomology and plant pathology will complement the disease and insect resistance breeding program as well as determining key pests in maize production. An FSR/Economist joined the team in September.

Overall Evaluation

PNM has produced impressive results. 21,000 Kg of Shaba-I, 26,000 Kg of Kasai-I and 5,000 Kg of Salongo-II were produced in 1985 as foundation seed. Commercial seed is then produced by private and national organizations (BUNASEM, National Fertiliser Program, and others). The urgent field research problem, as in PRONAM, is the extent of the diffusion of these new high yielding open pollinated cultivars and the differences between farms adopting and not adopting. This needs to be an important research activity of the new economist in the PNM.

Weeds are a serious problem, and the project makes no provision for a weeds specialist. A consultant could be engaged to assist agronomists with weed problems.

III. National Legume Program, PNL (Appendix E)

The National Legume Project (PNL) has had limited financial assistance from USAID since 1979-80 until August 1985 when project 091 became operational.

The principal research station is at Gandajika with soybeans and groundnuts as the main research focus here. Field bean research is centered at Mulungu in the Kivu Region, a main bean production area.

At present, 21 of the projected 40 national technical and scientific personnel are in place, while 31 of a projected 32 administrative and support staff are staffed, making a total of 52 of 72 positions filled. Only one of the speciality leaders (germplasm) has taken advanced (MS) training but most others are programmed to do so. Currently there is one IITA technical advisor, an agronomist, located at Gandajika. He also serves as technical advisor to the national program director, whose past experience was with PRONAM. Presumably PNL will benefit from technical assistants located at M'Vuazi (farm management) and Lubumbashi (FSR). A bean breeder will be joining the project shortly.

No speciality leaders exist as yet for groundnuts, cowpeas, or phytopathology. Other specialities, soybeans, commonbeans, germplasm, agronomy, entomology, seed multiplication and agricultural economies are fully staffed albeit not well trained or experienced as yet. In August 1986 an additional 11 graduates (A₂ and A₃) were offered positions with PNL. PNL employees in all categories number 175 including personnel who are responsible for maintenance of infrastructure and grounds of the INERA Station.

Currently 5 of the ingenieurs have been nominated for advanced degree education at US institutions. Three participants are in training in the US studying for the PhD and 7 are studying for M.S. degrees.

All buildings assigned to PNL are the legacy of INERA which established the station in 1936. Their buildings had fallen into disrepair but have undergone some renovation recently. The main research and office structures would be costly to repair and will be replaced by new buildings. A non-functional range of screen glass houses remains. One has been repaired by

PNL and serves soybean crossing purposes. A new screen house will replace this. Seed storage buildings are unacceptable because of the lack of temperature and humidity control which are necessary to maintain seed viability. Because of the inadequacy of electricity this problem cannot be immediately solved.

The most critical deficiencies of the station are a lack of continuous electric service and running water. Only one generator is operative 3 1/2 hours daily and only in the early part of the night. No functional back up exists. The water system originally installed is non-functional.

Overall Evaluation

Plant breeding, specifically the development of elite cultivars, is the primary program emphasis and soybeans have been proclaimed number one priority. The first professional breeder is scheduled to arrive in two months, so Dr. Shannon has begun material selection and evaluation in anticipation of Dr. Camacho's arrival.

The decision to concentrate on soybeans is based upon the IITA assumption that some of its breeding lines may be well suited to Zaire and that a few seasons of testing should lead to elite cultivars that will totally displace those now grown in a short time period. There is the marketing problem of what will be done with the soybeans. Three other grain legumes are grown much more extensively than soybeans, and are far more important in the national diet. Soybeans are a "new" crop. Acceptance is minimal even after 20 years of rather intense promotion. Introducing a new food crop is not easy, and a very small percent ever become important.

Groundnuts are the presently most economically important legume cultivated in Zaire. There are two research priority problems insufficiently evaluated in the legume priorities paper of Dr. Shannon. First, what is the potential for the introduction of soybeans into Zaire as an economically important human food? Secondly, what are the prospects for obtaining substantial yield increases for groundnuts in Zaire through breeding and improved agronomy?

The other major research thrust is combination cropping or "alley cropping". A woody legume interplanted with herbaceous crops is the prevailing design. Many species of woody legumes have been suggested and several have been selected for this research. This work, too, will require data over years and should be regarded as long-term and high risk for an applied research program.

Storage insects cause great losses in legumes. Some post-harvest research designed to address this problem should be considered. It would be good to bring in a post-harvest consultant.

The future of legume research rests squarely with the group of young scientists preparing to go for advanced training. There is no RAV cadre of senior scientists trained in legumes. The Ing. Agronomes at Gandajika appear to be excellent. They desperately need English training, and it is difficult to arrange. At the minimum, video tapes and other study materials should be provided, and soon. (Placement could be a problem, compounded by inadequate English.) Their departure should not be delayed excessively. The longer one

is away from formal study the more difficult it becomes. The most lasting effect and the greatest impact the project will have rests in the human development component. This needs to be pursued vigorously and astutely.

As young staff are trained and return to PNL the plant improvement work in groundnuts, beans and cowpeas will begin in earnest. This is, however, years in the future. In the interim every effort should be made to assemble and field test cultivars developed in other tropical countries. Conceivably some already exist that would have a place in Zairian agriculture.

Staff residences are inadequate now with new recruits being added to the program. In the interest of morale, and productivity, this is especially important in the rather isolated location. It is easy to develop a mind set that hardship and inconvenience are imperatives to working in a developing country. Normally they enter into the equation but technical problems have to be solved in terms of professional achievement, not on the ability to cope. To the extent that amenities encourage achievement every effort should be made to provide them.

IV Farming Systems/Economic Research

The principal activity in these fields to date has been in definitions, discussions, and workshops. Now that there are two expatriate economists, these discussions should not be a substitute for fieldwork.

The priority areas of investigation, in our opinion, in the PRONAM and PNM programs are:

- a) On-Farm trials of new cultivars and improved agronomy.
- b) Field studies of the extent of the diffusion of the new cultivars and the farm level factors associated with their diffusion.

Economists will need to be integrated into the PRONAM and PNM programs but will need their own budgets. They can also collaborate with the agronomists on the economic analysis of the latter's experiments. After two years of field work in the commodity programs, an evaluation of the feasibility of having a centrally located farming systems unit could be undertaken but first the economists need to demonstrate that they can be useful to the commodity programs.

The economists should also contribute to the new priority paper recommended for the legume program.

V Outreach - Extension:

There has been substantial activity in multiplication of Kinuani and F-100 accompanied by various types of extension activities in Bas Zaire and Bandundu. Also PNM has provided their improved cultivars to numerous development agencies with apparent success in farmers' fields. We have been impressed with the enthusiasm and the dedication of those involved in these activities especially Dr. S. Pandey and Cam Burn.

Nevertheless, our principal concern is that there needs to be more farm level evaluation of the new cultivars before multiplication and more documentation of their diffusion. Those working in extension need to facilitate these activities of the economists.

The basic objective of the extension activities needs to be in building up other development agencies and organizations including the "agronomes" as has been done in Bandundu. By providing these agencies and individuals with improved cultivars and some training the RAV program increases its impact and improves its network so that future improved cultivars can get out even faster.

C. Joint Research

There is an area of overlap of research in the project with scientists having multiple responsibilities for different commodities. FSR/economics will be involved in PRONAM, PNM and PNL. The entomologist and pathologist will work in PNM, PNL and to a lesser extent in PRONAM. Assuming there is a weeds specialist added to the staff of one of the programs this person would have responsibilities in all of the programs.

Joint efforts of researchers, conducting as many integrated research efforts together as possible, to avoid unnecessary numbers of field trials from which information concerning only one discipline will be forthcoming is recommended. Integrated trials will provide more information with less expenditure of time and money.

D. Projects' Relationship to Other USAID Projects

Project 102 - Bandundu Area Food Production and Marketing

This area development project provides a good opportunity for Project 091 for diffusion of seed and cassava stakes through non-governmental extension activities. Some collaboration is presently on-going with PRONAM. PNM could also begin providing on-farm trials of their improved cultivars.

Project 105- Central Shaba

Linkage to Project 091 will provide better access for production inputs, principally improved cultivars. PNM will be providing foundation seed of Kasai I, and possibly Shaba I after the very successful performance of the former in the North Shaba project (660-0059), to this project.

E. Highlights of Accomplishment

PRONAM - The cassava program is now staffed with a trained cadre of personnel and with the technical assistance of only 3 people from IITA. PRONAM, provided adequate funding is available, is a self-sufficient research institution. Two new cassava cultivars, Kinuani and P-100 have resulted from PRONAM plant breeding research. Each cultivar has been multiplied at the station and they have been diffused to the farmers through the PRONAM outreach program. The program has a well developed experiment station complex as well

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is a training center and reservation facilities for personnel. PRONAM has a well integrated model research team which will provide continued research and and provide improved cultivars to farmers, private and public institutions, and development programs.

PNM - The maize program started in the 1970's and was a productive program until funding was sharply reduced in the early eighties. Brought into Project 091 as a major research thrust, the program is in the process of rebuilding a balanced well trained staff of researchers. There is strong rivalry between the plant breeders and they make a complementary team which should result in a highly productive breeding program.

A new experiment station is being constructed for the maize program. Three maize cultivars, Shaba I, Kasai I and Salongo II, have been released from foundation seeds produced by the program. All three are in commercial production and are apparently doing well. Foundation seed has been diffused through program cooperation with a number of development agencies.

PNL - This is the newest program in Project 091, having been reorganized from previous USAID support to legume research through INERA. The program needs a new research priorities paper with outside consulting help. An emphasis is being put on training the young, enthusiastic staff already on-board. The station at Gandajika will be very expensive to renovate but immediate investment in improving the water and electricity would substantially improve morale and research efficiency.

FSR/Economics - This program has just begun and both FSR and Economics are new concepts in commodity programs in Zaire. Cit. Mbulu in PRONAM has been doing excellent farm trials and has helped the breeding program. Much effort in the last year has been put into definitions and workshops. With the addition of two expatriate economists this FSR activity will be sharply expanded. Both PRONAM and PNM have recognized the need for more information on the farm level performance of their new cultivars and of improved agronomic practices.

Project Management - The national program directors, particularly in the case of PRONAM and PNM, are experienced researchers. The program director of PNL formerly worked on cassava and will have to reorient his research efforts. The technical advisors to each program are competent research scientists but, in the case of the PNM and PNL, there appears at times to be a breakdown in communications between the advisors and the directors. This difficulty needs to be resolved.

The PRONAM program should consolidate their effort and not over extend their capabilities through overly rapid expansion.

The Coordination unit (RAV) is now fully activated with appropriate positions filled. The Adjoint Technique should play an active role in the development of research strategy and priorities. An accounting system is being developed and is badly needed for fiscal responsibility. There is a need for additional training for national fiscal officers in the programs as well as RAV.

RAV as the Coordinating management unit has a very important role in the success of the project and it should develop better lines of communication between the unit, programs, and USAID, as well as between the Coordinator and the technical advisor.

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APPENDIX A
EVALUATION
PROJECT ORGANIZATION AND MANAGEMENT
PROJECT 660-0091
ZAIRE

SEPTEMBER 1986

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ACRONYMS

AID	Agency for International Development
CDF	Convention Development Fund
CIMMYT	Centre International de Mejoramiento de Mais et Trigo (International Center for Corn and Wheat improvement)
DOA	Department of Agriculture and Rural Development, Republic of Zaire
DESURS	Department of Higher Education Universities and Scientific Research
FAO	Food and Agricultural Organization of the United Nations
FSR	Farming Systems Research
FX	Foreign Exchange
GQZ	Government of Zaire
IITA	International Center of Research on Tropical Agriculture
INERA	Institute National d'Etude et Recherche Agronomique
LOP	Life of Project
PACD	Project Assistance Completion Date
PL480	Public Law 480
PNL	National Legume Program
PNE	National Fertilizer Program: GOZ/FAO
PNM	National Maize Program
PRONAM	National Cassava Improvement Program
RAV	Project de Recherches Agronomique Applique et Vulgarisation - Applied Agricultural Research and Extension
USAID	U.S. Agency for International Development/Kinshasa

ORGANIZATION AND MANAGEMENT

BY J. D. PASCHKE

A. INTRODUCTION

I. Project Title

Applied Agricultural Research Outreach, 660-0091

II. Project Description

In June 1983, responding to a GOZ request for continuing support of the Programme National Manioc (PRONAM) after 1984, and for expansion of the research and outreach program to include corn (Programme National Maïs, PNM) and edible legume seeds (Programme National Legumineuse, PNL), a broader research and extension project was designed. The project, Applied Agricultural Research and Outreach - Project 091, was approved 1983. USAID allocated 10.0 million dollars for the first six years of a projected 10 year project. A GOZ contribution for the same period of approximately 267.4 million Zaires was stipulated, of which the national budget was to contribute approximately 37 per cent. The remaining 63 percent was to be covered from allocation of local currency generation from PL 480 and from the Zairian Convention Development Fund (CDF).

During the two year lag in the implementation of project 091, USAID and the GOZ continued to finance PRONAM.

III. Evaluation Purpose

This mid-term evaluation of the Agricultural Research and Outreach Project (091) constitutes an Implementation evaluation. The evaluation examines the implementation and progress of the Technical, Outreach, and Training aspects of each of the three commodity programs (PRONAM, PNL and PNM). In addition, a critical evaluation was conducted of the managerial and organizational structure of the Central Coordination Structure (RAV - Recherche Agronomique Appliquée et Vulgarization), established in the Division of Agronomic Research, Information and Training Service of the Department of Agriculture (DOA).

IV. Evaluation Methodology

The team leader was responsible for evaluating the organizational and managerial elements including (1) project goals and objectives (2) resource management (3), finances (4) personnel and training. He visited the headquarters of PRONAM, PNL, and PNM and inspected the physical plant, farms, reviewed appropriate documentation (Annex 1), and interviewed persons (Annex 2) within each program. Additional review of appropriate documentation and interviews were made at RAV headquarters, Kinshasa. Long consultation with the USAID Project Officer and Assistant Project Officers supplemented the discussions with both IITA Project advisors and Zairian Program Directors as well as the Project Coordinator and others of coordination staff.

The evaluation and analysis followed the specific questions raised by USAID in the scope of work (Annex 3).

V. The Project (660-0091) Goals and Objectives

The project provides USAID support to three national food-crop commodity research and outreach programs. Two of these are continuing USAID supported activities (PRONAM and PNL) and the third (PNM) was initiated with support in the 1970's with the assistance from the Centre International se Mejoramiento de Mais y Trigo (CIMMYT).

The research and outreach programs supported by the project are designed to alleviate food deficits and are based on a long term goal of increasing production in the principal food crops Zaire. Project 091 sought to gain certain advantages through combining the programs within a single project as a method to provide more effective establishment of research and extension priorities while at the same time providing horizontal integration of technical disciplines and effective lines of communication between research and extension. Presumably a centralized project coordination would enhance organizational and managerial efficiency.

Within the broad goal of national self-sufficiency in agriculture, the purpose of the project is to improve and expand the ability of the DOA to conduct applied research and transfer improvements in technology to the small farmer food crops producer.

The project has two main objectives:

1. Increasing crop production through research and outreach activities.
2. Establish a self-sustaining research and outreach institution through technical and managerial assistance and with significant training assistance, ie. Institution Building.

Project Elements (Inputs)

USAID Inputs

The project provides the usual inputs included in AID technical assistance projects. These inputs are summarized in the Project Implementation Letter Number 7 and they are briefly described as follows:

Forty two person years of long term technical assistance (TA) work to be provided by IITA and additional long and short-term technical assistance was estimated at approximately \$5.99 million.

An estimated \$1.8 million dollars was earmarked for participant training. Commodities procurement was estimated at \$1.9 million. Over the six year life of project (LOP) the total USAID inputs will be approximately \$10.0 million, including contingencies and allowances for inflation.

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GOZ Inputs

The GOZ inputs for salaries and allowances for personnel of 39 professionals and senior administrator, 30 research and extension assistants, 78 clerical, service, and administrative posts and 360 laborers were projected in the PP at a total cost of 39.7 million zaires. Slightly over 25 percent (10.5 million zaires) was allocated to each of the programs, and 8.1 million zaires allocated to the Kinshasa headquarters.

Costs for training, commodities, and other costs were estimated at approximately 25.4, 59.2 and 31.1 million zaires respectively. Overall costs for construction and civil works were estimated to be 9.7 million zaires of which one major expenditure was to be construction of principle research station (PNM) near Lubumbashi.

Covenants on Organization and Operational Modalities

Important covenants were proposed in the PP and are included with the Project Authorization Document. Success of the project is partially dependent upon the honoring of these covenants by the GOZ (Annex 4).

VI Project Implementation Status

The status of implementation considering technical assistance, personnel, GOZ personnel, training, commodities, infrastructure and farm development for each of the three programs, i.e. PRONAM, PNL, and PNM, are to be found in separate Appendices C, D, and E.

An analysis of the status of GOZ honoring the covenants concerning organization and operation are to be found in Annex 4.

B. ORGANIZATIONAL AND MANAGERIAL STRUCTURE (RAV)

By Interdepartmental Decree of 10 December 1985 between the Department of Higher Education, Universities and Scientific Research (DEUSR) and the Department of Agriculture and Rural Development (DOA) the responsibility for research on cassava, maize and legume seeds was delegated to the DOA. By the same decree, the DOA established Projet de Recherche Agronomique Appliquée et Vulgarisation (RAV). An organizational structure for the coordination of RAV and a representative National Program were presented in the same document.

The coordinator of RAV, Cit. Mota Bakajika, the Adjoint Technique, Dr. Lutaladio ne Bambi, and the Adjoint Administratif et Financiers, Cit. Wanzalughedo Musavuli, were named by the Secrétaire General de l'Agriculture et Développement Rural, 15 April 1986. In the same document each of the program directors were also appointed:

PRONAM -- Cit. Mahungu Nzolame
PNM -- Cit. Mulamba Ngandu
PNL -- Cit. Kilumba Ndaye

A document "Definition de Comptences devolves aux Differentes Partenaires Oeuvrant au RAV" dated March 1986 (Annex 5) developed by the Coordinator, Cit. Mota, defines the role and responsibilities of the IITA Chief of Party as Conseiller Scientifique. An earlier document dated 9 December 1985 (from the Department of Agriculture and Rural Development) established that the ten expatriates proposed by USAID were to be considered as Conseillers-Assistants Techniques (e.g. IITA Adviser Technical Assistants).

Another document (June 1986) describes the administration of science and technology, logistics, and finances. The document defines the role of the expatriates and their interaction with the appropriate Zairois Officer (e.g. Chief of Party with Adjoint Technique). Similar responsibilities are spelled out for cooperation between the Coordinator and the Chief of Party concerning administration matters.

The "Reglement d'Ordre Interieur" defines the rights, obligations, and conditions of work between RAV and members of its personnel. This paper, not as yet approved, is all inclusive beginning with recruitment and concluding with disciplinary actions.

Specific job descriptions for expatriate counterparts and descriptions of long and short term assistance were described in the original draft of the PP. For reasons unknown these pages (14-31) were omitted from approved PP. Other descriptions are found in PP and are less explicit.

RAV Technical Management

The position of Adjoint Technique has only recently (approximately 3 months prior to project evaluation) been filled by Dr. Lutalaladio. The precise role of this position (equivalent to Director of Research) has as yet not been defined precisely. The incumbent, a former Director of PRONAM has drafted a proposal defining the role of a Technical Service Directorate (service Technique RAV) and is developing documentation defining scientific policy lines for RAV with strategies for research. Both of these management techniques are in the proposal stage and as yet have not been reviewed by the coordination council of RAV. The position of Adjoint Technique and the developing Service Technique should play an important role in coordination of technical aspects of the project.

Current research planning in each of the programs is done after review and appraisal of the previous year's work at the annual program meeting which includes staff and others from collaborating entities. These plans are detailed down to each experimental trial. The work plans resulting from these decisions thus reflect what each program staff proposes to do in the coming year. Such planning fails to define strategies and overall priorities for each of the programs and their respective sections.

The role of the Adjoint Technique should result in overall development of research strategies and priorities on the basis of National needs resulting from discussions with program directors, section heads, and advisors in consultation. Research program planning based on strategy and priorities would logically follow through program directors, section heads and staff. The IITA COP is expected to offer advice to the Adjoint Technique in developing a research administrative service as well as in making recommendations concerning strategies and priorities. Care should be taken to not increase administrative positions in the suggested structure.

The Adjoint Technique is expected to maintain a line of communication with the RAV Coordinator and keep him informed of the planning process prior to discussions from which administrative decisions by the Coordination Committee would be forthcoming.

C. ANALYSIS -- ORGANIZATIONAL AND MANAGEMENT STRUCTURE

A RAV organizational structure has been adopted by the Coordination Committee and includes description of the responsibilities of each of the respective positions including those of the contractor (IITA), and names the various Zairois administrators down to the level of Program Directors.

The structure appears to be flexible on the national side and as nearly as can be determined adaptable to change. Whether or not DOA will support the structure at the agreed upon level of commitment was not determined; presumably continued support will be forthcoming. USAID should offer as much assistance as possible to assure GOZ support.

Project goals, strategies, and research priorities will be better defined after the Service Technique becomes operative. Currently it appears that there is a conflict in thought regarding the national goals and those of the contractor.

As nearly as could be determined, the organization and managerial structure as in place was developed by the Coordinator with agreement of the Coordination Committee but with minimum input by the advisor to the Coordinator. There appears to be lack of communication at this level of administration.

The Adjoint Technique should play an important role in the structuring of research administration with the advice of the contractor, i.e. COP.

No organizational structure for each of the research programs has been formally accepted and which would denote lines of communication and integration between research sections and project management. A draft operational organogram of current structure was provided the team by the COP.

The role of the Technical Advisors in each of the programs has not been clearly defined and there appear to be administrative conflicts beyond personality differences and which might be alleviated through better communication from RAV headquarters.

The evaluation team had frequent opportunities to become aware of a stressful situation between the role of the scientific advisors and their Zairois colleagues, i.e. the Program Directors. This was particularly evident in the PNL and PNM programs, and to a much lesser extent in PRONAM. Much of the conflict arose because of a lack of clear definition of the responsibilities of the expatriate as an advisor to the Program Director and a clear understanding of each in the building of a collaborative integrated research system in which each partner is a scientific colleague. It seems that the role and understanding of the IITA expatriate staff in building a functional research institution in an advisory capacity has not been fully accepted, especially on the part of the contractor, and to a lesser degree by the national staff.

There appeared to be significant lack of productive dialogue at all levels between the partners, arbitrariness by one or the other in decision making, whether in directing and conducting research, or with regard to morale building problems.

One of the major programmatic problems is that of the expatriate staff, normally in charge of contracted research (i.e. PRONAM until 1985) and their change in role from being in charge to a role of adviser. Undoubtedly this is a difficult change to make but if the 091 project is to be successful the contractor will have to accept the advisory role and assist the programs in that capacity as is well within their capabilities. In the evaluation team's opinion the lack of dialogue regarding solution of these problems in management is definitely hindering progress in implementation in some programs (PNM, PNL).

Another issue which probably plays a part in some of the problems is the fact that the Program Directors all have a certain amount of research under their direction and for which they are directly responsible, a split work load between research and administration. An in depth consideration of these factors, heavy work load and responsibility, may dictate changing the Director's role to more of administration with less research responsibility. This would require adjusting the national staff positions in such a manner that another staff member would assume more responsibility for research planning and conduct, with the collaboration of the IITA scientific adviser, while at the same time allowing the director much more time to devote to program management and its various functions. Addition of a national administrative assistant to help in day to day logistics would help relieve the problem of workload.

The position of Adjoint Administratif is one of extreme importance with regard to the efficient back-up of each of the research programs with problems of procurement, personnel, etc. in addition to fiscal responsibility. The responsible national officer in this post needs to be well trained in fiscal management and personnel management. Whether or not the Adjoint Administratif is receiving as much advice as necessary in the complicated management scheme involving line item budgeting, acceptable accounting and auditing procedures, as well as day to day management could not be determined. The fact that he is housed in the same office with the expatriate Administrative Officer is definitely a positive move in the right direction.

The expatriate Administrative Officer is required under the terms of his job description to provide administration, financial, and logistic support to the project. In addition, he is responsible for on the job training of the Adjoint Administratif. In actuality he appears (as judged as based on three hours of discussion) to be doing many more tasks than called for in his job description. Responding to day to day problems of operation plus required duties seems to be a way of life and he should be complimented on handling the problems in a very good fashion. However he should be relieved of many of the tasks he now currently faces and be permitted to concentrate on the tasks as defined. He could then assist the RAV Coordinator in financial and management problems, adequately prepare the Adjoint Administratif to assume a more responsible role in management and develop the necessary fiscal and management policies through collaborative efforts with national project personnel. Changes in responsibility should provide a more appropriate management of fiscal policy.

Resource Management

Procurement plans, in general, are lacking. An IITA equipment specialist developed a procurement plan at the time of project design. Such a list of equipment and estimated costs do not reflect current costs. Actual purchases and the original plan reflect budget constraints. It is not possible to determine the current status of equipment purchases, with exception of a list presented to USAID which will total approximately \$750,000 in expenditures.

The project Administrative Officer stated that there is no system currently in place for determining relative equipment priorities within and among national programs. Purchase requests from national program directors are discussed by the COP, the farm Manager, PRONAM, and purchases or requests are accepted or rejected. The Adjoint Administratif recommended during interview the co-approval by the project Coordinator for purchases.

A Zairois assistant to the Administrative Officer is being trained to conduct local procurement. National procurement officers would be helpful at each of the stations. In time it would seem that foreign procurement could be the assumed duty of such a person provided they received the necessary on the job training. No training programs have been held to date.

The fact that USAID/Kinshasa does not have a procurement officer is a constraint in purchasing foreign commodities and equipment. Procurement of foreign (US) equipment has been slow. The lack of waiver to enable buying non American vehicles would enable more rapid replacement. Changes in buying procedures from use of local counterpart funds to US funds has held up the purchase of new Land Rovers for which local funds were available. The original request for this equipment was dated June 1986. As of this date, September 1986, the vehicles have not been ordered. A waiver request has not yet been processed and meanwhile progress in the program is curtailed because of a lack of vehicles.

A monthly status report on orders of major equipment items is maintained until received in country. After arriving in country, records are maintained on location of large capital items. No status reports are kept on local orders. Records are maintained on expendables and non-expendables received.

No inventory system currently exists. PRONAM has begun an inventory system but the other programs do not yet have in one place. Annual reporting of equipment is required but nothing noted concerning condition. The Administrative Officer stated that a system of annual accounting of all vehicles, their condition etc. should be put in place with a physical connection to book keeping process. Thus a system of depreciation could be developed and useful life of equipment determined.

Price Waterhouse will advise on developing inventory and methods for putting in place. Currently Price Waterhouse is developing accounting procedures for funds as the number one priority, and will proceed with the inventory system and its development secondly.

Financial

The audit recommendations as provided by Price Waterhouse, retained by the USAID Controller, and outlined in USAID Memorandum dated 13 February 1986 from USAID Project Officer to the RAV Coordinator have for the most part been implemented. Those not implemented on this date, 3 September 1986, are in process of being put in place.

There is a budget planning cycle which corresponds to the requirements of USAID Kinshasa. In addition, one and 5 year budget projections were provided the GOZ, DOA in June of 1986. Budgeting is difficult because of uncertainty in the amount of counterpart funds which will be available.

According to the USAID Project Officer there is a serious budgeting problem with certain line items of the current year's budget, some lines being drastically overspent, and which was noted in budget summaries prepared in July 1986. On the other hand, RAV Coordination shows that these categories are not overspent, but this is based on their revised budget request and submission of new budget in July 1986. Receipt of the submitted rebudgeting was acknowledged by USAID on 22 July, 1986 and USAID requested information (justifications) for supplementing the primes. In addition there were items purchased which are not approved by USAID. Due to extenuating factors (home leaves, etc.) the discussions and justifications have not yet been made and the situation is yet to be resolved by either side of the issue. Meanwhile RAV coordination continues to spend based on their own revised unapproved budget.

Currently, an Internal Auditor, Cit. Kavota va hwere, is training with Price Waterhouse in proper auditing and accounting procedures. He provides monthly statements to RAV from each of the programs which are consolidated quarterly for presentation to USAID. According to USAID there have been many mathematical errors in the summaries submitted..

Price Waterhouse will design and implement auditing and accounting procedures for RAV in phases.

- a. familiarization with system
- b. design and improve systems
- c. implementation by teaching nationals at each station
the accounting system
- d. follow up.

The internal auditor will make spot audits of each program's accounts as deemed necessary.

The project has been audited twice by Price Waterhouse, once in June 1985 which covered the period from start-up of the project through first quarter 1985, and in June 1986. The PNM program was audited for the period from the first quarter 1985 through second quarter 1986.

RAV has apparently been unable to follow up on all recommendations of first audit because of lack of trained personnel in place in each of the programs, e.g. PNL is currently without an accountant. The Administrative Officer, RAV, is aware of this problem and wishes to see it improved. He did not suggest how soon changes will be made.

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Accounting training courses have been held at each of the Program Headquarters by both the Administrative Officer and the Adjoint Administratif (one in '85, and 3 in '86).

RAV Coordination apparently has the same concerns as USAID regarding accounting systems and audits and has assigned more financial responsibility to the Administrative Officer and the Adjoint Administratif, who share the work.

The system currently in place and operating is not now functioning at an acceptable level of competence. Additional training of the Adjoint Administratif might alleviate some of the the problems in accounting. USAID's accounting procedures and requests should be followed. Changes in procedures should be first discussed with, and subsequently approved, by USAID.

Most of the recommended accounting and auditing procedures have been made or are in the process of being developed. RAV coordination is aware of the shortcomings of their current procedures and are attempting to implement change. Such implementation will take time and appears to be progressing at a satisfactory rate. Well trained personnel will make implementation more rapid. Price Waterhouse advice is being accepted and the firm should be retained by USAID until implementation of their recommended procedures is implemented, and with continued follow-up with spot audits.

The budget issue presents a different problem. Line item budgeting, a new financial management technique, is established; but, without adequate training in managing line items, there are, and will continue to be, problems.

It is apparent that there is rigidity on the part of USAID/Kinshasa, in line item budgeting and which may at times impede the progress of operation of the research and development project. As suggested in the Mota-Bröckman memorandum of January 10, a project (091) without adequate operating funds will become another program with staff and infrastructure, but with no funds to carry out research.

The RAV Coordinator, Cit. Mota informed me that he believes the approved budget, bottom line, should be respected. However, he believes that the administration of funds should be left to the discretion of the Project Coordination. This is a feasible means of operating a project, the important issue being the conduct of research.

It is not unusual in many US institutions to use "innovative" budgeting with line items, but with restrictions being placed on salaries and fringe benefits, and, in most cases, on construction without adequate prior justification, and changes in line items other than those restricted, can be made. Perhaps some flexibility could be allowed RAV in making changes, but only after appropriate discussion between USAID and RAV Coordination.

The current situation of USAID considering that there is overspending with the current budget on the one hand, and RAV Coordination believing they had USAID approval of their revised budget on the other, is a truly significant problem which needs to be resolved as soon as possible. The fact that RAV Coordination kept their budget revision within the total for 1986 should not

be ignored, nor should USAID's request for justification of re-allocating funds. RAV also has to explain the expenditures of funds for unapproved items. The issue will continue to exist unless an understanding by both parties can be achieved.

The obvious problems in the issue under consideration are:

a. an apparent lack of dialogue concerning the issues, on the part of RAV with USAID or vice versa in resolving the issues;

b. lack of response, to date, of the request of USAID dated 22 July 1986 to RAV, requesting justification of certain items in revised budget.

Another problem which was mentioned by RAV Coordination concerned the budget reductions imposed by USAID in January 1986. I was told by the RAV Coordinator, and also the USAID Project Officer, that these reductions (30%) were made arbitrarily by the USAID officer.

RAV coordination maintains that a request to them for budget reductions was not made. They also believe that they should have had the opportunity to adjust the line items as they determined necessary. Here again a lack of dialogue concerning the issues appears to have precipitated a misunderstanding between AID and RAV management.

Personnel

A description of the responsibilities of each of the members of RAV coordination including contractor personnel and Zairois staff has been prepared, and each position has an assigned person to carry out the functions required.

The project paper provided a technical description of each of the required Technical Advisors. In addition more specific descriptions were drawn up but not included in the signed project paper. A more specific job description for each expatriate staff assigned to each of the three programs and the exact duties is related to the specific relationship with national staff should be developed. No formal job descriptions for technical staff in each program are on file in RAV headquarters other than those mentioned above, the Program Director. However PRONAM has developed rather simplified technical descriptions for technical personnel assigned to that program. Descriptions should be designed for each of the other two programs.

At the beginning of the project there were 25 technical persons assigned to PNM and PRONAM. The project paper called for filling 66 positions and with increasing numbers to 95 by the PACD. As of August 1986 there were 77 technical persons assigned to PNM, PNL, PRONAM and Coordination, as follows:

PNM	15
PRONAM	29
PNL	23
Coord.	10 (1)

A list of the IITA Technical Assistants is found in Annex 6. Included are the key people in each of the programs.

The mix of skills of the technical staff appear to be appropriate to facilitate the attainment of project objectives with the following exceptions: there is no weed specialist named in the project because the project planners believed they could rely on the services of short term consultants to advise on constraints due to weeds. At the minimum each program should have someone trained in weed science-agronomy and who would be a functional member of the appropriate FSR team.

Based on current funding problems encountered by RAV in acquiring adequate funding from the GOZ it seems unlikely that the current staffing patterns could be maintained after the PACD. The request of the DOA for projected budgets of one and five years in May of 1986 suggests that there is concern by the GOZ for the future funding of RAV. Whether or not a five year projected budget is utilized to assure adequate GOZ funding was not determined. A larger commitment on the part of GOZ for agriculture and agricultural research will be required and should be encouraged now. The project Coordination should not further expand the originally planned staffing pattern.

Participant Training

Project 091 provided for 4.5 years of long term Technical assistance to coordinate both the long and short term training programs and the outreach program. The latter presumably would be short term-training of private organization personnel involved with extension and outreach activities. The director/coordinator of training joined the RAV office in Kinshasa in 1985. Because of the lag in start up no participant training was initiated as described in the international plan.

Approximately 3.0 million dollars were allocated to long term training programs of RAV staff. An additional 300,000 dollars was set aside for short term training programs. Local currency for foreign travel costs and in-country training were approximately 25,441,000 zaires.

Currently there is no national counterpart to act as the training director and therefore Dr. Miller serves in that capacity. He has indicated this is a short coming in the project while being interviewed by the evaluation team. A national should be placed in this role as soon as possible.

The training and outreach director has developed a document which defines staff development and training for the project and which also considers the functions and relationships of organized staff training. The document provides the groundwork for staff development in project 091.

In addition Dr. Miller has developed a procedure by which national program staff are nominated for US participant training. Nominees must score 550 on the TOEFL (Test of English as a Foreign Language) as requirement for admission into US academic institutions. Ability to score acceptably on the GRE (graduate Record Exam) is an additional requirement. The nominees are screened carefully through an advisory committee which is composed of the Coordinator, RAV, expatriate COP advisor to the coordinator of RAV, the director of training, directors of each program, and the head of the farming systems program RAV.

All members must express approval of each candidate. Student applications and assignments are arranged by USDA/OICD/ITD for preliminary evaluation pending TOEFL and GRE scores. Acceptance is obtained by the OICD. Project 091 has negotiated a contract with the USADA/OICD for these services.

Currently there are 4 PhD and 9 MS students studying in the US. (See Annex 7) One person, Dr. Lutaladio ne Bambi, Adjoint Technique, RAV, was awarded the PhD in March 1986, University of Ibadan.

In may 1986 it was projected that 11 additional MS and PhD students, besides those identified, were needed for to reenforce the three programs. Nine nominees had been identified for the MS and 6 for PhD programs in the US.

The mix of students in the participant training program appears to meet the needs of each of the programs with the exception of weed science. Training of MS students in agronomy/weed science should be considered.

Short term training has been planned with a number of participating institutions including IITA, ICRISAT, USDA (in country), University of Pittsburgh, University of Illinois, and the Institute of Development Studies, UK. These are planned for a period of five years and will serve a variety of needs from training in crop production (maize, root crops, cowpea-soybean) to management. A total of 155 staff participants are expected during the period 1986-1989.

Other training activities center on the sessions designed to "train the trainers", that is, the training of outreach collaborators including national organizations (agronomes de collectivité), Peace Corps Volunteers, private voluntary organizations, and international collaboration (FAO-PNE). In addition training for specialists such as mechanics, computer operators is also planned.

The training component of 091 is large and well organized. Much time and thought has gone into its development and it will play an important role in creating a self-suffient successful institution by the PACD.

A few problems in the training program hase encountered, most of which can be solved. The evaluation team leader discussed the training program with the OICD coordinator of the 091 trainees in the US. She pointed out three problems the students are encountering in the US:

1. English proficiency is inadequate when the student arrives in the U.S.
2. Poor GRE scores
3. No resolution of the means by which students will conduct their research in the US, or in Zaire? Research in Zaire seems advisable if details can be worked out.

Another problem not well resolved is the question of whether not families can accompany the students to the US or not. If not, a directive should be sent to each of the nominees giving specific guidelines regarding families.

The latter problem has resulted in much confusion in the minds of the nominees. Some believe that they can not take their families with them even if they pay the costs. Many believe they should be able to take the family because of precident already established by USAID (Two students were allowed to take their wives).

Points one and two, above are related to English proficiency and English should be acquired in Zaire at a much reduced cost to the project. Also the students should take the TOEFL in Zaire prior to departure to the US. This would provide them with a more competitive background for the situation in which they are placed. Further English training in the US should be required in cases of a score of 550 on the TOEFL examination. The student should be sent to the US to acquire a BS degree in agriculture and then proceed in a graduate program. A BS would provide background for a competition score in the GRE. Such programs are currently in place with AID Supported Programs.

C. Project Objectives

A discussion of program strategies, priorities, and objectives has been presented above. The importance of the position of Adjoint Technique and the importance of continuing dialogue between Program Directors, the Adjoint, the RAV Coordinator, and the Technical Advisors in establishing research priorities is again stressed.

D. Other Issues

Many of the issues which are raised in this section of the Project Evaluation Scope of Work have been discussed under each of the topics of evaluation. Others will be addressed here.

In general the project appears to be making progress towards financial, managerial, and organizational stability. Specific problem areas have been identified in the evaluation process and are mentioned in the appropriate section. The success of the project will depend on how soon and how many of the changes can be implemented.

It is not understood by many of the technical staff what the future may be for the project after the current PACD. This question, which has also been mentioned by USAID a number of times in the Scope of Work for this evaluation (Annex 3), needs to be addressed now with projected budgets, including estimated inflation, and other increased cost factors for presentation to the GOZ. RAV Coordination and USAID could then attempt to achieve a commitment from the GOZ for forward funding after the PACD. Use of hard data and public relations as developed in the project to date, plus other information, e.g., FAO report concerning agricultural production in Africa (September 1986), should be used for justification.

In my opinion the Zairian staff appreciate the goals of project 091 but are less informed about priorities and the means by which they are developed. This is apparently due to a delay in filling the position of Adjoint Technique, an administrative post which is necessary for the development of priorities and from which could then be articulated the strategies and priorities of each of the programs.

Projects Relationship to Other AID Projects

Project 102 - Bandundu Area Food Production and Marketing

This area development project which provides capital and/or credit, technical assistance and training to local non-governmental institutions who are actively involved in farmer level agricultural extension activities is a logical project for an 091 linkage, particularly for the 091 outreach program and the diffusion of new cultivars and agronomic practices. Some interaction is currently in place with 091.

Project 105 - Central Shaba

Agricultural production and marketing (roads) project. PNS (059) was predecessor to this project. Linkage with 105 would provide greater ease of access for production inputs (seed) developed from 091 and also provide better means for marketing commodities produced by regional agriculture.

Whether or not agriculture production has increased among the small farmer clientele as a result of project 091 cannot be determined on such little information developed after only a short operational history. With the current complement of FSR staff, plus those to be added, the information should be available by the PACD.

Certainly the PRONAM manioc cultivars F-100 and Kinuani have the potential for increasing production. This is also true of the maize cultivars Shaba I, Salonga II and Kasai I, which have been demonstrated as successful releases by PNM.

ANNEXES

EVALUATION

PROJECT ORGANIZATION AND MANAGEMENT

PROJECT 660-0091

ZAIRE

September 1986

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ANNEX 1

Documentation
Reviewed

- 1985 Republic of Zaire Consiel Executif - Department de l'Agriculture et du Developpement Rural
Le Commissaire D'Etat
Arrete Interdepartmental No. 10001 185 DV 10 Dec 1985 portant creation et organization d'un project de Recherche Agronomique Applique et de Vulgarization en Abrégé (RAV). RAV files
- 1986 Department de l'Agriculture et du Developpement Rural
Developpement Rural - Project de Recherche
Agronomique Applique et Vulgarization USAID 660-0091 - Definition des Attributions au Nouveau des Services de la Coordination. RAV files.
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ANNEX 2

PERSONS INTERVIEWED

OR

CONTACTED

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Persons Interviewed or Contacted

USAID

Mr. <u>Chandler</u> , Dennis	Director/USAID
Mr. <u>Brown</u> , Donald	Chief Agriculture and Rural Development
Ms. <u>McCarthy</u> , Cheryl	Project Manager 091
Mr. <u>Attaberry</u> , David	Assistant Manager Project 091
Mr. <u>Braddock</u> , Lee	Chief Program Development and Evaluation
Ms. <u>Rectenwald</u> , Debra	Program Development and Evaluation
Ms. <u>Alder</u> , Janet	Program Development and Evaluation
Cit. <u>Nkiere Mbo Wassa</u>	Assistant Manager Project 091 and Agro-Economist
Cit. <u>Tshishiku Kabundi</u>	Assistant manager Project 091

Kinshasa

RAV Headquarters	
Cit. <u>Mota Bakajika</u>	RAV Coordinator, Department of Agriculture and Rural Development GOZ.
Dr. <u>Brockman</u> , Frank	Chief of Party IITA Technical Assistance Team
Mr. <u>Servant</u> , Greg	Administrative Assistant IITA team
Dr. <u>Miller</u> , David	Training Officer/Outreach IITA team
Dr. <u>Bartlett</u> , Christopher	Economist/FSR IITA Team
Cit. <u>Lutaladio ne Bambi</u>	Deputy Director/Technical RAV
Cit. <u>Wanzalughendo Musavuli</u>	Deputy Director/Administration and Finance RAV.
Cit. <u>Kankonde Dambu</u>	Executive Secretary RAV.

Bas-Zaire

Cit. <u>Mahungu Nzola Meso</u>	Director PRONAM and Head Plant Breeding Mvuazi
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Dr. <u>Osiname</u> , O.A.	Agronomist/Soils and Principal Advisor IITA Team Mvuazi
Cit. <u>Landu</u> Kalemba	Head Agronomy Dept. Mvuazi
Cit. <u>Moyolo</u> Kilumba	Head Pathology Dept. "
Dr. <u>Nsiama</u> Hatalman	Head Entomology Dept. "
Dr. <u>Pandey</u> , Sheo	Head Dept of Outreach IITA Team
Dr. <u>Babu</u> , Buyyala Chitti	Technical Service IITA
Dr. <u>Otoo</u>	IITA Cassava Program, Ibadan, Nigeria
Mr. <u>Delaporte</u> , J,	Conseiller Project Agricole (French) Mbanza-Ngungu.

Kasai

Cit. <u>Kilumba</u> Ndayi	Director, PNL
Dr. <u>Shannon</u> , Dennis	Aronomist, Principal Advisor, IITA
Cit. <u>Bakelana</u>	Plant Breeder
Technical staff as a group	

Shaba

Dr. <u>Mulamba</u> Ngandu Ngindu	Director, PNM
Dr. <u>Johnson</u> , Kenric	Plant Breeder, Principal Advisor, IITA
Dr. <u>Hennessey</u> , Ron	Entomologist, IITA
Dr. <u>Vogel</u> , Wolfgang	FSR, IITA
Cit. <u>Kapongo</u>	Entomologist
Cit. <u>Kanku</u>	Plant Breeder

ANNEX 3

SCOPE OF WORK

091 EVALUATION

SCOPE OF WORK
FOR THE EVALUATION OF
THE APPLIED AGRICULTURAL RESEARCH PROJECT (660-0091)

1. CONTRACT OBJECTIVE

The objective of this contract is to procure the services of four qualified individuals to conduct the initial evaluation of the Applied Agricultural Research Project (660-0091).

2. INDIVIDUAL SCOPES OF WORK

- a. Team Leader (30 work days) -- The Team Leader will be responsible for ensuring that all issues and questions listed in parts 7,8,9,10 and 11 are addressed in the final evaluation report. He/she will submit a draft of the entire report two days before his debriefing with the Director, and submit a final report by the end of his contract in Zaire. The Team Leader will also be responsible for overseeing all evaluation work; he will delegate field work and work assignments as appropriate among the team members and he will coordinate team members' schedules to permit a timely submission of the evaluation report. The Team Leader will meet with the Director and other appropriate USAID staff to discuss evaluation findings before his departure.
- b. Farming Systems Research Specialist (20 work days) -- This person, working under the direction of the Team Leader, will determine if a food crops research program using the FSR approach is being established. He/she will address all issues concerning the farming research systems component in this project.
- c. Maize Agronomist (20 work days) -- This person, working under the direction of the Team Leader, will visit the centers concentrating on maize research. He/she will examine all issues concerning maize research.
- d. Legumes Agronomist (20 work days) -- This person, working under the direction of the Team Leader, will visit the centers concentrating on legumes research. He/she will examine all issues concerning legumes research.

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3. PROJECT DESCRIPTION

This project is conceived as a ten-year endeavor (1983-1993) divided into two phases of six and four years. The first phase begins the long-term process of building institutional capacities for a national agriculture research system by establishing within the national foodcrop commodity programs a management capacity with a farming systems research approach. The project's first year was designed to serve as a transition from ongoing discrete research foodcrop commodity activities to a coordinated national food-crop research program. The experience over the remaining five years will shape subsequent planning for the project's second phase. The International Institute of Tropical Agriculture (IITA) has signed a cooperative agreement with USAID for advising and working with the GOZ's Department of Agriculture in implementing the project. The Project Assistance Completion Date (PACD) for the first phase is September 30, 1989.

4. EVALUATION PURPOSE

This initial evaluation constitutes a Routine Implementation Evaluation. The evaluators will assess project progress vis-a-vis project objectives as identified in the Project Paper to determine if the project is on track. They will also make recommendations for any necessary revisions of the Project Paper as deemed appropriate in light of lessons learned through experience with the project so far, or of new ideas about how to better outline project objectives.

5. EVALUATION TEAM AND ITINERARY

The evaluation team will comprise nine members, four of whom will be provided by this contract, four to be provided by the Mission and one from IPFRI. An agricultural research management and organizational specialist will lead the team. Other participants will include a farming systems research specialist, an agricultural economist, and three agronomists with research experience in corn, cassava, and foodgrain legumes. The USAID Project Officer and her project staff will serve as resource person to the team. The team will conduct interviews with relevant project and USAID personnel and review project documentation in Kinshasa. The Team Leader will draw up an itinerary with the USAID Project Officer for project site visits, dividing the field work among the participants as appropriate. The evaluation is scheduled for four weeks starting in June 1986.

6. SELECTION CRITERIA

- a. University Qualifications: College of Agriculture with strong commodity research programs and experimental farm system; faculty with tropical farming research experience preferably in Africa consultants; good international reputation; and familiarity with the international agricultural research centers system.
- a. Team Leader: PhD in a Crop related field; agricultural research management and organizational specialist; experience in agricultural research planning (forecasting, setting objectives, developing strategies, programming, budgeting, setting procedures, determining policies), organizing (establishing organizational structure, delineating relationships, creating position descriptions, establishing position qualifications), staffing (selecting, orienting, training, developing), and logistics for a public university system; experience in agricultural experiment station management, including extension activities; familiarity with Farming Systems Research. Experience in African countries required, French highly desirable. Detailed knowledge of AID procedures and requirements desirable. Good writing and editing skills essential.
- b. Legumes Agronomist: PhD in breeding, pathology (including insect pests) plant physiology, legume and soil interaction or derivative of any of the above; familiar especially with peanuts, soybeans, and Phaseolus, and of lesser importance is wing beans, Bambara nuts, and Cajanus; familiar with farming systems research; French preferred but not required.
- c. Maize Agronomist: PhD in breeding, pathology (insect, viral, and bacterial), or maize physiology; must be familiar with both open pollinated and hybrid maize; experience with farming systems approach to research; French preferred but not required.
- d. Farming Systems Research Specialist: PhD in any related field; field experience in the implementation of farming systems research; familiar with AID mandates and definition of FSR and with IARC's definition of FSR role; French desired, but not required.

7. EVALUATION REPORT

The Team Leader will submit a final evaluation report by the end of his contract in Zaire. This report will be limited to 15 pages and will be prefaced by an executive summary of no more than two pages. Additional comments and analyses may be appended to the report. The evaluators will address the questions and issues listed below, as well as pertinent evaluation issues listed in the Zaire FY87 ABS.

8. EVALUATION ISSUES

The following issues and questions refer to end of project status. The evaluators will examine the project's present status and will determine if scheduled progress has been made in meeting project objectives.

- a. Organizational and Managerial Structure. Is a structure which will be capable of defining and managing research programs for a national agricultural research system being set up?
 - 1) Has an organizational chart been prepared? If so, determine if the chart is appropriate for real working conditions. Is the organizational structure flexible enough to adapt to changes which may occur in the national research system? Recommend any necessary revisions.
 - 2) Is the organizational structure within the support capabilities of the Department of Agriculture (DOA)? If not, recommend how this problem can be resolved.
 - 3) Is the managerial structure defined explicitly, enabling all participants to clearly understand the extent and limit of their authorities? Is the structure appropriate for real working conditions? Is it flexible enough to respond to changing needs? If not, recommend how necessary revisions should be executed.

- b. Food Crops and Research Program. Is a food crops research program using the FSR approach being established?
 - 1) Are the food crop research programs being coordinated and integrated? Are the programs and the project sufficiently flexible to adapt to the evolving national agricultural research policy? If not, recommend how necessary revisions should be implemented.
 - 2) Has the FSR been implemented in its entirety? If not, is there a plan for implementing the remaining facets? Is the direction of the research identified in the Project Paper congruent with project goals? Discuss the system's strengths and weaknesses.
 - 3) Have linkages with the farming population been established through FSR or other means? Are the linkages set up so that information flows both ways; that is, do farmers participate in the research process? To what extent? Discuss.

- c. Zairian Staff. Are Zairians being sufficiently trained in agricultural research to participate effectively in the project? Are Zairians being trained in technical and managerial skills as called for in the Project Paper? Are these trained Zairians being placed throughout the various programs as described in the Project Paper? Is the distribution of these skills appropriate? Discuss.
- d. Agricultural Production. Are constraints which preclude small farmers from increasing production being identified?
- 1) Have potential economic, marketing, and sociological constraints been identified? Which method has been used to identify these constraints? Is it appropriate?
 - 2) Do research objectives accurately reflect the conclusions and recommendations of the FSR work which is being done? How were they developed? Do all concerned parties agree with them? If not, recommend how differences could be resolved.
- e. Dissemination of Technology. Is progress being made towards developing and implementing a methodology for effective utilization of public, semi-public, and private organization in the dissemination of technology and the provision of feed-back and evaluations?
- 1) Assess the progress being made towards implementing a strategy for outreach. Has the strategy been explicitly defined? Discuss.
 - 2) Are technological packages being extended through outreach linkage mechanisms? If not, by when will a package be prepared? Which kind of organization would most effectively distribute these packages?
- f. Seed and Plant Material Production. Is a capacity being developed for producing foundation seeds and plant materials?
- 1) Is this capacity being developed to support seed and plant material production by public and private entities?
 - 2) What role is defined for Recherche Agronomique Appliquée et Vulgarisation (RAV) in this regard? Have all concerned parties agreed to this role?
 - 3) What progress has been made in transferring RAV's seed and plant production activities to private entities? Is RAV working with other projects? Is it encouraging PVOs, missionary groups, and cooperatives to undertake multiplication activities? If so, discuss this collaboration.

- g. Extension. Are improved seeds, plant materials, soil management, and agronomic practices being developed and tested under farmer conditions?
- 1) Are research programs being organized to develop and test soil management and agronomic practices? Discuss.
 - 2) Have at least 6,700 farm families been shown these improved agricultural techniques over then past two and half years of project activity? Have village cultivators (mainly women) adapted easily to these techniques? To what extent have they been practicing these techniques?
- h. Training. Is there a long term training plan? Is there a short term training plan? Do these plans address the needs and concerns identified in the Project Paper? Discuss.

9. PROJECT MANAGEMENT

a. Resource Management

- 1) Is there a procurement plan? For what time-frame? Does the plan reflect budgetary constraints? Is there a system for determining the relative priorities within and among national programs? Has a training program in procurement techniques been held? Discuss.
- 2) Have commodities been delivered in a timely manner? Is funding for commodities sufficient? Does the commodity list reflect program activities and priorities? If not, how should it be adjusted?
- 3) Has a system which provides status reports on procurement actions been set up? Have receiving and end-use tracking systems for expendable and non-expendable supplies been established? Does each research system have an inventory system? Discuss these systems' strengths and weaknesses.
- 4) Have reporting dates been established? Are they understood and respected by all concerned parties? If not, discuss necessary revisions.

b. Financial

- 1) Have audit recommendations been implemented? Discuss.
- 2) Is there a budget planning cycle? Does it meet the needs of project financiers? Does it complement program and research planning? Is there an adequate accounting system? Is there an accountant training program and adequate audit (informal and formal) systems? Discuss.

c. Personnel

- 1) Have job descriptions for all RAV positions been prepared?
- 2) Have all technicians called for in the Project Paper been hired? Do these technicians provide an appropriate mix of skills to facilitate attainment of project objectives? Is the level of effort appropriate for each skill?
- 3) Do current scopes of work for the technical assistance team reflect those which they are carrying out? Are the skills required for the technical assistance team, as identified in the project paper, still appropriate? Discuss.
- 4) Can the GOZ eventually absorb all costs associated with current personnel levels? What are realistic levels? Discuss.

10. PROJECT OBJECTIVES

- a. Are program objectives and priorities clearly identified? Are they understood and agreed to by all concerned parties? Do they logically lead to project objectives?
- b. Do scopes of work reflect project objectives and priorities? Have staffing patterns within individual programs been designed to facilitate attainment of program objective?

11. OTHER ISSUES

- a. Is the project making progress towards financial, managerial, and organizational sustainability? Are measures being presently implemented which will permit the project's continuance after the PACD? Do Zairian staff members understand and appreciate the project's goals and objectives? How will the project finance its activities once AID assistance runs out? Discuss.
- b. What should the project's relationship be to other AID-financed projects in Zaire? Are there areas in which projects can effectively collaborate? Discuss.
- c. Has agriculture production increased among the small farmer target group? Is the project geared to monitoring production?

DEFINITION DES COMPETENCES DEVOLUES
AUX DIFFERENTS PARTENAIRES OEUVRANT
AU RAV

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DEFINITION DES COMPETENCES DEVOLUES
AUX DIFFERENTS PARTENAIRES OEUVRANT
AU RAV



Mars 1986

P R E A M B U L E

Le but de ce document est d'arriver à déterminer les responsabilités des différents partenaires qui seront appelés à oeuvrer au sein du RAV, à savoir : le Conseil Exécutif et les sociétés d'intervention (p.ex. IITA) représentés respectivement par les cadres nationaux et l'équipe des scientifiques expatriés.

Cette répartition des responsabilités part du principe accepté par le Conseil Exécutif et l'AID cosignataires de l'acte de dont créant le Projet, le 13 Septembre 1983 .

Aux termes de l'Arrêté interdépartemental n° 001/ds du 10 décembre 1985 portant création et organisation du RAV, il est stipulé que le Projet est chargé de coordonner les Programmes Nationaux de Cultures Vivrières et d'y développer les activités de recherche agronomique appliquée et de vulgarisation, en vue de répondre positivement à l'impératif national de l'autosuffisance alimentaire.

Il convient de rappeler que le RAV demeure une structure exécutive du Département de l'Agriculture (cfr. Dispositions 5. 2G de l'Accord de Don). La présente répartition tient compte de cette relation organique et s'insère dans le cadre de l'intégration prochaine du RAV au sein de l'Institution nationale de recherche (cfr. compte rendu du Conseil Exécutif du 13/09/85 et Rapport du Groupe d'Etude/ ISN. - février 1985).

En conséquence, la définition des compétences dévolues respectivement aux cadres nationaux et expatriés oeuvrant dans les structures du Projet devra obéir à deux principes majeurs suivants :

- 1° Eviter de reposer toutes les activités de recherche sur les compétences extérieures, lesquelles, à l'expiration du contrat les liant au Projet, feront apparaître un manque critique des cadres. Or, ce handicap ne contribuerait nullement au développement de l'institution nationale de recherche (INERA) en pleine restructuration.
- 2° Asseoir la Recherche sur les compétences nationales, qui peuvent bénéficier, de façon ponctuelle, des apports scientifiques extérieurs. Cette condition permet de pérenniser l'existence des structures nationales de recherche.

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Compte tenu de ce qui précède, il est impérieux de responsabiliser les nationaux à tous les postes, autant que faire se peut. Dans ce cas, les Expatriés seront appelés à épauler les autochtones avec le rang de Conseillers "actifs". Cependant, les postes organiques pour lesquels il manque encore des compétences nationales (concept à définir), les Expatriés les assumeront à titre de "faisant fonction".

Sur base de ces considérations, le Projet devra dans le meilleur délai, mettre en place une réelle politique de formation et procéder à l'identification des compétences potentielles sur le territoire national.

Le présent document rappelle donc les limites et décrit les attributions de chacun des partenaires appelés, de par leur complémentarité, à se mouvoir dans le réseau RAV.

Son double mérite est d'éviter :

- a/- les interférences négatives, en définissant clairement le champ de compétences de chacun des partenaires;
- b/- l'apparition de deux administrations parallèles, en permettant aux expatriés ayant rang de Conseillers, de s'intégrer à l'organigramme officiel, tel que tracé par le Département de l'Agriculture d'une part, et d'épauler les cadres Zaïrois désignés comme responsables de service d'autre part.

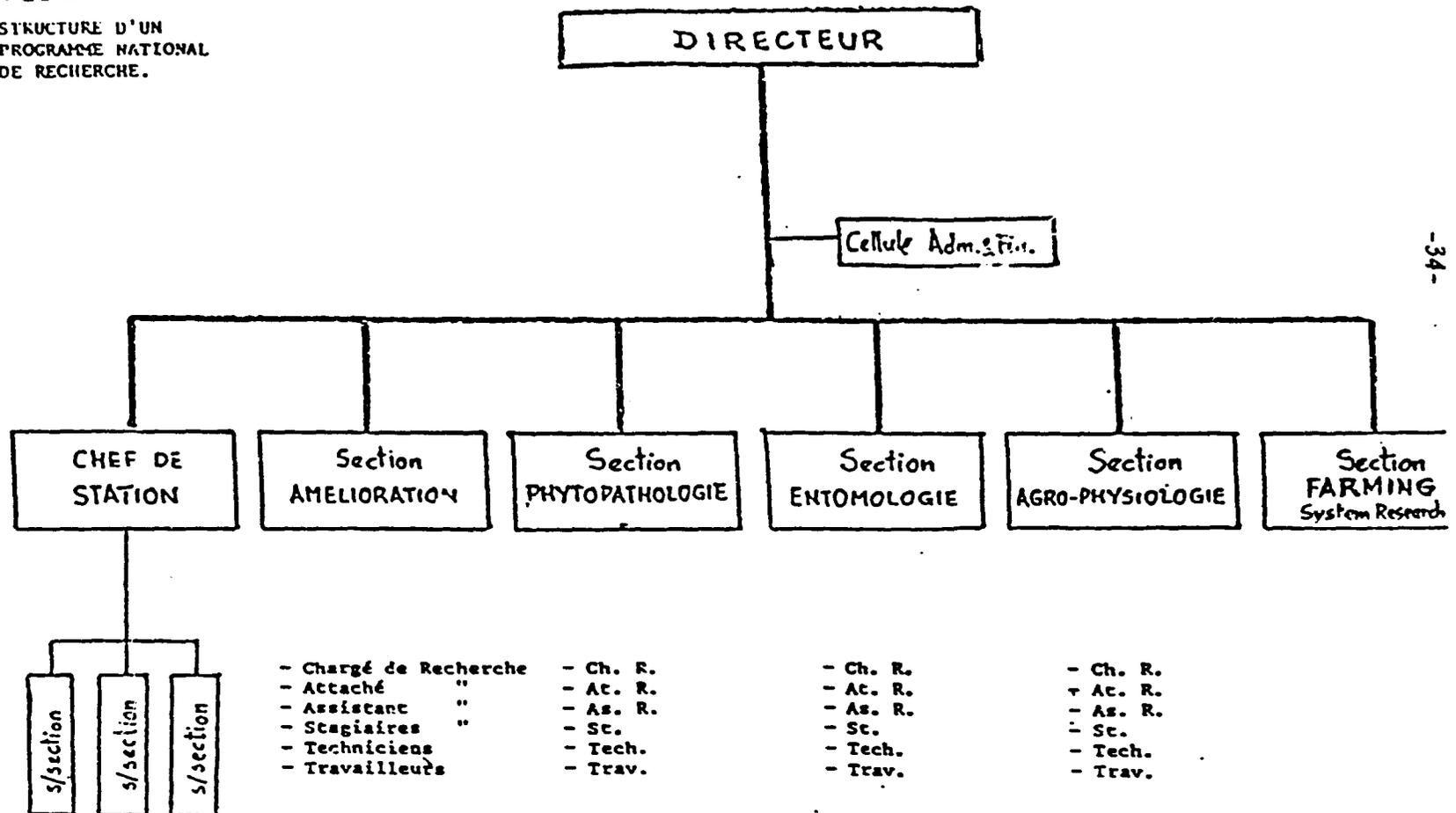
Ce document passe par 3 points essentiels dans la gestion courante de tout Projet, à savoir :

- la gestion technique/scientifique
- la gestion administrative et logistique
- la gestion financière.

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STRUCTURE D'UN
PROGRAMME NATIONAL
DE RECHERCHE.



A - GESTION TECHNIQUE/SCIENTIFIQUE ET LOGISTIQUE

Il convient de rappeler le principe selon lequel l'objectif majeur du Conseil Exécutif en matière de recherche sur les cultures vivrières est d'en accroître les rendements pour atteindre l'autosuffisance alimentaire du Pays.

Cette politique évoluera à travers les axes suivants :

- la sélection et l'amélioration génétique des variétés;
- le développement de la résistance des cultures aux maladies et pestes par manipulation génétique et autres moyens;
- la mise au point des techniques culturales appropriées;
- l'établissement des relations efficaces entre la recherche et les structures chargées de vulgarisation.

-1. De la définition des projets ou plans de recherche

- La responsabilité de cette démarche revient au Conseiller Scientifique Chef d'Equipe de la société d'intervention (p.ex. IITA). Il devra, après concertation avec l'Adjoint Technique Zaïrois et d'autres consultations, notamment avec les Directeurs des Programmes, définir à partir de la politique ci-dessus indiquée les lignes maîtresses des expériences à mener dans des domaines précis.
- Ces projets de recherche qui peuvent être à court, moyen, ou long terme, ne sont exécutoires pour les Programmes Nationaux qu'après leur approbation par le Département de l'Agriculture et l'AID.
- Le Chef d'Equipe et l'Adjoint Technique sont tenus de présenter trimestriellement les rapports d'activités indiquant l'état d'avancement des travaux scientifiques sur le terrain.
- Ces rapports visés conjointement par le Chef d'Equipe et l'Adjoint Technique seront signés par le Coordinateur du RAV, pour leur expédition à toute hiérarchie intéressée, notamment le Département de l'Agriculture et l'USAID.
- Les actes scientifiques et technique à destination des Programmes Nationaux seront préparés et visés conjointement par le Chef d'Equipe et l'Adjoint Technique; ils seront ensuite transmis aux Programmes sous la signature du Coordinateur.



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a -2. De la mise en oeuvre

- Par respect de l'autonomie reconnue aux Programmes, la définition des protocoles d'essais et l'exécution s'effectueront au niveau de chaque Programme, à travers ses différentes sections et ce, sous la coordination du Directeur du Programme assisté de son Conseiller principal. Les deux responsables agréeront le protocole avant son exécution et signeront conjointement sur tout document à caractère scientifique.
- En raison de leur importance en tant que foyers de toutes les activités de recherche, les "Sections" devront être gérées par les autochtones compétents et expérimentés, conformément au principe énoncé dans le préambule.
- A chaque Section sera affecté un Conseiller de Section. Toutefois, un Conseiller, à quelque niveau qu'il se trouve (coordination ou Programme) aura le rôle de:
 - 1) suivre et fournir des conseils techniques, scientifiques et de gestion de recherche à tous les niveaux de cette Section à travers le Chef de Section d'une part, d'approuver par une contresignature (ou visa) tous les travaux ou documents de recherche émanant de la section d'autre part.
 - 2) se consacrer, en tant que chercheur pour ceux qui sont aux Programmes, à une tâche bien précise de recherche s'inscrivant dans le programme de l'ensemble de la Section.
- Pour éviter une gestion bicéphale, il importe de préciser que le conseiller n'est pas investi d'un quelconque pouvoir hiérarchique. Ses attributions lui confèrent néanmoins le pouvoir d'approuver ou non, par signature/visa, les travaux et décisions qui rentrent dans le champ de sa compétence, tel que décrit dans le présent document.
- les Directeurs des Programmes, assistés de leurs Conseillers, sont habilités à désigner les responsables de différentes Sections.
- Pour les Conseillers qui s'occupent de 3 Programmes à la fois (par ex. Entomologie), ils ne peuvent s'adresser aux Sections qu'à travers les Directeurs des Programmes.

a-3 Du suivi et de l'orientation des Programmes Nationaux

Ces prérogatives seront assumées par le Département de l'Agriculture et l'AID, autrement dit par le Coordinateur et le Project Officer à travers l'Adjoint Technique RAV et le Chef d'Equipe.

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Le Département se réserve le droit de contacter l'AID aux fins d'arrêter toute activité qui ne se conformerait pas aux priorités de la recherche agronomique du Zaïre.

a - 4. De l'évaluation

Elle sera réalisée conformément au Plan d'évaluation prévu dans l'Accord de Don.

a - 5. De la logistique technique

A ce poste, comme ailleurs, la politique Zaïroise évoquée plus haut demeure. Néanmoins, faute de compétences nationales disponibles en ce moment:

- les approvisionnements pour les équipements à caractère technique et scientifique sont placés sous la responsabilité d'un titulaire désigné par la société d'intervention à titre de "faisant fonction".
- le titulaire expatrié est chargé d'assurer à très court terme la formation du cadre Zaïrois qui lui sera affecté. En outre, il devra, de par la nature de ses fonctions, s'en référer chaque fois à l'Adjoint Technique tant au niveau de la Coordination qu'à celui des Programmes.

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B. - GESTION ADMINISTRATIVE ET APPROVISIONNEMENT

b - 1. Du personnel

- Du point de vue scientifique, tous les chercheurs et techniciens, nationaux et expatriés, seront gérés conjointement au 1er niveau par le Coordinateur et le Chef d'Equipe; au 2è niveau par les Directeurs des Programmes et leurs Conseillers.
- Du point de vue administratif, tout le personnel tant national qu'expatrié sera régi par la législation de l'Administration Zaïroise (ordres de mission, horaires de service,...). Dans ce cas, tout le personnel est placé sous la gestion du Coordinateur et des Directeurs des Programmes Nationaux, assistés respectivement par le Chef d'Equipe et les Conseillers principaux.
- Exception doit être faite cependant pour les problèmes particuliers des expatriés touchant aux relations avec leur maison-mère, pour lesquels ces expatriés relèvent de leur Chef d'Equipe.
- La disposition ci-dessus s'applique également mutatis mutandis aux cadres et agents Zaïrois à l'égard de leur administration.
- Il est demandé aux deux parties, dans les deux cas, de s'informer mutuellement.

b - 2. De décisions à caractère scientifico-administratif

- Pour respecter le principe de la décentralisation des Programmes Nationaux vis-à-vis de la Coordination RAV, les décisions à caractère scientifico-administratif seront prises collégalement :
 - a) au niveau de la Coordination: par le Coordinateur et le Conseiller Chef d'Equipe. D'autres personnes peuvent éventuellement être associées.
 - b) au niveau des Programmes: par le Directeur et son Conseiller. D'autres personnes peuvent éventuellement être associées.
- Les documents de cette nature seront signés par les responsables Zaïrois (Coordinateur, Directeur,...) après visa de leurs Conseillers respectifs.
- En cas de désaccord irréductible au sein du collège, l'arbitrage proviendra:
 - a/ pour des Programmes: de la Coordination RAV
 - b/ pour la Coordination: la voix du Coordinateur est prépondérante.



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- Afin de favoriser l'esprit de concertation dans la gestion du RAV, il est obligatoire d'organiser, tant au niveau de la Coordination que des Programmes des réunions mensuelles sauf cas d'urgence. Participeront à ces réunions les responsables suivants :

a/ le Coordinateur et les Conseillers,

b/ les Directeurs de Programmes, les Conseillers et les Chefs de Sections et les cadres de commandement.

Le but de ces réunions est de traiter de la gestion quotidienne (administrative, technique, scientifique). Un compte rendu analytique doit être rédigé. Les Programmes ont l'obligation d'en réserver une copie à la Coordination.

b - 3. De l'appréciation du rendement des cadres

- Pour les expatriés, le rapport d'appréciation sera établi trimestriellement et, conformément aux instructions, transmis aux Autorités (Département, USAID). Un des critères d'appréciation des expats concerne leur capacité de transférer les connaissances aux nationaux (formation).

- Pour les cadres Zaïrois, le rapport d'appréciation sera établi annuellement et ce, conformément aux Statuts de l'Administration publique qui les régissent.

- Les critères dont on doit tenir compte pour apprécier le rendement des cadres (Nationaux et Expatriés), sont les suivants :

a/ connaissance du métier

b/ expérience

c/ savoir-faire : rendement/qualité/valeur

d/ ordre et méthode, organisation

e/ esprit d'initiative, dynamisme

f/ sens de responsabilité

g/ efforts pour développer ses connaissances et aptitudes

h/ formation du personnel subordonné ou homologue

i/ honnêteté, intégrité

j/ relations sociales

- Une fiche de notation standard sera mise en circulation à cet effet.

- Les procédures d'appréciation du rendement sont les suivantes:

(R/V)

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- a) Le DIRECTEUR DU Programme et son Conseiller principal sont chargés de noter le rendement de tous les cadres nationaux et expatriés.
- b) Le Conseiller principal du Programme est noté par la Coordination RAV, après avis du Directeur de Programme.
- c) Le Directeur du Programme est chargé d'assurer l'expédition à la Coordination de toutes les fiches de notation, sous pli confidentiel.
- d) Le Directeur du Programme ainsi que les Conseillers de la Coordination seront notés par le Coordinateur après avis du Chef d'Equipe.
- e) Le Chef d'Equipe sera noté par le Coordinateur.
- g) Le Coordinateur transmettra au Département de tutelle, sous pli confidentiel, les fiches de notation des Expatriés et Cadres Nationaux.

b - 4. Des approvisionnements

- Les approvisionnements en fournitures de bureau et autres de consommation courante, relèvent de la compétence de l'Adjoint Administratif & Financier (pour la Coordination) et du Secrétaire Administratif (pour les Programmes).

(RAV)

(67)

C. GESTION FINANCIERE

La gestion financière du RAV se conformera à une double injonction :

- a) l'esprit de l'Accord de Don
- b) les procédures comptables édictées par le Département de l'Agriculture et du Développement Rural.

De cette manière, il est entendu que la gestion

- a) au niveau de la Coordination, sera assurée par un représentant du Conseil Exécutif (le Coordinateur ou un délégué) et un représentant de l'USAID ;
- b) au niveau des Programmes Nationaux, sera assurée par les Directeurs des Programmes et une personne désignée par l'AID (le Conseiller au Directeur par ex.).

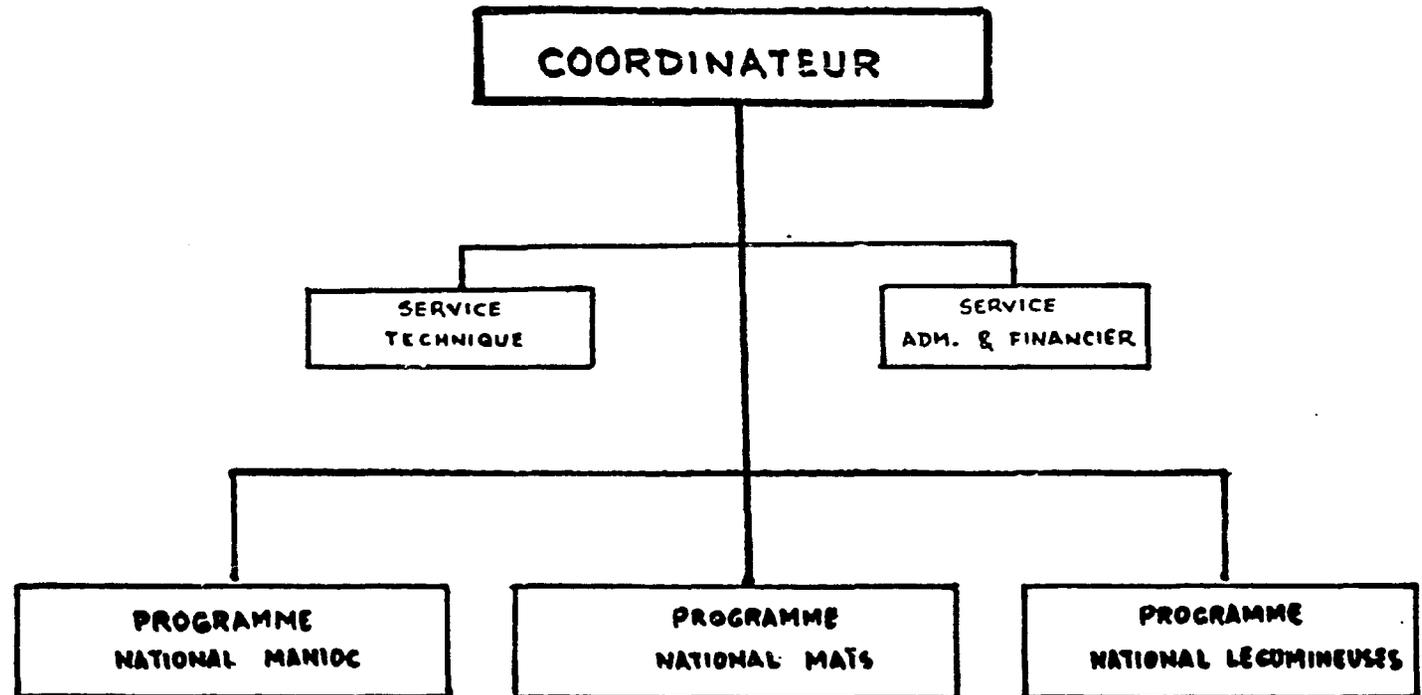
Un rapport financier sera transmis trimestriellement à l'AID.

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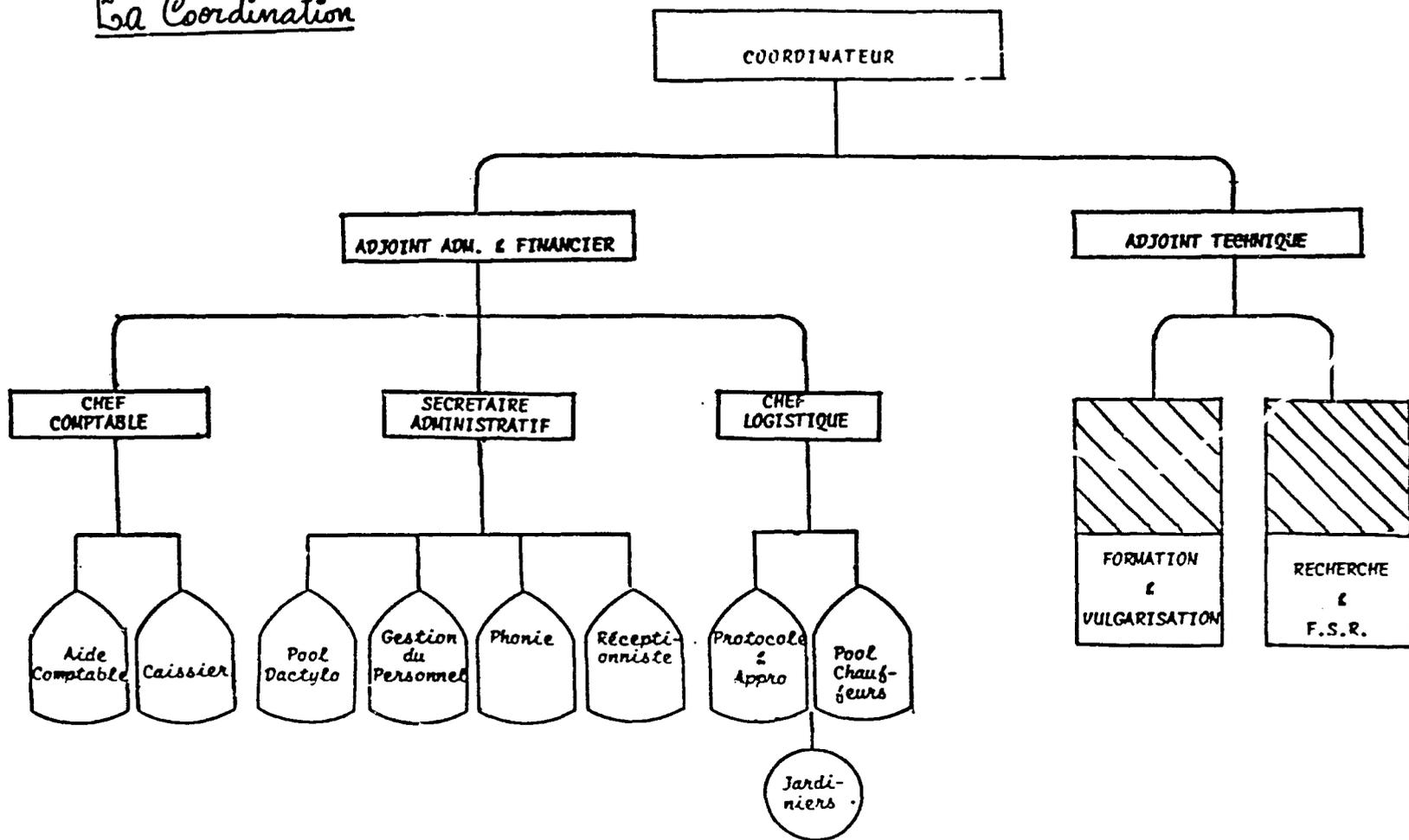
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ORGANIGRAMME



La Coordination





K.L./MB.H.

REPUBLIQUE DU ZAIRE

Conseil Exécutif
DEPARTEMENT DE L'AGRICULTURE ET
DU DEVELOPPEMENT RURAL

Kinsasa, le 22 AOUT 1985

N° 5011/ 000188 /SG/AGRIDRAL/

TRANSMIS copie pour information aux :

- Citoyen Commissaire d'Etat
à l'Agriculture et au Développement Rural

à KINSIASA/COMUE.

- Citoyen Secrétaire d'Etat
à l'Agriculture et au Développement Rural

à KINSIASA/COMUE.

- Aux Citoyens Directeurs-Chefs des Services

Tous à KINSIASA/COMUE.

- Directeurs des Projets (Tous)

LE SECRÉTAIRE GÉNÉRAL.

Objet :

Envoi rapport trimestriel
d'évaluation des activités
des Coopérants.-

Me référant à la décision du Conseil Exécutif prise le 02 Août 1985 à propos des expatriés résidant au Zaïre, et dans le souci de me permettre de suivre l'évolution des activités des coopérants affectés à vos Projets et d'apprécier ainsi l'impact de l'assistance de ce personnel dans le cadre de la coopération bilatérale et multilatérale dans le domaine agricole; je vous demande de me fournir trimestriellement un rapport d'évaluation des activités de chaque coopérant mis à votre disposition.

La présente constitue un ordre permanent obligatoire et ne peut souffrir d'aucune exception.-



[Signature]
BEWA-NZAU.-

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ANNEXE 5

IITA TECHNICAL ASSISTANCE

Chief of Party	Dr. Frank Brockman
Administrative Assistant	Mr. Greg Servant
Farm Manager	Mr. Buyyala Chitti Babu
Services Engineer	Mr. Francisco Garcia
Maize Plant Breeder	Dr. Kenric Johnson
Legumes Plant Breeder	Dr. Luis Camacho
Research Agronomist - Cassava	Dr. Olu Osiname
Research Agronomist - Maize	Dr. Margaret Quin (Proposed)
Research Agronomist - Legumes	Dr. Dennis Shannon
Research Entomologist	Dr. Ron Hennessey
Socio-Economist/FSR	Dr. Christopher Bartlett
Socio-Economist/FSR	Dr. Wolfgang Vogel
Training/Outreach	Dr. David Miller
Outreach (M'Vuazi)	Dr. Sheo Pandey

ANNEX 7
LONG-TERM TRAINING

LONG-TERM TRAINING

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PRESENTLY NOMINATED AND
PAPERS IN PROGRESS

PROJECT PAPER GOAL	CURRENT IN U.S.	POTENTIAL A ₀	POTENTIAL A ₁
34	13 (9 DIFFERENT DISCIPLINES)	7	13

A₀: 5 YEAR UNDERGRADUATE DEGREE RECOGNIZED BY U.S.

A₁: 4 YEAR UNDERGRADUATE DEGREE NOT RECOGNIZED BY U.S.

APPENDIX B
EVALUATION
FARMING SYSTEM AND ECONOMICS RESEARCH IN THE
THREE RAV COMMODITY PROGRAMS

SEPTEMBER 1986

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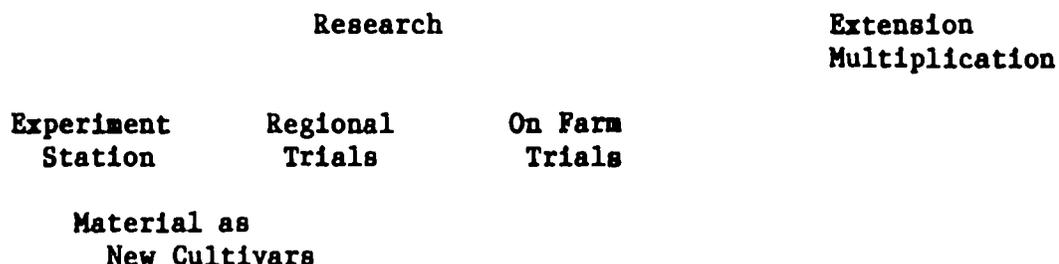
Recommendations from the FSR and Economic Analysis of the three Commodity Programs

1. There should be equal participation in both design and analysis of the on-farm trials by the agronomists and economists. Economic analysis is particularly important in farm level trials. The economists need to have their own budgets for some on farm trials as well as working with the agronomists on the economic analysis of the agronomists' trials.
2. Estimates need to be made of the extent of the diffusion and of the farm level impact of the new cultivars in the Cassava Program (Kinuani and F-100) and in the Maize Program (Shaba I, Kasai I, and Salongo II). It is recommended that farm level interviews be designed and implemented by the economists in these programs to estimate the extent of diffusion and to evaluate the farm level factors associated with diffusion.
3. Organizationally, farming systems components needs to be placed in each commodity unit. It is recommended that Dr. Chris Bartlett be located in Mvuazi to work with PRONAM as soon as suitable housing can be arranged there. Dr. Wolfgang Vogel will be working with PNM in Lubumbashi. The coverage of PNL by FSR economic analysis will be worked out once the PNL personnel have arrived and the FSR/economic programs are running in the PRONAM and PNM commodity teams.
4. The definition, discussion, and workshops on farming systems research are useful activities as long as they are not a substitute for doing field work on on-farm research, which will help contribute to research priorities. This fieldwork should proceed immediately now that two economists are in place in PRONAM and PNM.
5. In the PNL program the present commodity orientation of putting a major emphasis on a new crop is considered to be very risky in a new commodity program. Moreover, soybeans are expected to be a large farmer activity in Zaire. The bias of the team was to put the major emphasis on groundnuts and then common beans (Phaesolus vulgaris) based upon the present economic importance in Zaire of these two commodities. However, we recognize the IITA argument that they may be able to make rapid progress in yield increase in a short time with soybeans. Our recommendation is that two outside consultants be engaged to work with the two RAV economists and the PNL team on a new legume priorities paper. These consultants would be respectively knowledgeable about:
 - a) soybean marketing and processing for human consumption.
 - b) research priorities and potential for yield increase of groundnuts in tropical conditions (ICRISAT)

Introduction:

Our operating definition of FSR in a commodity program is the setting up and utilizing of farm data in a systematic way as an input into the research design process. FSR defined here is the assertion that a systematic evaluation of farm level constraints should be undertaken by those setting crop research priorities. It is not the only factor because research priorities must also take into account the expected potential and time period for success of different research strategies.

The research process can be conceptualized as having three locational stages, the experiment station, regional trials, and on-farm trials as below:



Feedback on Technology Performance

New component parts of the technologies come out of the experiment stations. The new cultivars and/or new agronomic practices move on to regional trials, where they are combined and tested for location specific adaptability problems. The final stage of research is on-farm testing. Here the component parts are put together into new technology packages and tested under a wide range of different farm level conditions. On-farm trials are still part of the research process to evaluate the profitability and the fit into farmers' systems of production of the new technology packages developed from the component parts research at the experiment station.

The farm level testing is an integral part of the research process and needs to precede seed multiplication and the extension-demonstration activities. In many commodity programs scientists become excited about the prospects of a new cultivar and associated improved agronomic practices and they rush into the seed multiplication and distribution stage before undertaking systematic on-farm analysis of the performance of the new technologies. Frequently, in this case the researchers discover that their new cultivar does not perform well under a wide range of farm level conditions. On the experiment station soils are often more fertile than on farmers' fields. Frequently disease and insect pressures are more intense unless there is chemical control.

By doing farm level testing at an early stage of the research process before multiplication, an identification of the specific different farm level constraints to the introduction of this new technology can be undertaken. Specifically, can the farmer make money from one or more of the new technology packages and does one or more fit into the farmers' systems of production? Other marketing or other constraints can also be evaluated here.

The central aspect of the FSR is the On-Farm Research. Specifically the performance of new cultivars and associated improved agronomy levels on farmers' fields. However, other economic surveying to supplement this information is often undertaken. Exploratory surveys, rapid reconnaissance surveys, and other descriptive or baseline surveys are considered to be of secondary importance as compared with the on-farm trials. Rather these surveys should be designed to complement the on-farm trials and to expand upon and help resolve the related economics and systems problems accompanying the introduction of the new technology systems in the trials. Similarly, marketing evaluation or evaluation of specific factors such as the sexual division of labor and land in cassava production could be identified as necessary types of information to understand the constraints to the new technology introduction.

Based on the documentation provided and the interviews with the Program scientists this report will review the three commodity program activities in FSR and Economics and make suggestions for future activities. First, the next section will review the progress of FSR and Economic analysis in the RAV program.

History of FSR and Economic Input into the RAV Program:

In June 1983 James Jones of the Florida Farming Systems Support Project (FFSP) wrote the Project Paper Annex E-3, "The Farming Systems Approach to Research and Extension". He also made estimates of Project benefits and costs based upon assumptions about:

- a) farm level yield increases in the three basic commodities made possible by the three research programs.
- b) the successful diffusion of those new cultivars onto farmers' fields.

In February 1984 a three man team from the IITA Farming System Unit visited Zaire. Their memo (H.J.W. Mutsaers, "FS/OFAR proposal for the Zaire /IITA project" of March 16, 1984) in their words "deviated significantly" from the original project paper and was "summarily discussed with USAID mission staff at the last day of the visit." This memo forms the basis of the FSR planning for the RAV program (F. Brockman, personal conversation).

The proposal recommended "three regional FS/OFAR teams attached to the stations" in contrast with the Jones' recommendation of a centrally located team to serve all three regions.

In December 1985 a joint workshop run collaboratively by FSSP and IITA personnel was held at Mbanza-Ngungu. The workshop included group participation in a rapid reconnaissance survey ("sondeo"). The estimated cost of this workshop was 631,000Z. Another workshop with the same two collaborating institutions was scheduled for April 1986 in Lubumbashi at an estimated cost of 900,000Z (G. Servant's conversation). It was called off due to shortages of operating costs and the unavailability of one of the principal IITA collaborators (D. Miller, personal conversation). This workshop has been rescheduled for January 1987. These workshops have the objective of familiarizing the staff of the various commodity programs with FSR methodology and thereby helping them to define what they can get out of it.

The RAV program has been gradually acquiring its professional staff, who will be involved in FSR work. The following expatriate technical advisers have been added to the programs on the following dates.

Dr. Chris Bartlett, Agricultural Economist, March, 1986 presently located in the Central Office but will do FSR and economic research with PRONAM

Dr. Olu Osiname, Soil Fertility Specialist and Technical Advisor to the PRONAM Program, March 1986. He will also be doing some experimentation on the farm level.

Dr. Dennis Shannon, Agronomist and technical adviser to PNL, September, 1985. He has been doing varietal trials at the stations but with the build-up of the breeding program is programmed to become involved in the FSR.

Dr. Wolfgang Vogel, Agricultural Economist, contracted April 1986. He will be doing FSR and Economic research in the Maize Program.

Dr. Margaret Quin, Agronomist, may be arriving in the fall of 1986. She will be responsible for agronomic trials on both the experiment station and on the farms for PNM.

Since the expatriates have only arrived very recently, there is not much to evaluate except their future plans.

There has been a recent discussion on the location of FSR and Economic research within the Commodity teams or in the Central Office. There are two principal arguments for including these activities within the Commodity Programs:

- a) The Program Directors and the Zairean central management want these activities to be in the Commodity programs.
- b) If the principal objective of FSR is to provide information from the farms to facilitate the setting of research priorities in the commodity programs, it is important for the FSR teams to know the commodity research programs very well. The economists would know the programs better from inside the programs. But there could also be some work across commodities by the Economists just as Dr. Hennessey, the Maize Entomologist may also be requested to provide technical services to PNL on their insect problems.

My recommendation is that the FSR economist as well as the agronomist be located in the commodity teams of cassava and maize and that both the agronomist and the economist should have their research projects including On Farm trials over which they have expenditure authority within their Commodity Programs. This was discussed and agreed to in the PRONAM by both the Director and the Principal Technical Adviser. The Director of PRONAM has now incorporated the On Farm evaluation of new cultivars and improved agronomic practices into his breeding selection process.

The main summary observation is that there now have been multiple definitions of FSR, proposals, and a workshop and another workshop planned. Meanwhile an Economist has been employed in the RAV program in the coordination office since March 1986 and another Economist arrived in September. However FSR is defined it is time to get the Economists access to the FSR budgets and to get them going with field work. Both are anxious to be involved with both On Farm trials of new technology (new cultivars and improved agronomic practices) and surveys of the farm level impacts of the new cultivars already released. In the next three sections the FSR and Economic activities and requirements in the three Commodity Programs are reviewed.

Farming Systems and Economic Analysis in the
Cassava Program (PRONAM):

This is the flagship program since RAV evolved from the earlier USAID support of this program by combining PRONAM with the maize (PNM) and grain legume (PNL) programs. USAID supported PRONAM (Project No. 77) from 1980-1985. Besides developing a comprehensive research program (breeding, entomology, pathology, agronomy, multiplication and extension) a large number of Zairean junior scientists were sent off for M.S. and Ph.D. training. They are presently providing most of the scientific staff for PRONAM. Since 1980 stake multiplication and distribution has been undertaken in Bas Zaire (see Table A-1 in the Appendix). The principal cultivar released officially by the DOA in February 1983 has been Kinuani. (Final Report Cassava Outreach Project, p.11). Kinuani is more precocious than traditional varieties and has "a good level of resistance to Cassava Bacterial Blight, Cassava Mosaic Disease, and Cassava anthracnose" (Final Report, pp. 11,12).

In spite of this long history of seed multiplication and distribution to a wide range of agencies, there has been very little analysis of the farm level impact of the cultivar. An exception is the field work of Mbulu-Ntoto, "Activities de O.F.E. a Kisantu de 1982-86". In the following his farm level results and other observations on Kinuani are summarized. This information was also verified with other scientists in the PRONAM programs.

(1) On a high fertility valley soil Kinuani in monoculture outyields by 36% the local variety in the first season but was inferior in the second season. On the lower fertility plateau soil the yields of Kinuani and the local were approximately equal in the first season with Kinuani being again inferior in the second season.

Yields of Kinuani and the local cultivar on the two types of Region Cultivated in both seasons:

	<u>Cultivar</u>	<u>First Season</u> <u>Yields (T/ha)</u>	<u>Second Season</u> <u>Yields (T/ha)</u>
Valley	Kinuani	9.1	8.5
	Control (Mpelo-longi)	6.7	9.3
Plateau	Kinuani	6.1	1.6
	Control (Mpelo-longi)	5.8	3.4

Much of the Cassava in Bas Zaire is planted on the lower fertility plateau and in the second season since the priority high value crops for the valley in the first season would be maize and peanuts.

(2) Kinuani yielded less than the traditional cultivar in association with peanuts (Mbulu-Ntoto, p.4). Kinuani branches much more than the traditional variety.

B

(3) Kinuani can be harvested early at 10 months but is generally harvested from twelve to fourteen months. Farmers report that after 14 months Kinuani becomes much more fibrous and of inferior quality (Mbulu-Ntoto, conversation). Cassava in most forms spoils rapidly after harvest and is traditionally harvested in small quantities over a long time period. Hence the time cassava can be left in the ground without spoiling appears to be an important characteristic to farmers. The traditional variety in the areas we visited is harvested for 1 to 1 and a half years after 18 months in the ground. Time in the ground before qualitative deterioration needs to be one of the important selection criteria in the breeding program for small farmer utilization.

(4) Associated with earliness is early flowering. Once flowering commences, the leaves ("pondu") become bitter. The "pondu" is an important component of the Zairean diet and the revenue from the leaves is almost as important as the roots in determining the income derived from Cassava.

From two days in the field visiting farms with Kinuani we had the impression that under more favorable soil and rainfall conditions, in the valley during the first season and especially with fertilizer, there was a moderate yield advantage to the introduction of Kinuani. Some farmers are also expected to plant Kinuani for the earliness to further stagger their harvesting times. Another advantage of the development of Kinuani was the linking up of PRONAM with private and public agencies including large farms interested in producing Cassava.

Bas Zaire is a priority region for PRONAM since research has been concentrated here and it is a principal supplier of cassava products to Kinshasa. There is substantial soil variation in Bas-Zaire with a predominance of low fertility, frequently acidic sandy soils in the region. The on-farm trials in Bas Zaire illustrated the problems of understanding better the fertility requirements on different soil types and the need for separate selection of first and second season cultivars. Dr. Olu Osiname, a soil fertility specialist, has now been added to the PRONAM team. There are various cultural practices presently utilized by farmers, including the "mafuka" (burying the weeds in ridges and partially burning them), which undoubtedly affect soil fertility. He will be designing agronomic experiments to evaluate soil fertility problems at the farm level including the responses to chemical fertilizer, lime, and variations of the "mafuka" practice.

There are a number of public and private agencies receiving stakes from PRONAM including a cement factory, missionary groups, the army, the transportation ministry, and various large farmers. PRONAM needs to get back information on yield performance and production problems from these groups in a systematic way. The PSR agronomist could help some of these groups set up simple trials and an afternoon in the annual review of PRONAM could be set aside for feedback from these groups on the performance of the new cultivars and improved agronomic practices.

Due to its resistance to three of the principal cassava diseases Kinuani should considerably increase cassava yield stability overtime and its greatest impact will be when the disease pressures are the highest. There are a series of problems with Kinuani especially the apparent need for the better

production conditions of the first season and monoculture production in the valley. Nevertheless, this cultivar is apparently diffused and adopted by some farmers. This diffusion may also be partially explained by the availability of the stakes of Kinuani in large quantities at low cost. Nevertheless, the diffusion of Kinuani is helping create a network for the future release of new material. Farm level surveying should be undertaken to estimate the extent of diffusion and the farm level factors associated with diffusion.

In summary PRONAM is off to a good start in producing new material and has begun some on farm research. More systematic on-farm trials of Kinuani may have identified earlier some of the above mentioned problems and enabled an earlier incorporation into the selection process of such criteria as:

a) time in the field after maturity before qualitative decline of the tubers;

b) cultivar performance under plateau and second season higher stress (soil fertility, insect infestation and earlier drought stress)

At this time the on-farm trials need to be complemented with a larger surveying effort on the extent and farm characteristics associated with the adoption of Kinuani.

(Also see Annex 1 on F-100 in Bandundu)

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MAIZE PROGRAM - FSR AND ECONOMIC ISSUES

Historically this has been a very strong program with CIMMYT ties during the seventies. They developed new open pollinated cultivars:

PNM I and SHABA I - high altitude;

KASAI I and SALONGO 2 - low altitude;

which in the 1985-86 yield trials in various locations were still out yielding or not significantly different from most materials from CIMMYT and IITA and the populations from IITA including those with Streak Resistance (see the Annual Report for 1985 of Dr. Mulamba). During the seventies this program including the CIMMYT participation was financed by the Zairean government. In 1981 with the continuing financial pressures on the Zairean government the Zairean funding was substantially reduced and the CIMMYT expatriates left.

The program has been renovated with the financial infusion of the RAV program beginning in August 1985. Dr. Mulamba, the PNM Program Director, worked in this national maize program in the seventies and obtained M.S. and Ph.D. degrees from Iowa State in Plant Breeding plus some post graduate work at the University of Illinois on Seed Production. Dr. Mulamba is very proud of this PNM program experience. The present PNM experimental facilities were upgraded over the seventies and eighties by the CIMMYT Station Manager and Israeli team. This station has now been taken over by President Mobutu. The government has provided in turn 200 ha. on an old Belgian farm. This facility will require extensive renovation. The A.I.D. program will be paying for this but it will require several years of private contracting. Meanwhile, normal station operations will be made more difficult.

Dr. Mulamba has two members of the RAV expatriate staff working on the Maize Program, Dr. Kenric Johnson, and Dr. Ron Hennessey. In the next few months an Economist, Wolfgang Vogel, and an agronomist, Margaret Quin, will be delegated by the RAV program to PNM to the National Maize Program (PNM). Dr. Mulamba and Dr. Johnson are introducing an emphasis in the breeding work on disease resistance breeding. The concentration is on:

1) Streak Virus

For particular regions disease resistance is also sought for

2) Downy Mildew (P. Sorghi) in North Shaba and Kasai Oriental

3) Upland Leaf Blight (H. turcicum) in south Shaba (highland)

As part of this resistance breeding effort the main program of Dr. Hennessey is presently the production of sufficient leaf hoppers to inoculate for streak virus all the breeding material of Dr. Johnson in the coming production season. Then Dr. Hennessey proposes to begin doing field studies on farmers' fields in various parts of the country to determine the economic importance of various field and later storage insect pests. The pathologist on the program, Cit. Kasongo, is also tied into the disease resistance breeding program and does evaluations of the incidence of these two diseases on the maize material.

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The disease resistance emphasis of the program illustrates the strengths of the IITA contact. IITA has had a major concentration on Streak Resistance and to a lesser extent, Downy Mildew in its Maize Pathology program at IITA. They have developed research techniques to evaluate new material. Both the breeding and entomology sections benefit from these contacts with research methods and the intellectual exchange.

At the same time Dr. Mulamba is very proud of the long tie to CIMMYT in the seventies and the open pollinated cultivars developed during this period. The shift to an almost exclusive concentration on these three disease resistances in the breeding strategy appears to be a little too fast for him. Over time competition between the breeders could be a very useful factor pushing both of them. There will be some pushing and pulling and even friction with two well trained experienced breeders in the same program. If some noise and differences are accepted as normal and both are encouraged and supported to be very productive, then PNM could move rapidly and could take advantage of this competition.

In the CIMMYT phase of the program in the seventies, simple on-farm testing of new cultivars with and without improved agronomy (principally moderate fertilizer levels, higher densities, and two weedings) was compared with farmers' cultivars with and without improved agronomy. Another innovation of the agronomic work in the CIMMYT period was the elimination of the ridges at planting with land preparation by hoeing and then utilizing ridges to cover the area side-dressed. PNM has a standard small farmer fertilizer recommendation of (64-46-0 for N, P₂O₅ and K₂O). See the Extension recommendations for Maize of May 1985 in Annex 3. There was some gathering of prices and costs but only a minimal economic analysis went into these recommendations (see Annex 3).

The agronomy program seems to be very disperse and not very well fit into the overall research program of the PNM. The Zairean agronomist, Cit. Mundeke, was not available but his program was presented. Given the very large soil differences within and between regions, soil fertility analysis is critical to this program. Dr. Mulamba told us that the on-farm testing did generally show an independent, significant effect from the new cultivar alone as compared with the farmer's cultivar. Given the high levels of chemical fertilization utilized in the regional trials to obtain the low C.V.s of which Dr. Mulamba is very proud, this assertion should be regarded as a testable hypothesis in future farm testing of new and traditional cultivars at different fertilization (and agronomic practice) levels.

In the southern Shaba region chemical fertilizer is expected to be combined with new cultivars if it is available. Chemical fertilizer is available from development agencies and is often combined with credit so that the cost can be repaid at harvest. Presently, there is no Zairean fertilizer industry but Dr. Mulamba argues that raw materials for atmospheric production of N is available. A feasibility study of the domestic production potential for a chemical fertilizer industry will become increasingly important in the next five years.

There are a large number of agricultural development programs presently operating in Zaire. Moreover, seed companies are being formed for different regions of the country in the new BUNASEM, World Bank supported national seed office. (Details of this program are presented in Annex 3) Dr. Mulamba has been furnishing foundation seed to these agencies for different regions of the country. The seed furnished has been principally Shaba I with smaller quantities of Kasai I and Salongo II also being furnished. Kasai I is utilized as a highly susceptible check in some of the IITA international testing of their Streak Resistance nursery. Dr. Johnson pointed out that Babungo, which has streak resistance, is already outyielding Shaba I in the Kaniameshi regional variety trials though the difference was not significant (Breeding Report, 1985, p.23).

Dr. Mulamba considers on-farm testing as extension-demonstration rather than an integral part of the research process. Nevertheless, he takes considerable pride in the improved cultivars so that it would not be difficult to get simple farm trials going with improved cultivars and fertilization. Then the disease resistant cultivars could move into these trials as they became available. It is important to do economic analysis of the profitability of the different treatments and to analyze the systems interaction with other crops and other activities of the farmers. It is recommended that these trials be concentrated on small farms since the large farms can quickly pick up new cultivars and test them for themselves. A descriptive analysis of the whole farming system including a fairly detailed analysis of labor utilization overtime would be useful and could lead into linear programming analysis on micro-computers.

In the North Shaba Development Project (USAID 059), which has concentrated on roads and maize, Kasai I and improved agronomy (higher density and weeding) have been successfully introduced. Reported yield increases from this new technology combination are from 0.8t/ha to 1.7 t/ha . on savanna soils and from 1.8t/ha to 3.2t/ha. on forest soils. (see Annex 3) Then also adding the standard PNM fertilizer recommendation of (64-46-0) with two bags of urea and two bags of diamonium phosphate (DAP), raises yields another 1t/ha on the savanna and 2t/ha in the forest. The acting project director, Bruce Spake, says that at 16Z/kilo farmers presently consider chemical fertilizer to be too expensive especially given the declinning real price of maize in the last three years (see below)

Estimated average farm level maize prices received in North Shaba (conversation with B Spake)

1984	4 Z/kilo
1985	3 to 3.8 Z/kilo
1986	4 Z/kilo

After new cultivars, chemical fertilizer appears to be the most obvious method of obtaining the next major yield increase and it is considered highly unlikely that a viable economically justifiable substitute will be obtained in the next decade for increased chemical fertilizer. Mulching, green manures and different rotations especially a rotation fertilizing groundnuts undoubtedly needs to be considered in the Agronomy Program of PNM. Nevertheless, chemical fertilizer is still expected to be an increasingly important input with maize especially as the cost of cutting and burning new forests goes up and the length of the fallow period declines. When implicit

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land costs begin increasing, the substitution of chemical fertilizer and improved rotations (cereal-legume) are expected to become increasingly important in Shaba. This increasing pressure on the available land has already been experienced in some regions with a decreasing fallow period and is expected to become increasingly important in the next five to ten years.

In North Shaba maize is planted in the first (Sept-Dec) and second seasons (Jan-April) with the bi-modal rain distribution. In this project region an estimated 90,000t. was harvested in the first and 50,000 t, in the second season. Streak virus becomes a serious problem in the second season with the build up of the leaf hoppers and Kasai I is highly susceptible. (conversation-B. Spake) An IITA cultivar (TZSR-W) with streak resistance has been grown experimentally for several seasons there with very impressive performance in this second season.

, Increased collaboration with the PNM is now being sought to identify a streak resistant cultivar for diffusion. Streak resistance would give more flexibility for later planting. However, it also seems important to emphasize that the PNM probably should not overinvest in developing disease resistances. A high yielding cultivar, Kasai I, has been very popular in this region over the last five years even though early planting is necessary to avoid streak. The search for high yielding materials for different regions without heavy innoulation paid off in the seventies in the CIMMYT period of the PNM. Now PNM has high yielding, locally adapted cultivars and is following a second stage in the Beeding Program of developing a specific strategy by identifying the constraints and then looking for a region specific solution. The North Shaba project manager was also concerned about the gradual decline of seed quality and believed that his project would benefit from more investment in seed purification in the PNM project.

The National Maize Program provides foundation seed to the National Fertilizer Program (PNE), the North Shaba Program, BUNASEM, and various other projects (see Appendices I, V and VII). These projects also generally provide fertilizer to their program participants. We were told that the only fertilizer available comes from these programs or from bringing it into the country from Zambia. This fertilizer importation is reportedly being done by the plantation farms of the mining companies and some large farmers.

There was some talk among the Corn Program Scientists of the potential effect of new varieties alone. However, the extension bulletin of recommended practices ("Guide pour la Culture du Maïs, au Zaïre", Inforav No. 1, May 1985 attached as Appendix II) included chemical fertilizer in all three of its different recommendations. When repeatedly questioned about the extent of fertilizer utilization and of the new cultivars, Dr. Mulamba responded that he believed that both were principally being utilized on the development projects. This program needs to document the extent of the diffusion of the new maize varieties and the associated improved agronomic practices.

Since the development agencies are presently intensively engaged in putting the new cultivars onto farmers' fields, there is an excellent opportunity to measure the yield and profitability results in association with them. Supplementary analysis of the whole farm systems to consider the potential constraints would also be feasible. This should give excellent feedback to the Maize Program on the economic factors associated with the new

technology introduction. It could also introduce more systematic analysis of their recommendations on different soil types in connection with the National Fertilizer Program (P.N.E.).

Future Farming Systems and Economic Research in the PNM:

A. On-farm trials of Fertilization and New Varieties -

One area needing more research in the PNM is in soil fertility research including the level of the three basic nutrients and lime across a wide area. FAO also does nation wide testing of this type with some crops. Clearly, in most regions chemical fertilizer is expected to be an important component accompanying new maize cultivars. PNM has the cultivars developed during the CIMMYT period but several of them especially Kasai I are extremely susceptible to Streak Virus (IITA, "Solving the Problem of Maize Streak Virus, 1986, Appendix 2, p.1). It is recommended that regional cultivar testing would be extended into on-farm testing. Regional cultivar trials involve 10-20 varieties at one agronomic level and usually a very high level of fertilization to reduce the C.V.'s of the trials. (A C.V., coefficient of variation is the standard deviation over the mean and is often utilized by agricultural scientists as a rough indicator of the reliability of their scientific results.) The recommendation here is to extend the testing by putting out a number of on-farm trials with one or two new cultivars at different fertilization levels plus the farmers' cultivar at the same fertilization levels.

In many cases various development agencies or the National Fertilizer Program can do this testing. However, the development agencies probably need to be helped to generate more accurate data. It is recommended that this data on the comparative performance of new and traditional cultivars at different fertilization levels and its interpretation would be presented at the annual meeting of the PNM to review its research output for the year. Specifically, that the information from these on-farm trials needs to be incorporated as feedback into the research planning process.

In those regions if the development programs, such as the national fertilizer program or the Central Shaba program, are unable to or unwilling to provide accurate data on yields, the PNM agronomist should help them to develop the capacity to do so or implement the trials herself.

Collaboration in the On Farm trials with an economist is necessary to move beyond yield comparisons to analyze the profitability of various fertilization strategies. Assuming that several levels of fertilizer are utilized as treatments, there are several sites, and soil fertility and other factors influencing yields are collected, regression analysis can be undertaken. As data is accumulated over time and between sites the risk factor can also be incorporated into the economic analysis. The new economist for the PNM is well trained in the techniques for this analysis.

There is a more basic problem of the development of a national fertilizer industry. The basic assumption is that sustainable technology to increase maize yields will include not only a new cultivar with higher yielding characteristics and disease resistance(s) but also improved agronomy technology especially fertilizer. There are three qualifications to be considered on the utilization of fertilizer:

a) First, the above trials can evaluate the profitability of fertilization. This is currently a complex pricing problem because chemical fertilizer is principally provided by the developmental agencies and there are expected to be subsidies of some kind involved. This can be handled in the economic analysis by varying the price of fertilizer over some range (sensitivity analysis);

b) Secondly, the assertion that there is an independent cultivar effect can be tested on farmers' fields and also compared with the combined effect of the new cultivar and fertilization and with fertilization on the farmers' cultivar;

c) Finally, in collaborative work with development agencies on new cultivars and improved agronomy a field evaluation by the economist and agronomist of the factors associated with adoption and non-adoption by various farmers is also expected to provide useful information on the constraints to new technology adoption.

In summary in much of the farming systems literature the stress on developing new technology without utilizing purchased inputs is considered to be another barrier to agricultural development. To increase and maintain stable maize yields in Zaire, increased chemical fertilizer and ultimately the development of a domestic fertilizer industry will be necessary. Already some farmers in southern Shaba following the extension recommendations of the late seventies and early eighties utilize chemical fertilizer. Increased utilization is expected. At the same time chemical fertilizer levels will undoubtedly be moderate and the above proposed trials will estimate the effect on farmers' fields of the cultivar alone.

B. Economic Evaluation of Insect and Disease Constraints

As a priority area of both the entomology and the pathology programs the identification and quantification of key pests and the impact on yields from various pests and pathogens were stressed in their program planning. If some integrated work were combined with the economic evaluation of other factors also influencing yields such as soil fertility variables and management practices, more accurate estimation of the economic losses could be made from these above problems. This type of analysis could also be tied to the above farm trials so that the impacts of these pests and pathogens on both new and traditional cultivars and at different levels of fertilization could also be studied. Finally, with the involvement of the economist a more systematic treatment of the economics of insect and disease control, especially the costs and benefits of management of both field and storage pests could be undertaken.

C. Macro-Policy Economic Evaluation

Large quantities of corn flour move from Zambia into southern Shaba. There were three different explanations proposed for this trade:

a) The medium size (30-40 ha.) mechanized farms of Zambia have had substantial research and infra-structure support in the past and therefore are more efficient producers (higher yields) at lower costs;

b) There is a consumer quality difference in the maize flours with the Zambian product receiving a price premium.

c) Exchange rate distortions or other trading phenomena such as lower transportation costs on backhauls could be explaining some of the corn flour movement. Some evaluation of these trade policy issues could be done. However, it is recommended that the principal economic activity needs to be on the farm level analysis of factors associated with new technology and this needs to be tied into the economic analysis of the farm level testing. Whole farm modeling is one extremely useful direction to go and it can include the new technologies as activities. Moreover, the new economist has experience in this type of modeling. Another extremely useful supplement to the on farm testing would be the systematic evaluation of the factors associated with adoption. Tobit analysis has been successfully employed to analyze differences in adoption rates between farms in an increasing number of empirical studies in the U.S. This technique is just an extension of multiple regression to handle the zero observations of no adoption.

FSR and Economic Analysis in the Legume (PNL) Program:

Since I was unable to get authorization to fly into Gandajika, the Director, Cit. Kilumba, and the technical adviser, Dr. Dennis Shannon, were kind enough to come to Kinshasa. Since both are agronomists at the M.S. and Ph. D. levels respectively, they both have much interest and a broad understanding of many of the farming systems in their region.

However, PNL is at a much earlier stage of program development than either PRONAM or PNM. PNL does not have the long history, in the seventies of outside support nor the apparently successful introduction of new cultivars. Moreover, PNL has taken a multi-commodity definition of its program objectives in contrast with the two other programs. The PNL Director, Cit. Kilumba, advised me that approximately one-half of the future research effort will be put into soybeans with the rest of their research effort approximately equally divided between cowpeas, field beans (*Phaseolus vulgaris*), and groundnuts. As discussed in H. Erickson's report the principal reason for this orientation was the belief that with selection among the improved soybean cultivars of IITA for similar climatic and soil conditions the PNL could rapidly identify and then diffuse new cultivars within three to four years. Normally breeding programs take five to ten years to produce new material. With the stress on obtaining rapid results, the PNL director has opted for a concentration on a new crop with an uncertain market potential. Both the concentration on soybeans and the emphasis at various Zaire stations on alley cropping are endeavors actively promoted by IITA from their primary station research. National resistance to both of these research activities has been expressed in the course of this evaluation.

Dr. Dennis Shannon has been doing varietal testing for a series of legumes in preparation for the arrival of the soybean breeder. But he will be engaged in agronomic research on and off the station once the breeding activity has commenced. Both Dennis and Cit. Kilumba indicated that surveys describing the farming systems in various regions of the Kasais would be very useful to all three commodity programs. Both argued that soil fertility in some of the Kasai regions is apparently higher and there are less acidity problems than in other regions such as Bas-Zaire and Bandundu. Therefore, Gandajika is a very important experimental site for the program. A better identification of the farm level constraints in the regions is necessary.

In the region a World Bank program (PMKO) has been promoting Salongo II of the PNM and chemical fertilizer, and more recently new varieties of cassava from PRONAM. PNL would like to take advantage of the survey data collected in this program. Moreover, they have been trying to identify improved legume cultivars of INERA-INEAC to multiply seed for this program. As in the PNM program PNL would produce foundation seed so that the BUNASEM Programs and other development programs and agencies could continue the seed multiplication and distribution process.

With the booming demand for foodstuffs from the mining industry and the more fertile soils, there are regions in the Kasais with substantial agricultural potential including the potential to use higher levels of purchased inputs. Nevertheless, given the budgetary restrictions in the RAV program limiting the number of economists to two and the further state of advancement of the two other programs, it is recommended that the farming systems analysis of this program be delayed until the economists have firmly established their positions in PRONAM and PNM. Then some farm level surveying could be undertaken in this program. Meanwhile, Bartlett and Vogel could further orient the Zairean economist presently working in this program.

One argument for the central location of the economists would be to enable them to work with the three programs. However, Chris Bartlett has been in the central organization since March and was unable to obtain a budget or to get his research program going there. It would be preferable for the economists to get research going in the respective commodity programs and to reevaluate this structure of having PSR programs in each commodity program in the next review of the RAV.

An Overview of the three Commodity Programs:

Agricultural research programs can be conceptualized as passing through three stages, the first two of which are relevant to Zaire:

Materials
Transfer

Methodology
Transfer

Basic Scientific
Solution to
Specific Problems

In the first stage in commodity programs cultivars are imported from all over the world and local selection of the best material including the crossing of the breeding program takes place. Then the new cultivars with local adaptation and improved characteristics are introduced. This stage has already occurred in PRONAM and PNM and is just beginning in the PNL. Now cultivars with local adaptation are being widely disseminated by PRONAM and PNM.

In the second stage region specific problems are identified and methodologies are imported. Kasai I is well adapted and has high yields in north Shaba but is very susceptible to streak virus especially in the second season when the leafhopper populations have built up. Techniques for raising leaf hoppers and for evaluating this resistance have been introduced into PNM as well as streak resistant material. The Streak Resistant material has shown

only marginal yield advantages over the locally improved material in the yield trials. In this second stage more specific tailoring to the local problems is required.

The second stage often requires a more sophisticated multi-disciplinary approach. Now in both PRONAM and PNM the principal Zairean staff have advanced degrees and recognize the importance of multi-disciplinary collaboration. This trained staff in these two Programs should be increasingly taking over the intellectual leadership for Program direction. The expatriate staff will have their own technical programs and will interact with the Program Directors. However there should be an equal intellectual exchange between the technical advisers and Program Directors in PRONAM and PNM on the overall program directions especially the breeding priorities.

At the same time, more decentralization of responsibilities to the section leaders in each commodity program is necessary for them to mature as scientists. Moreover, more concern for improving information flows and for the educational advancement of the junior scientists in this program is necessary.

The PNL is in an earlier stage of development. Its objectives are too broad and need to be refocused and more narrowly defined. Specifically, much more emphasis needs to be put on groundnuts and much less emphasis on soybeans. The materials transfer is still the dominant stage and a definition of research priorities and a selection program for groundnuts will apparently require some outside technical outputs. A consultant from ICRISAT (either Hyderabad or Niamey) is recommended. Once these recommendations are obtained a new position paper on research priorities for PNL should be undertaken in collaboration between the technical adviser and the program director. Given the small size of the research program a much narrower focusing will be necessary.

Role of Extension:

Previously, in the commodity research programs there have been only regional trials of new cultivars and improved agronomy. Then cultivars were identified for multiplication and extension. Between those two operations, on Farm trials are a necessary part of the research process to evaluate the combined components of the technologies produced on the experiment station. PRONAM is presently incorporating On Farm trials into their regular breeding programs as the last stage before multiplication. This may also be a useful innovation for PNM.

Extension bulletins have been produced in all three commodity programs based upon technical recommendations. There has been no economic analysis to support those recommendations. However, there has been substantial on-farm experience in agricultural development programs and other agencies and firms utilizing the new cultivars from both PRONAM and PNM

It is recommended that on farm testing be a standard feature of the new technology evaluation process and that economic analysis precede the dissemination of technical recommendations of an extension type.

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The principal role of extension of David Miller from the coordination office has been to support the Extension personnel in the commodity programs including Dr. S. Pandey, Cam Burns and Cit. Mutombo in their training activities. This training has generally been associated with the multiplication operations of Kinuani and F-100. The training in production methods has been principally aimed at the private voluntary organizations and in Bandundu at the governmental extension service.

We have been very impressed with the enthusiasm, dedication, and organization of all of the extension personnel. However, it is important in the future that extension not precede a thorough analysis and that more information is generated from the development agencies on the performance of the new cultivars.

Role of USAID:

The public agricultural research system works well in the U.S. and in other developed countries because there is regular feedback from farmers into the research system and to the legislators, who determine a large percentage of the budgets for the research institutions. Thus, the public research institutions feel the economic pressure, as in the private market system, to respond to and help resolve the real production problems of farmers. Moreover, farmers can be in continual contact with extension agents, and even researchers, to provide feedback on new technology performance.

In developing countries it is often more difficult for researchers to get feedback from farmers. Moreover, the research institutions often feel more pressure from their professional peers, e.g. to lower their coefficients of variation (C.V.s), than economic pressure from the funding institutions to respond to the real problems of farmers.

USAID, through its financing of RAV and its contacts (and financing) of other development projects, is attempting to play this role of putting economic pressure on the three RAV Commodity Programs to more rapidly respond to the small farmers' production problems. Hence, USAID has been continuing emphasizing farming systems research, extension-multiplication and obtaining feedback from farmers.

The USAID strategy has been to promote the introduction of new cultivars and improved agronomic practices, which involve principally labor intensive changes without substantially increasing purchased inputs. This strategy has been successful in PRONAM and PNM with the introduction of Kinuani, F-100, Shaba I, Kasai I, and Salongo II.

For example, in Table 1 data on the performance of the improved cultivar, Kasai I alone with some changes in cultural practices, but without increased cash expenditures illustrates this USAID strategy. On savannah soil these two improvements increased yields from base yields of 0.8t/ha. to 1.7t/ha. On forest soils yields were increased from 1.8t/ha. to 3.2t/ha. Hence, without fertilizer purchases but just an improved cultivar and better agronomic practices the PNM increased yields by 0.9 t/ha. on the savannah soils and 1.4 t/ha on the forest soils.

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Table 1

Maize Yields in Demonstration Plots in North Shaba (1985)

	Yield Savannah	Yield Forest (t/ha.)
1. Traditional Practices/Local Varieties	0.8	1.8
2. Traditional Practices/KASAI I	1.2	2.4
3. Improved Practices/KASAI	1.7	3.2
4. Improved Practices/KASAI I/Fertilizer	2.7	5.2

Source: Unpublished data from Mr. Minh Nguyen, Agronomist of the North Shaba Project.

This strategy is continuing as the maize program searches for Streak Virus resistance and other disease resistances. The PRONAM program also has other improved cultivars being developed as it reacts to the second generation problems identified in the farm level testing of Kinuani.

However, it appears in both PRONAM and in PNM, that soil fertility is the next major constraint after the gains due to the new disease resistant cultivars. A soil fertility specialist has been added to the PRONAM program and will be studying traditional practices to augment soil fertility and control weeds ("mafuka"), chemical fertilizers, and new rotations. As indicated in Table 1, low levels of chemical fertilizer (64-46-0) increased yields of Kasai 1 on the savannah by 1t/ha. and in the forest by 2t/ha.

Finding technically adequate, low cost substitutes for chemical fertilizer has been attempted in many institutions all over the developing countries. Mulch, animal manure, "green manure," rotations, including legumes and nitrogen fixation, have all been recommended and experimented with. As a general rule those alternatives either are not available in sufficient quantities, are not economic, or involve very complex research problems (nitrogen fixation under tropical low fertility conditions). Hence, it is expected that in the next five to ten years Zaire will need to increase its utilization of chemical fertilizers in order to attain the next potential yield increments after the new generation of new cultivars presently in the research pipeline (see Table 1 again).

In all developing countries agricultural development is associated with higher levels of cash expenditures for inputs. As new cultivars are introduced and as farmers can improve their price received by avoiding sale at the post harvest price lows, the profitability of farming will be increasing. At the same time on the national level, the GOZ needs to be developing the capacity to market either imported or domestically produced chemical fertilizers. Developing this capacity will require improved roads and other input and output marketing structures. The GOZ needs to accompany the research process with a series of investments in infra-structure to improve both product and input marketing. The plant breeders should not be expected to resolve through breeding the soil fertility constraints of the country.

In summary, a low purchased input strategy has been observed in the two major commodity programs of RAV. Over the next five years the utilization of chemical fertilizer on the Zairean food crops will probably remain negligible. However, the GOZ and RAV need to begin to plan their research strategy for the next five to ten years. During that time further increases in food crop yields are expected to most efficiently come from moderate levels of chemical fertilizer. Other actions of the GOZ to evaluate the domestic production or continued importation of chemical fertilizers and to begin the investments in input and output marketing infrastructures for this period need to be initiated. Farmers and governments need to spend money to develop the agricultural system.

ANNEX 1

NEW CASSAVA CULTIVAR INTRODUCTION

AND

FARMING SYSTEMS IN BANDUNDU

The region of Bandundu is the second principal production area for cassava after Bas Zaire. Cassava production also goes to Kinshasa and there is a very large area of savanna below the river Kwilu-Kasai with some small forest areas in the lower lying regions south of the river. Here Kinuani doesn't do very well but F-100 and its successors have performed well in regional testing. In the last two years stakes of F-100 have been multiplied and distributed to village associations, development agencies such as the World Bank supported CODAIK program, and various church groups.

F-100 like Kinuani is early but apparently can also be harvested over a longer period than Kinuani but still not over as long a period as the traditional varieties. (12 to 21 months as compared with 18 up to 36 months). F-100 is sweeter than Kinuani and has resistance to Mosaic but it has only some tolerance to bacterial blight in contrast with Kinuani.

The farming system varies by regions. Where we visited, farmers put small areas of the lowland regions into paddy rice in the dry season. On the savanna millet was planted first in January followed by cassava in March-April. Ridging was utilized with the weeds covered with dirt but no burning as in the Mafuka in Bas Zaire. On farmers' fields this ridging sometimes ran downhill and thereby promoted erosion. On other fields the ridging was alternated so that the water would be retained or at least slowed. Spacing was wide with 1 1/2 to 2 m between the ridges and 1.2 m and up between the plants. Cassava was planted lengthwise so there were multiple plants in each site. No fertilizers or other purchased inputs were utilized. Soils were generally sandy and poor even in the forest areas. Long rotations of up to 10 years used to be practiced but the fallow periods are being reduced to as little as four years with higher population pressures.

In other regions where there was more forest we were told that one family would plant 1/4 ha. in forest and about 1/2 ha in savanna. In the forest at the start of the rainfall the preferred associations were:

- maize- peanuts
- peanuts-manioc
- maize-manioc

If the first, manioc would be planted, when the peanuts were harvested. Also squash would be frequently planted in the above systems. This higher fertility forest area would be the primary use of labor. Then in March through August cassava could be planted in the savanna area. It could be preceded by millet or planted alone but on the savanna region it would be the principal activity, which could take advantage of these poor soils.

Due to the proximity to major markets the marketing of the basic food crops is becoming increasingly important. However, farmers complain that prices have not increased over the last three years but have even declined in real terms. Farmers are also dependent upon the price and time of arrival of the truckers coming for their produce. They prefer to sell at harvest time after they have decided how much of their crop they will keep for the coming year. For most crops this would be the annual low price for the crop.

We were not able to get any feeling about the acceptability of F-100 because it was too early for farmers to have an opinion where we went as the first local demonstration trials were last year. My impression was that F-100 would be useful and accepted in the region but that farmers would only plant it on a small proportion of their area. Cam Burn reported that it was his impression that in areas where F-100 was introduced four years ago farmers plant it on approximately 10% of their area. Like Kinuani, F-100 would also suffer from being planted later since farmers will plant their more profitable crops first. Like Kinuani the harvest period is shorter but the problem of Kinuani of rapidly turning to fiber was less serious here according to Cit. Mutombo, who works in Extension/Agronomy in Kiyaka.

Farmers plant horizontally and get multiple stems from the same stake. The recommended agronomic practice is to plant at a 45° angle and therefore get only one plant. Often F-100 gives very tall plants if planted this way at the start of the rainy season. Lodging has resulted in forest soils planted at the beginning of the rains. Unlike Kinuani which branches F-100 does not and should be more adaptable to association.

Bandundu is a very poor state with poor sandy soils, infrastructure problems, and substantial malnutrition according to a Tulane Nutrition study made in 1983. F-100 and the other F cultivars look good and are being diffused. These are different materials than Kinuani and other materials for Bas Zaire. The continuance of the extension-demonstration-multiplication program will facilitate the work of a number of development agencies including two AID projects (#079 and #102), and CODAIK (World Bank supported). More effort needs to be put into a more systematic provision of data from On-Farm trials of this new material compared with farmers' varieties. Also more information is needed on the factors associated with the diffusion of the new materials between farms. Since more research on both of these topics is planned for Bas Zaire, these field level research projects could also be extended into Bandundu.

Among the priority research areas for PRONAM in Bandundu would be the:

- a) regional breeding activities;
- b) continuation of multiplication-demonstration;
- c) On Farm data generation and analysis of the performance of the new varieties and the factors associated with diffusion.

The time in the ground (maintenance of quality) is an important factor to evaluate for and to check out farmers' opinions in the diffusion analysis.

ANNEX 2

Background Notes on the PNM Trip

In Lubumbashi (August 19-23) met with:

Dr. Mulamba - Head of PNM
Dr. K. Johnson - Breeder (RAV) - PNM
Dr. R. Hennessey - Entomologist (RAV) - PNM

With Dr. Mulamba we had extended discussions of the PNM program over time. We spent one half day visiting the market and one half day visiting farms. I asked to see other PNM professional staff but was not able to see them. I met the directors of the North Shaba program, but was not able to see other development agency personnel.

Training Objectives:

Have the following sections in the PNM Program:

Breeding
Pathology
Entomology
Agronomy
Socio-Economics

The Socio-Economics section does not exist as yet. The PNM works in three principal regions. Dr. Mulamba would like to have a Ph.D. heading each section in each region and two M.S.s working with each Ph.D. A more realistic long-term objective might be

5 Ph.D.s to cover each section
10 M.S.s

Note on computers - Need micro-computer support to handle their simple statistical analysis -

ANOVA
LSD
Regressions

This is too laborious to do by hand and discourages anything but the simplest analysis. Nevertheless in the USAID - Lubumbashi office there were four micro-computers. PNM could save money here by just obtaining the statistical and L.P. packages and utilizing these micro-computers. There appears to be substantial excess computer capacity in the AID regional office. Except for the economist the PNM computer requirements are very seasonal and could be easily satisfied with the USAID office equipment here.

Foundation Seed Production by PNM:

For 1986-87 the PNM is providing foundation seed for multiplication to various regional divisions of the World Bank financed seed program (BUNASEM) and to various development programs. Dr. Mulamba is very proud of this rapidly increasing demand for his cultivars.

Below is a list of the seed already distributed or requested and to be given to the following agencies for the 1986-87 planning season:

Foundation Seed made available by PNM is the 1986/87 Crop Year

<u>Agency</u>	<u>Quantity</u>	<u>Variety</u>
North Shaba	150 Kg	Kasai I
CEDERIN	150 Kg	Kasai I
BUNASEM-MPOYI	60 Kg	Salongo II
BUNASEM-LOMBO	60 Kg	Kasai I
Projet Lubudi	1.8 tons	Shaba I
BUNASEM-SODIMIZA	1 ton	Shaba I
BUNASEM-TRAEZA	1 ton	Shaba I
BUNASEM-SWANEOEL	1 ton	Shaba I
Plateau de Bateke	300 Kg	Kasai I

Source: Dr. Mulamba provided this information

There is a danger here of too much PNM activity being put into seed production. These are open pollinated cultivars hence they can be multiplied by the agencies receiving seeds and by the farmers. PNM needs to concentrate most of its energies on its research program and develop its disease resistant cultivars.

Market Visit:

There was substantial corn flour with prices ranging from 20-30Z for approximately 2 Kg depending apparently on the milling quality. The Zambian flour had a price premium.

The preferred legumes are peanuts and common beans (Phaesolus vulgaris) and there were numerous vendors and fairly wide variation in types here. There was one vendor selling cowpeas. Common beans were 40 to 45Z for the approximate 1 Kg. measure utilized. The price goes as high as 80Z out of season according to one vendor.

ANNEX 3

**VARIOUS TECHNICAL DOCUMENTATION
ON THE
PRONAM AND PNM PROGRAMS**

6. LA DENSITE DE PLANTATION, LES ECARTEMENTS ET LES ENGRAIS

Il convient d'observer les densités recommandées ci-après de planter uniformément et systématiquement, de remplacer toujours les boutures mortes durant le premier mois. Là où il y a des vides, la compétition des mauvaises herbes peut être sérieuse avec pour conséquence ultérieure la diminution de rendement.

Les meilleurs rendements sont obtenus avec les écartements de 1 x 1 m en savanes peu fertiles, et de 1 x 0,67 m dans les vallées fertiles. Dans le système de culture sur billons à double rangée, les écartements seront de 50 cm entre les boutures, et de 1 à 1,5 m entre les billons.

Selon les écartements précités, l'on aura besoin de 10.000 à 15.000 boutures de manioc/ha. Quant aux doses d'engrais NPK, le Programme National Engrais FAO recommande les formules 100 - 100 ou 50 - 50 - 50.

7. LE SARCLAGE

Le sarclage temporaire, de préférence au rythme de deux à trois sarclages à 30, 60 et 105 jours après la plantation, est recommandé. La perte en rendement peut varier entre 80 et 95% s'il n'y a eu aucun sarclage.

8. LA PLANTATION SUR DES PENTES

Si le manioc doit être planté sur une pente légère, mieux vaut labourer le champ complètement et planter sur le sol plat. Dans d'autres cas, les billons peuvent augmenter les risques d'érosion surtout quand ils sont préparés dans le sens longitudinal de la pente.

9. LES PLANTES DE COUVERTURE ET LA LUTTE CONTRE LES MALADIES

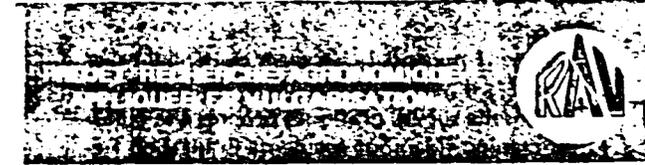
Pour protéger le sol et contrôler la croissance de mauvaises herbes, des légumineuses telles que Pueraria sp. et Mucuna sp. pourraient être plantées comme cultures de couverture. Elles peuvent, en cas de nécessité, être détruites à l'aide des produits chimiques. Le manioc peut par la suite être planté après un labour minimum. Les rendements seront alors meilleurs, ou aussi bons que ceux des parcelles n'ayant pas été aménagées avec les légumineuses de couverture.

Pour lutter contre les maladies et insectes qui affectent le rendement du manioc, le PRO-NAM recommande l'utilisation des variétés résistantes et l'application de la lutte biologique.

10. LA RECÔLTE DES FEUILLES

Récolter les feuilles comme légume une fois tous les deux mois peut augmenter le rendement en tubercules pour des variétés à pouvoir de reprise rapide. Des récoltes très fréquentes réduisant le rendement en tubercules et augmentent l'incidence de la mosaïque, de la flétrissure bactérienne et de l'anthracnose lorsqu'on utilise les variétés sensibles.

Cependant le bénéfice provenant de la vente des feuilles peut atteindre 5 fois plus celui des cossettes ou des tubercules frais. Mais le problème de la conservation de ces feuilles à l'état frais reste entier.



PROGRAMME NATIONAL MANIOC
Direction : M Vuazi (Bas-Zaïre)
B.P. 11635 Kinshasa 1

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RECOMMANDATIONS
POUR LA CULTURE
DU MANIOC
AU ZAIRE

Département de l'Agriculture
et du Développement Rural
République du Zaïre

Inforav n°2
Juin 1985

L'objectif poursuivi, à travers ce dépliant, est de fournir, d'une façon simple et concise, quelques conseils sur les pratiques propres à la culture du manioc (*Manihot esculenta* Crantz) en République du Zaïre.

Beaucoup d'informations présentées ici sont basées sur les résultats des expériences du Programme National Manioc (PRONAM), l'une des composantes du Projet de Recherche Agronomique Appliquée et Vulgarisation (RAV).

Dans les notes qui suivent, il sera par conséquent indiqué certains concepts d'application générale sur lesquels l'attention des vulgarisateurs, fermiers et paysans doit être attirée.

Le manioc occupe actuellement 50% des terres cultivées au Zaïre. Il fournit à 70% de la population environ 60% de calories.

La production des tubercules frais est estimée à 14 millions de tonnes/an.

Feuilles et tubercules sont consommés. Les feuilles peuvent contenir, selon les variétés, de 26 à 41% de protéines crues sur base du poids sec.

Elles constituent donc une source appréciable de protéines, de vitamines et de sels minéraux.

Le rendement moyen national par hectare est de 6,88 tonnes.

Il est de loin inférieur aux potentialités du Zaïre. Les variétés développées par le PRONAM peuvent donner de 10 à 25 t/ha :

- a) la variété Kinuani est cultivée au Bas-Zaïre et à Kinshasa;
- b) la F. 100 convient pour le Bandundu, Bas-Zaïre et Kinshasa;
- c) la 4(2) 0426/1 est recommandée pour les

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- Kasai et le Nord-Shaba;
- d) la 33787/6 est adoptée également au Kasai et au Nord-Shaba.

Par ailleurs, certains facteurs contribuent à la baisse des rendements, par exemple :

- a) l'utilisation des cultivars locaux à faible rendement;
- b) les pratiques culturales inadéquates;
- c) les maladies telles que la mosaïque, la flétrissure bactérienne, l'antracnose ainsi que les pestes (la cochenille du manioc et l'acarien vert).

1 LA PREPARATION DU TERRAIN

En forêt, un déssouchement complet peut être exigé pour éviter la pourriture causée aux tubercules par le *Fomes lignosus*, grand hôte des arbres.

En savane, la parcelle doit être débroussaillée avant la préparation du terrain.

Toutes les pratiques impliquant l'incinération sont à proscrire.

Là où le terrain présente une pente supérieure à 10%, il est préférable de labourer complètement le champ et de planter le manioc à plat et en lignes.

2. LE MATERIEL DE PLANTATION

Là où c'est possible, il est toujours recommandé d'utiliser du matériel de plantation amélioré, exempt de maladie et peste, possédant un haut rendement et de préférence âgé de 8 à 18 mois. Le matériel de plantation peut être conservé :

- a) en meule, disposé verticalement et couvert d'un peu de terre humide;

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- b) sous un hangar, en position verticale;
- c) près d'un ruisseau pendant la saison sèche.

3. LES METHODES DE BOUTURAGE

Elles varient selon que la bouture est plantée verticalement, horizontalement ou obliquement. Les résultats concernant l'effet de la position des boutures sur le rendement en tubercules varient en fonction du mode de préparation du terrain, du type de sol et de sa fertilité.

Cependant, les observations ont montré, pour les boutures plantées horizontalement, une augmentation significative du rendement en feuilles et en nombre de tiges par plant, ainsi qu'une réduction de la verse.

4. LE TEMPS DE PLANTATION

Le PRONAM recommande de planter très tôt dans la saison.

Il faut retenir que la plantation du manioc intervenant un, deux ou trois mois après la reprise des pluies aboutit à des réductions progressives d'au moins 10, 20 ou 30% du rendement en tubercules.

5. LA CULTURE PURE OU ASSOCIEE

Comme le petit paysan est le grand producteur du manioc, les avantages de la culture associée (manioc + maïs ou manioc + légumineuses) à son niveau de technologie sont réels. La culture associée lui permet d'obtenir sur une même surface de terrain, dans le même laps de temps, deux cultures différentes et, par conséquent des revenus substantiels.

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TABLE A-1

DISTRIBUTION OF PLANTING MATERIAL IN BAS-ZAIRE 1980-1985 (Meters)

Year	By Sale	Free		Total to Public	To Cover (ha)	For P R O N A M
		Small Farmers	Collaborating Agencies			
1980	49,200	11,350	-	60,550	24.2	45,000
1981	110,250	3,500	5,000	118,750	47.5	24,200
1982	39,500	8,000	25,000	72,500	29.0	90,000
1983	50,000	8,000	54,000	112,000	14.8	80,000
1984	114,650	*	257,630	372,280	148.9	175,000
1985	398,750	69,000	360,750	828,500	331.4	190,000

* included in the figure for collaborating agencies.

TABLE A-2

DISTRIBUTION OF PLANTING MATERIAL IN BAS-ZAIRE - 1984

	meters
Individual Farmers	114,650
Collaborating Projects	
1. Agricultural Project, Mbanza-Ngungu (French aid)	47,500
2. National Fertilizer Program, FAO, Mbanza-Ngungu	40,000
3. O X F A M, Mbanza-Ngungu	24,000
4. Integrated Agric. Development Project Luala (Italian aid)	12,500
5. Salvation Army, Mbanza-Ngungu	5,000
6. Church Groups, Kolo, Sonabata, Luvaka	18,750
7. CEDECO (Kimpese)	7,500
8. ONATRA, Lufu-Toto (Railways)	23,500
9. Technical Agric. Schools, Gombe Matadi, Kimpese	10,200
10. Ministry of Agriculture, Mbanza-Ngungu, Kisantu	16,430
11. Cement Factory (Lukala)	27,500
12. Army (FAZ and Ecole de Formation et d'Apprentissage de Troupe Blindée)	24,750
	<hr/> 372,280 <hr/>
PRONAM own use	175,000

Table A-3

DISTRIBUTION OF PLANT MATERIAL IN BAS-ZAIRE DURING 1985

	(meters)
Very small farmers	69,000
To Collaborating projects	
i. Programme National Engrais (PNE/FAO), Mbanza-Ngungu	47,500
ii. Projet Agricole, Mbanza-Ngungu	127,500
iii. Salvation Army, Mbanza-Nzundu	15,000
iv. Various Churches	8,750
v. Cement Factory, CIZA, Lukala	72,500
vi. National Seed Service	5,000
vii. Army (FAZ + EFATBL), Mbanza-Ngungu	76,250
viii. National Rice Program, Mawunzi	5,000
ix. Cooperation Agricole Italo- Zairoise, Lukala-Luoxi	10,000
x. Centre Développement Communautaire, Kimpese	25,000
By sale	398,750
Total	860,250

TABLE A-4
F-100 STOKE DISTRIBUTION IN SOUTHERN BANDUNDU (1985)

N°	ORGANISMES	VARIETES	NOMBRE (m)
01	Projet Kibolo	F100	2.600
02	Zone de Santé Rurale Moanza	F100	5.500
03	CIZEM/Mvana Basile	F100	2.500
04	M.O. Tumikia (Secours)	F100	500
05	Hôpital Mosango	F100	2.500
06	M A D A I L	F100	1.000
07	Projet d'implantation des Fermes	F100	2.500
	BANKAMA		
08	Centre Agricole de Iusekela	F100	1.000
		F150	1.000
		F162	1.000
09	Habitat pour l'Humanité	F100	1.250
10	Comité de Développement PAZI	F100	4.375
11	Dr. Hammer (Hôpital de Bonga)	F100	2.600
12	Prison Urbaine de Kikwit	F100	500
13	PROHAM - M'VUAZI	F100	4.000
14	Projet-Italo-Zaïrois (FESHI)	F100	2.900
15	Fermiers	F100	1.100
16	CEPLANUT	F100	2.500
17	Zone de Gungu (Commissaire de Zone)	F100	7.500
	T O T A L	F100	46.875

CHAMPS RECOLTES ET DISTRIBUTIONS DE BOUTURES AUX PAYSANS.

N°	COLLECTIVITES/VILL.	Inbre DE PAYS.	BENEF.	VARIETES	RENDEMENT
01	Coll. KWILU-KIMBATA Vill. LUKANGA	80			
12.3	Coll. MOSANGO Vill. TUMUKIA et SAKUMBANZA	75		F162 F100	12,235 12,295
04	VILLAGE KOSHI	180		F100 F162 F156 LOCALE	14,847 14,121 12,356 7,320
05	Coll. KILUNDA Vill. KUKOKO	150		F100	6,666
06	Coll. LOBO Vill. ZONE	200		F100	9,145
07	Coll. KALANGANDA Vill. TOMOTE	150		F100	16,960
08	Coll. MUNGINDU Vill. Kalunga	80		F100	8,525
09	Coll. YASSA-LOKWA Vill. MAKANCA	200		F100BIL. F100CAPL.	28,000 10,000
10	Coll. KAPIA	40			-
11.	Coll. PANZI Vill. MAZINDA	100			4,500
	T O T A L	1.215			

COST ESTIMATES OF A DIFFUSION STUDY (CHRIS BARTLETT)

DIFFUSION STUDY

The study will be carried out in two phases as follows:

The field work will be completed in eight months.

1. Identification of the recipients of cuttings and development of hypotheses on problems they might have with growing the new varieties of cassava. For this work two agronomes (A₁ and A₀) and the IITA agricultural economist will spend 4 days in the field with each of 6 organizations which have received the cuttings. A total of 24 days.
2. A survey of farmers who have received the cuttings and of their neighbours at 30 locations. An A₀ and two A₂'s will spend 4 days at each location i.e. 120 field days.

It will cost an average of £ 250 for each person to be transported to each location and £ 250 to come from each location, a total of £ 15,000 per person.

Budget.

<u>1. Per Diems.</u>	£	£
A ₀ 120 days @ 1,800		216,000
24 days @ 1,800		43,200
A ₁ 24 days @ 1,440		34,560
A ₂ 120 days @ 1,080 x 2		259,200
		<u>552,960</u>
<u>2. Transport.</u>	£	
30 locations @ 500 x 2 people		30,000
<u>3. Equipment.</u>	£	
1 motor cycle @ 180,000		180,000
Cost of running motor cycle @ 5,000 per month		40,000
Camping equipment @ 12,000 x 3		36,000
		<u>256,000</u>
<u>4. Wages.</u>		
A ₂ staff @ £ 7,750 x 8 months x 2 people		124,000
TOTAL		<u><u>962,960</u></u>

Assumption: All costs of IITA ag. economist on RAV budget.

DATE: SAPR85

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BEST AVAILABLE DOCUMENT

REPLY TO

ATTN OF: Mr. MINH NGUYEN, AGRONOMIST/PNS *Minh*

SUBJECT: RENDEMENT DES VARIETES LOCALES.

TO: Mr. RUDY GRIEGO, USAID/ARD/PNS PROJECT OFFICER *Rudy*

THROUGH: Mr. PAUL DeLUCCO, DCOP/PNS *Paul*

The results of a number of demonstrations conducted in the PNS area showed that by using improved KASAI I seed and improved practices, farmers have increased maize production as below (Please note that there were four demonstration plots in the form of a diamond):

Maize Yields in Demonstration Plots in North Shoba

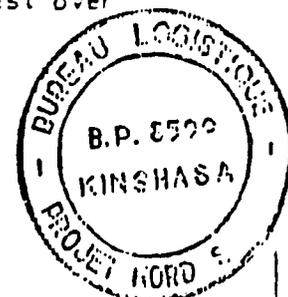
	YIELD SAVANNAH	YIELD FOREST
1. Traditional Practices/Local Varieties	0.8 T/Ha.	1.8 T/Ha.
2. Traditional Practices/KASAI I	1.2 T/Ha.	2.4 T/Ha.
3. Improved Practices/KASAI I	1.7 T/Ha.	3.2 T/Ha.
4. Improved Practices/KASAI I/Fertilizer	2.7 T/Ha.	5.2 T/Ha.

This demonstration has not been repeated for the last two years because, according to SCAD (Service de Collection et Analyse des Données) local maize varieties have been eliminated so there is no point in including them in demonstration plots. Before 1979, our farmers used a number of maize varieties of unknown origin. These varieties were considered as local even though they possessed some characteristics of improved maize varieties.

In addition, traditional practices are no longer being used. SCAD reported that in the latest campaign 64% of farmers in the Project area followed practices recommended by PNS; 36% followed recommended practices in part.

In summary, farmers using KASAI I of the second or third generation can increase yields by 40%. Farmers using recommended practices alone can increase maize production by 25-40%. Fertilizer use can increase yields by 1.2 T/Ha. A farmer strictly following recommended practices, planting KASAI I of second or third generation, and using 100 kg. of urea and 100 kg. of DAP per hectare can increase his harvest over pre-PNS yields by 300%.

CC: SPAKE



APPENDIX III.

Résumé des données des 8 années de culture pilotes de Maïs avec crédit supervisé dans le Sud du Shaba.

	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81
Superficie	5.70	62.03	61.33	52.92	172.89	250.00	185.89	-
Rendement moyen en Kg/Ha	5138	3168	4744	4020	4443	4950	2870 **	-
N-P ₂ O ₅ -K ₂ O Kg/Ha	129.115.38	50.60.40	64.40.30	58.38.25	66.45.45	66.45.45	64,5.22,5.22,5	-
Prix officiel par Kg	4 K	5 K	7.5 K	12 K	22 K	35 K	45 K	60 K
Prix de vente à la récolte chez le planteur/Kg	6 K	10 K	12 K	15 K	25 K	50 K	75 K	100 K
Prix d'engrais chez le planteur/Kg	15 K	15 K	15 K	30 K	30 K	50 K	70 K	160 K
Remboursement de crédit en %	90.6	45.3	69.1	77.8	98.1	78.2	-	-

** Ce faible rendement est dû à l'insuffisance des pluies enregistrées durant la saison culturale 1979-80 dans plusieurs villages.

In mid 1984, the World Bank began to finance a national seed office (BUNASEM) within the Government of Zaïre's Department of Agriculture and Rural Development to try and meet Zaïre's seriously unfilled needs for quality seeds of staple food crops. The project fields a team of three FAO experts¹ (seed expert, agronomist, economist) is for five years duration, and will be funded for approximately U.S. \$ 20 million as 80 % IBRD, 10 % UNDP and 10 % GOZ.

The Zaïrian director general of BUNASEM reports directly to the Directeur de Production Végétale within the Department of Agriculture.

Essentially, BUNASEM's mandate centers around the following activities :

- a. to encourage private sector development in the formation of a seed industry
- b. to take concerted action towards resolving a number of generally recognized problems
- c. to eventually underwrite legislation that would set the registration requirements for the certification of seed
- d. to establish a central quality control laboratory at Kinshasa and 5 regional laboratories for quality control determination.

BUNASEM hopes to develop 5 seed farms all of which will be privatized. The farms will deal with corn, manioc, soybeans, beans, peanuts and rice.

- 1) In Bas-Zaïre, a 200 hectare farm located at Kwilu-Ngongo at the Société Sucre with Belgian and Zaïrian interests will deal with corn, manioc, soybeans and peanuts.
- 2) In Bandundu, CODAIK, a Zaïrian agricultural development society located in Kikwit will develop a 600 hectare seed farm to deal with corn, manioc, soybeans and peanuts.
- 3) In Haut-Zaïre, a cotton organization known as SOTEXKI with Italian, Belgian and Zaïrian interests will develop a 1000 hectare seed farm for cotton, rice, soybeans and peanuts.
- 4) In Kasaï Oriental, PMKO (Projet Maïs Kasaï Oriental) is developing a 400 hectare seed farm at Mpoyi, near Ngandajika, to produce seed of corn, soybeans, peanuts and other legumes. The farm has Zaïrian and unofficial Belgian cooperation interests.
- 5) In Shaba, a seed farm of about 400 hectares for corn, soybeans and beans has not as yet been selected, since BUNASEM first wishes to see what USAID will do in its CSADP 105.

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APPENDIX VI.

FARMING SYSTEMS RESEARCH WORKING DEFINITION
FOR PROGRAM NATIONAL MAIS

September 1, 1986

Farming systems research is a holistic approach to agricultural development which attempts to increase communication and information between the national research program in a given commodity (e.g., maize) and the farmer. Agroecological and socioeconomical information is acquired in the initial diagnosis stage. Technology is then designed at the research level to overcome identified constraints. Testing these designs begins at the research headquarters and later moves to the farmers' fields. Proven technologies are then distributed by an extension effort in the appropriate environments. The primary criteria guiding this F.S.R. process are:

- 1) Does the technology improve production?
- 2) Is the technology profitable for the farmer?
- 3) Is the technology socially, economically, and technically acceptable and likely to be adopted by the farmer?

In summary, F.S.R. integrates research, extension and the farmer into an integrated holistic approach that serves to guide the research process in realistic directions and provides the farmer with proven and acceptable technologies to improve his well-being.

It is recognized that much of what is now referred to as F.S.R. has been done in the past by the Zairean commodity programs (PRONAM and PNM especially with PNL being recently formed).

It is also recognized that there is a need to clarify and expand on F.S.R. activities to more fully benefit the farmers of Zaire.

In order to facilitate the F.S.R. approach within the regional, commodity-based programs presently operating under R.A.V. direction, a recent board of directors meeting suggested that F.S.R. be incorporated into the agronomy section of each commodity program.

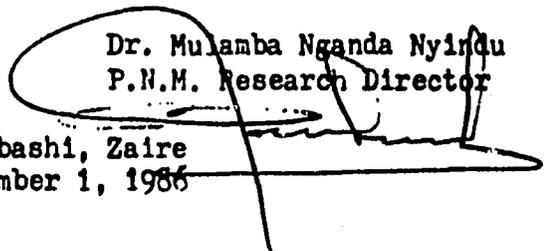
While this may be necessary from an operational point of view, it is also recognized that F.S.R., as a holistic approach, must consider the total context of the production environment and that this requires a degree of autonomy from the individual commodity program for effective operation.

With a clear definition of the FSR approach, proper recognition of past accomplishments, and a cooperative spirit toward effective research in the future, the best interests of the farmer and the country of Zaire will be well served.

Dr. Kenric M. Johnson
Principle Advisor to P.N.M.



Dr. Mulamba Nganda Nyindu
P.N.M. Research Director



Lubumbashi, Zaire
September 1, 1986

APPENDIX VII.

BEST AVAILABLE DOCUMENT
PROGRAM NATIONAL MAIS

FIVE-YEAR MAIZE-TESTING PROPOSAL

TO

SOUTH SHABA PROJECT (I.F.A.D. - BUNASEM)

REPRESENTED BY JOHN PELISSIER (WORLD BANK)

INTRODUCTION

An expanding maize research effort is now underway at Program National Mais (P.N.M.) facilitated by recent funding from the United States Agency for International Development (A.I.D. Project 091). The primary goal of P.N.M. is to develop high-yielding, disease-resistant, open-pollinated varieties of maize for the benefit of farmers in Zaire. Certain regions, known to have high maize production potential, are emphasized, such as the South Shaba area where P.N.M. headquarters are located in Lubumbashi.

With I.F.A.D. funding now proposed to support maize seed production and distribution in South Shaba through a newly-formed national seed organization (BUNASEM), an important opportunity exists for cooperation between this effort and P.N.M. If facilitated, this cooperation would assure that the best possible varieties are identified through a yearly testing program at a number of sites within the South Shaba target area.

PAST TESTING RESULTS IN SOUTH SHABA

Most of the maize performance data collected by P.N.M. in South Shaba was done when adequate funding was available during the period of 1973 to 1975. At that time the recommended varieties were Shaba Safi and PNMI, which have now been, for the most part, replaced by a newer variety known as Shaba I. This variety, although being susceptible to streak-virus like its predecessors, has generally tested at higher yields in the testing sites selected in South Shaba over the past several years. It is anticipated that with newer, streak-resistant materials now available and with an increased number of testing sites proposed here, the actual yields of maize could be increased substantially, both at seed production sites and in farmers' fields.

COST OF TESTING

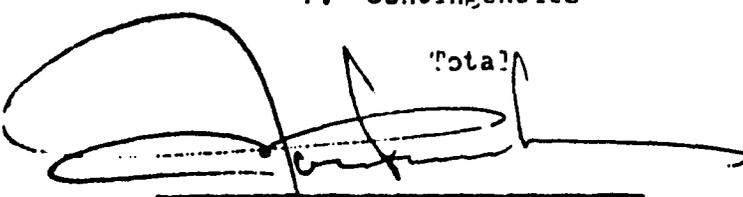
For P.N.M. to conduct val
future maize varieties, certai
be acquired. A transport vehi
as well as planting and harver

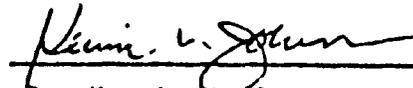
reliable testing of current and
ment, supplies, and personnel must
pable of hauling two to three personnel
plies over rough terrain is essential.

along with fuel, oil, and spare parts for its operation. In addition, one technician at the Agronomer A₁ or A₂ level must be hired and trained with per diem travel expenses provided. Other supplies needed include fertilizer and herbicides.

It is proposed that eight to ten sites be selected to be located in representative areas in South Shaba. For five years of funding maize trials at these sites, the following expenses are anticipated:

	US\$	Zaires
I. Investment Costs		
A. Vehicle (4x4 e.g. Land Rover)	26,700	1,600,000
B. Equipment (scale, moisture meter)	1,000	60,000
II. Recurrent Costs		
A. Salaries (Agronomer A ₁ or A ₂)		
\$2,000 or Z120,000/yr x 5 years	10,000	600,000
B. Office	1,000	60,000
C. Vehicle operation:		
1. Fuel (1500l/yr x 5 years x 40Z/l)	5,000	300,000
2. Oil (1 drum/yr. x 5 years x 15,000Z/drum)	1,250	75,000
3. Spare parts	5,000	300,000
D. Travel allowance		
1. technician (40 days/yr x 5 yrs x 2200Z/day)	7,300	440,000
2. supervisor (20 days/yr x 5 yrs x 3800Z/day)	6,300	380,000
E. Testing Supplies: .1 ha/site x 10 sites x 5 yrs equals 5 ha total area)		
1. fertilizer (DAP, K ₂ O, urea, CaO)	1,100	66,000
5 ha x 12 sacks/ha x 1100Z/sack		
2. herbicide: 5 ha x 7l/ha x 550Z/l	320	19,250
F. Contingencies	5,030	301,800
	\$70,000	24,200,000


 Dr. Mulaaba Nganda Nyindu
 Director, P.N.M.


 Dr. Kenric M. Johnson
 Advisor, P.N.M.

BEST AVAILABLE DOCUMENT

3 - Grands fermiers :

120-180 N : 90-120 P₂O₅ : 30-60 K₂O

Seuls le mélange III et le DAP sont recommandés car ils permettent d'appliquer 1/3 de N et la totalité de P₂O₅ au semis tandis que les 2/3 de N sont appliqués 30 à 45 jours après le semis, lorsque les plantes atteignent la hauteur des genoux.

Mélange III : 300 kg au semis

Urée : 200 kg, 30 à 45 jours après le semis

DAP : 200 à 261 kg au semis

Urée : 183 à 289 kg, 30 à 45 jours après le semis.

• Rendement escompté : 5 Tonnes ou plus par hectare.

• **CONTROLE CHIMIQUE DES MAUVAISES HERBES (Herbicide)**

Utiliser 5 litres de Primagramme dans 200 litres d'eau à pulvériser dans un hectare, après avoir semé le maïs.

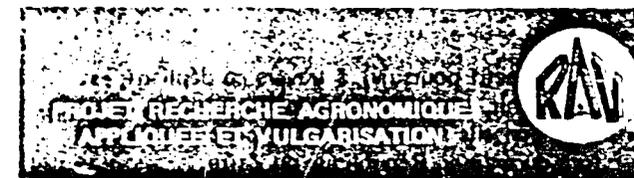
• **CONTROLE DES INSECTES RONGEURS DES RACINES ET CHENILLES FOREUSES DES TIGES**

Saupoudrer 20 kg par hectare de Aldrin à 2,5%

BEST AVAILABLE DOCUMENT

Pour plus d'information, veuillez contacter
- Coordination RAV BP 11635 KINSHASA I.
- Direction P.N.M. BP 3673 LUBUMBASHI (Shaba)
- P.N.M. Station de Gandajika Gandajika (Kasai-Oriental)
- P.N.M. Station de Kaniama (Shaba)
- P.N.M. Station de M'Vuazi (Bas-Zaïre)

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PROGRAMME NATIONAL MAIS

Direction : Kaniama zhi B.P. 3673 Lubumbashi (Shaba)



APPENDIX II

Département de l'Agriculture
et du Développement Rural
République du Zaïre

Inforav n°1
Mai 1985

-41-

L'objectif poursuivi, à travers ce dépliant, est de fournir, d'une façon simple et concise, quelques conseils sur les pratiques propres à la culture du maïs en République du Zaïre. Beaucoup d'informations présentées ici sont basées sur les résultats des expériences du Programme National Maïs (PNM), l'une des composantes du Projet de Recherche Agronomique Appliquée et Vulgarisation (RAV).

Dans les notes qui suivent, il sera par conséquent indiqué certains concepts d'application générale sur lesquels l'attention des vulgarisateurs, fermiers et paysans doit être attirée.

• GENERALITES

1. Les champs sont apprêtés avant ou dès la tombée des premières pluies (désouchage complet et labour ou houage).
2. Semer à temps normal et éviter les semis tardifs qui sont susceptibles aux maladies et attaques d'insectes.
3. Employer les semences améliorées.
4. Respecter les écartements de semis.
5. Bien sarcler les champs et à temps. Respecter l'opération jusqu'à la floraison.
6. Les herbicides sélectifs (ex. : Primagramme) peuvent être utilisés si possible.
7. Appliquer les engrais chimiques si possible.
8. Le fumier de fermes peut être utilisé si possible.

• ENGRAIS CHIMIQUES

	N	P ₂ O ₅	K ₂ O
Mélange I	17	17	17
Mélange II	23	23	0
Mélange III	8	15	10
Urée	46	0	0
DAP	18	46	0

• VARIETES RECOMMANDEES

- *PNM 1 et Shaba 1* : adaptées aux régions de haute altitude; leur rendement est de 9t/ha en station et 5 au champ.
- *Kasai et Salongo 2* : adaptées aux régions de basse altitude; leur rendement est de 8t/ha en station et 4 au champ.

Ces variétés peuvent être obtenues au départ des Stations PNM ou auprès des projets Lubudi, Kaniama-Kasese, Projet Nord Shaba, P.M.K.O.

• QUANTITE DE SEMENCES A L'HECTARE

20 à 25 Kg à raison de 1 grain par poquet.

• ECARTEMENTS DE SEMIS

* 75 cm entre les lignes et 25 cm dans la ligne pour un semis mécanisé ou pas mais avec une bonne dose d'engrais et une bonne pratique culturale.

* 75 cm entre les lignes et 50 cm dans la ligne pour un semis manuel sans engrais chimiques.

• PROFONDEUR DES POQUETS ET MODE DE SEMIS

Semer à 5 cm de profondeur dès les premières pluies.

Le semis à plat est vivement recommandé. Un léger buttage peut suivre lors du 2^e sarclage ou lors de l'application de la 2^e dose d'azote.

• DOSE D'ENGRAIS CHIMIQUES A L'HECTARE

Pour des raisons économiques le P.N.M. recommande l'usage des engrais hautement concentrés tels que le DAP et l'urée.

1 - *Paysans débutants* : 64 N : 46 P₂O₅

- a) Mélange I : 300 kg au semis
Urée : 40 kg, 30 à 45 jours après le semis
- b) Mélange II : 200 kg au semis
Urée : 100 kg, 30 à 45 jours après le semis
- c) Mélange III : 300 kg au semis
Urée : 100 kg, 30 à 45 jours après le semis
- d) DAP : 100 kg au semis
Urée : 100 kg, 30 à 45 jours après le semis.

* Rendement escompté : 2 à 3 Tonnes ou plus par hectare.

2 - *Fermiers moyens* : 90 N : 60 P₂O₅

- a) Mélange I : 353 kg au semis
Urée : 65 kg, 30 à 45 jours après le semis
- b) Mélange II : 260 kg au semis
Urée : 65 kg, 30 à 45 jours après le semis
- c) Mélange III : 400 kg au semis
Urée : 130 kg, 30 à 45 jours après le semis
- d) DAP 3 : 131 kg au semis
Urée : 145 kg, 30 à 45 jours après le semis

* Rendement escompté : 3 à 4 Tonnes par hectare.

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ANNEX 4

BIBLIOGRAPHY

The basic background papers for the commodity programs were the following three research priority papers in the three commodities and the Final Report of the Cassava Outreach Project No. 660-0077. The Annex reports C,D, and E for the respective commodity agronomists were also utilized. Various other commodity documents were also utilized especially for PNM but these have been cited in C. Brown's Bibliography on Maize/

Research Priority Papers:

- PRONAM: Dr. Mahungu Nzola Reso, "Politique Scientifique du Programme Nacional Manioc (PRONAM), Mvuazi, 1985, 19 pages
- PNM: Dr. K.N. Johnson, "Programme Nacional Maiz, An Analysis of Present REsearch and Recommendations for Future Growth," Lubumbashi, August 1986, 29 pages
- PNL: Dr. D. Shannon, "New Directions - Towards a Realistic Approach to Grain Legume Research in Zaire," Gandajika, 1985, 12 pages
- PRONAM: Dr. Frank Brockman and others, "Final Report, Cassava Outreach Project, USAID Project No. 660-0077", Department of Agriculture and Rural Development, Zaire and International Institute of Tropical Agriculture, Kinshasa, July 1985.

Farming Systems Background:

- "The Function of FSR within RAV," mimeo, 1986
- "Comments of the IITA Strategic Planning Committee on FSR," mimeo, 1986
- M. Ashraf and others, "Cassava in the Bas-Zaire Region of Zaire - Results of an Exploratory Survey," Kinshasa, 1984, 24 pages plus tables.
- "A Brief Outline of FSR Functions and Methods," mimeo, 1986
- "Study of Growers of Improved Varieties," mimeo, 1986
- W. Vogel, "Workplan PNM - On Farm Research - Lubumbashi, "Mimeo, 1984
- PRONAM, "Farming Systems REsearch Work Plan, 1984-87" mimeo, 1986
- Mbulu-Ntoto, "Activites de O.F.R. a Kisantu de 1982-86, mimeo, 1986
- Moto Bakjika, "Discussions Relatives au Farming System Research (ISR)," mimeo, 1984
- PRONAM FSR Report No. 1, "Forrested Areas of Kassangulu and Medimba Zones, Bas Zaire, mimeo, 1985, 29 pages
- H.J. Mutsaers, "FS/OPAR Proposal for the Zaire/IITA Project," IITA Mimeo, March 1984
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"FSR Work for PRONAM, " mimeo, 1986

"Recommendations for Organization of FSR Work under RAV," mimeo, 1986

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N.M. Mbulu, F.E. Brochman, and M. Ashraf, "On Farm Research Program in Zaire,"
mimeo, 1984

APPENDIX C

EVALUATION

PROGRAMME NATIONAL MANIOC

PRONAM

ZAIRE

September 1986

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ACRONYMS

AID	Agency for International Development
APCP	Programme Pan-Africain de Lutte Biologique
CEDECO	Centre de Développement Communautaire (Community Development Center)
CDF	Convention Development Fund
CIMMYT	Centre International de Mejoramiento de Maiz et Trigo (International Center for Corn and Wheat improvement)
CIZA	Cementerie du Zaïre (Zaire Cement Factory)
DOA	Department of Agriculture and Rural Development, Republic of Zaïre
DAGP	Direction d'Administration Generale des Project
DESURS	Department of Higher Education Universities and Scientific Research
FAO	Food and Agricultural Organization of the United Nations
FSR	Farming Systems Research
GOZ	Government of Zaïre
IFA	Institute Facultaire Agronomique - Faculty of Agriculture
IITA	International Center of Research on Tropical Agriculture
INERA	Institute National d'Etude et Recherche Agronomique
NPK	Nitrogen - Phosphorus - Potassium
PACD	Project Assistance Completion Date
PL480	Public Law 480
PNL	National Legume Program
PNE	National Fertilizer Program: GOZ/FAO
PNM	National Maize Program
PRONAM	National Cassava Improvement Program
RAV	Project de Recherches Agronomique Applique et Vulgarisation - Applied Agricultural Research and Extension
USAID	U.S. Agency for International Development

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EXECUTIVE SUMMARY

A high quality and comprehensive research program on cassava has been developed. There are nevertheless a few weaknesses to which attention is drawn.

With few exceptions the staff is well trained and well balanced with respect to scientific disciplines. Training and staffing for extension and farm and equipment management are the weakest points.

Current organization, staffing and projected training places PRONAM on a solid institutional foundation which should be self-sustaining after the 10 year life (about 1990) of project 091.

As the three commodity training programs are accelerated there is appearing a shortage of B.S. degree graduates for M.S. and PhD training. This could be alleviated by drawing from the goal of Eng Agronomes who could be accepted for graduate study in the U.S. after 1 - 1 1/2 year of undergraduate work. There are numerous good potential candidates from this page.

Financial sustainability, however, is not likely to be achieved. A substantial change in GOZ priorities, as evidenced in practice, with respect to budget allocations will be needed which judging from the past is not likely to happen within the next two or more decades.

While survivability of PRONAM as a single commodity research institution seems to be assured, the outlook for integration of PRONAM with other national food crops research programs (PNL and PNM) which are at the present less well organized and less advanced in their research programs is still unclear. Some important changes in philosophy and strategy will be necessary to bring about the desired collaboration.

A well defined and sustainable rule for the project in extension and seed (in case of cassava vegetative plant material) production is still to be developed to replace the existing ad hoc/targets of opportunity approach. Given the current state of extension in the Department of Agriculture and Rural Development it is likely that the existing approach will be the only practical one for sometime to come.

More objective and purposeful planning is needed. Especially needed are more formalized mechanisms for defining strategy and establishing priorities. In this connection, defining a role for the proposed technical directorate in RAV and providing this structure with adequate support and resources can make an important contribution.

As research and extension in the other two programs get fully underway the relationship among researchers in different programs at the same station will need to be clarified. While this will probably be best done on a case by case basis, it should be possible to establish some general orientation to the programs and station directors.

Much more and more systematic study of farmer practices is needed to provide guidance to research and for suggesting innovations which could fit in farmers' production systems.

The scope and intensity of research on soil fertility and methods for maintaining/improving soil fertility and moisture supplying potential should be enlarged. In this connection there is a need for more systematical recording of conditions under which demonstration and on farm testing is carried out - type of soil, inherent fertility from soil test where possible, previous history of use, specific practices of soil preparation, plating and time and methods, weeding, intercropping, rainfall (it should be possible to place simple rain guage at the more important on farm testing centers) than appears to be currently practiced.

• Rather than expanding the program of research to encompass wider geographic locations, the next several years should concentrate on consolidation of the program and in strengthening areas where weaknesses exist.

I. INTRODUCTION

A. Background

During the early 70s, a serious disease of cassava appeared in epidemic proportion in several important production areas of Zaire. The reduction in yields and production which resulted manifested itself in serious shortages of cassava in the principal urban areas. The Government of Zaire (GOZ) responded by requesting the International Institute of Tropical Agriculture (IITA) to make a study to determine the cause and possible solutions. The study, conducted in 1973 identified bacterial leaf blight caused by Xanthomonas campestris V. manihotis as the principal cause of production losses. Subsequent study identified other diseases and insect pests.

On invitation of the GOZ the IITA launched a cooperative program of research to develop means for counteracting the diseases and insects and to improve cassava production generally. This program initially supported entirely by the GOZ, through the Department of Agriculture and Rural Development (DA), became the Programme National Manioc (PRONAM).

Concurrent with a decline in the Zairian economy, the GOZ requested assistance from the United States Agency for International Development (USAID) for continuing the program. In 1978 USAID approved an allocation of 4.5 million dollars to cover foreign exchange costs including technical assistance by IITA, for continuing the program through 1982-Project 077. Implementation of the agreement, however, did not begin until 1980. As a result of the start-up delay the original Project Activity Completion date (PACD) was extended to march 1984. Further extensions carried the project through 1985.

In June 1983, responding to a GOZ request for continuing support of PRONAM after 1984 and for expansion of the research and outreach program to include corn (Programme National Maize, PNM) and edible legume seeds (Programme National Legumineuse, PNL), a broader research and extension project was designed. The project, Applied Agricultural Research and Outreach - Project 091, was approved in September 1983. USAID allocated 10.0 million dollars for the first six years of a projected 10 year project. A GOZ contribution for the same period of approximately 267.4 million Zaires was stipulated, of which the national budget was to contribute approximately 37 per cent. The remaining 63 percent was to be covered from allocations of local currency generation from PL 480 and from the Zairian Convention Development Fund (CDF).

During the two year lag in implementation of project 091, USAID and the GOZ continued to finance PRONAM.

B. Purpose of The Evaluation

The project paper provided for a mid-term evaluation during the third year of project implementation. However because of delays in startup only approximately one year has elapsed since the beginning of implementation of the expanded project. Activities in PRONAM nevertheless continued uninterrupted. This evaluation of PRONAM therefore covers a period of about three and one half years.

The purpose of the evaluation is to assess progress towards project objectives, to identify specific problems, to recommend revisions in project paper where deemed necessary or appropriate and to introduce new approaches for better achievement of the project purpose and objectives where applicable.

II. THE PROJECT (660-091), PURPOSE and INPUTS

A. The project provides USAID support to three National food-crop commodity research and outreach programs. Two of these, PRONAM and PNL, are continuing USAID supported activities. PRONAM had been receiving major assistance as detailed in the foregoing, while PNL had received limited assistance through a broader project for assistance to INERA (Project 064). PNM, which was started in the early 70s with assistance from the Centre International de Mejoramiento de Mais y Trigo (CIMMYT) International Center for Maize and Wheat Improvement, is added to these.

The three commodities research and outreach programs supported by the project constitute the principal food crops of Zaire with the exception of rice. Although progress had been made in each of the three programs as independent commodity programs, the Project 091 design sought certain advantages by combining the three within a single project: a mechanism for more effective establishment of priorities for research and extension planning, for allocation of resources, for more effectively dealing with general problems which cut across commodities e.g. soil fertility, soil-water relation and production systems, and provides a more effective support for extension.

Within the broad goal of national self-reliance for agricultural production, the project purpose is to improve and expand the ability of the DA to carry out applied research and to transfer improvements in technology needed to increase production of food crops by small farmers. The project has a double focus:

a) through research and outreach activities to contribute to increasing crop productivity and production and (b) through technical and managerial assistance and training to contribute to establishing a self-sustaining research and outreach institution.

B. Project Elements (Inputs)

1. AID Inputs

The project provides the usual inputs included in AID technical assistance projects. Since the inputs provided in the project paper are usually lumped for the project as a whole it not feasible in most cases to identify those specifically allocated to PRONAM. Technical assistance is an exception.

Of the 45 person years of technical assistance to be provided by IITA or other contractual means at an estimated cost of \$5.99 million, 15 person years are allocated to PRONAM. These include 5 positions. Farm manager, services manager, agronomist/soils, outreach specialist/Mvuazi and outreach specialist/Kiyaka. While the farm manager is initially concerned primarily with PRONAM, his responsibilities extend to the other two programs as well. An equipment maintenance specialist (services manager), also concerned with the three national programs, will likewise initially be concerned with PRONAM.

Training and commodity inputs are shown for the project as a whole. For the project as a whole approximately \$1.8 million are provided for long and short term training and \$1.9 million for FX procurement of commodities-vehicles, equipment, materials and supplies. Allowing for inflation and contingencies brings total AID inputs to \$10.0 million over a 6 year period.

2. GOZ Inputs

The GOZ inputs are not segregated by programs excepting for salaries and allowance for personnel, and for construction and civil works. For the project overall the GOZ personnel total of 39 professional and senior administration posts, 30 research and extension assistants, 78 clerical, service and administrative posts and 360 laborers are projected at an total cost of 39.7 million zaires. At the time of project preparation the official exchange rate was \$1.00 = 5.75 zaires. The parallel exchange rate was approximately \$1.00 = 30 zaires. Slightly over 25 percent (10.5 million zaires) was allocated to PRONAM as well as to each of the other two programs. 8.1 million zaires were allocated to headquarters in Kinshasa.

Overall costs for training, commodities and other costs contribution by the GOZ were respectively approximately 25.4, 59.2 and 31.1 million zaires.

Overall cost for construction and civil works was projected at 9.7 million zaires of which 2.0 million was allocated for construction and utilities at Mvuazi, PRONAM headquarters. Adding 102.3 million zaires for contingencies and inflation brings the total GOZ contribution to 267.4 million zaires. These contributions of local currency were to come from the Zaire Ordinary Budget about 37 percent, the GOZ Convention Fund 51 percent and AID generated counterpart 12 percent.

C. Covenants on organization and operational modalities

A number of covenants were proposed in the Project Paper, and included in abbreviated form in the Project Authorization document, some of which implied significant impact on project implementation:

1. To place authority for coordination of the National Food Crops Programs in the Division of Agronomic Research, Training and Information within the Service d'Etudes et de Planification of the DA.
2. To negotiate definitive agreements with INERA on the use of facilities at INERA stations on which the project programmes are operational.
3. To provide adequate utilities-electricity, water and sewage systems- at those stations.
4. To establish separate budget line items for each program and to maintain these separate from those of INERA.
5. To employ no less than 66 A3 or higher level personnel, this number increasing to 95 in 1988.

6. To establish salary scales for project personnel competitive with those of the Institute Facultataire d'Agronomie (IFA).

III. PROJECT IMPLEMENTATION STATUS

A. Technical Assistance/Personnel

In early 1983, on the occasion of an evaluation of PRONAM there were 7 technical assistant positions in PRONAM all of which were staffed by IITA. As implementation of the boader project (091) got under way the chief of party and administrative assistant positions were transferred to the headquarter organization, Recherche Agronomique Appliquee et Vulgarisation (RAV), which was created to implement the Project Applied Agricultural Research and Outreach. The plant Breeder position was terminated at the end of the incumbent's contract in mid 1983 and a national, returning from training with a PhD degree was assigned as chief of the plant breeding division.

A training adviser programed under the original IITA contract was posted at headquarters to deal with training for all three programs.

In September all programed position in PRONAM were filled. Manpower for PRONAM numbered 4: an agromomist/soils, an outreach specialist and a farm manager/technical support specialist were stationed at Mvuazi and an outreach specialist under AID personal services contract replacing the earlier IITA outreach specialist was stationed at Kiyaka.

The farm manager and technical support specialist, though assigned at Mvuazi is responsible for serving each of the three programs. A second technical support specialist is to be assigned to complement the farm manager and will also be assigned at Mvuazi, and will also serve the three programs.

B. GOZ Personnel

Important changes has taken place in the GOZ personnel. In 1983 at PRONAM head quarter at Mvuazi all divisions were headed by expatriates. In September 1986 only two expatriates remain as heads of divisions. Two divisions are headed by nationals with PhDs and two are headed by M.S. degree holders. The total professional staffing at M'vuazi (includes Kisantu in Bas-Zaire) consist of 10 individuals with M.S. and PhD degree and 8 with Ingenieur Agronome (equivalent to B.S) degrees. One M.S. degree holder is assigned at Gandajika. Four Ing. Agronome-level research assistants are assigned at Gandajika (2) Lubumbashi (1) and Kiyaka (1).

The total professional staffing of PRONAM is now 23 of which 4 are absent, enrolled for advanced degrees in the U.S.. The professional staff is supported by 34 technicians at the A2 and A3 level (technical agricultural high school).

In addition to the 57 employees directly involved in the research and extension program PRONAM has 497 employees. A rough breakdown of these place 49 in administrative, accounting and clerical positions, 89 as specialized labor and 358 as common labor.

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C. Training

Three of the individuals in training in 1983 have returned to the program. One with MS and two with PhD degrees. The former PRONAM director completed the PhD Degree and is now assigned to the post of Deputy Director of RAV for Technical matters. Currently 3 individuals are pursuing study for MS and PhD degrees.

The Program Director has nominated 7 individuals for Training (5 for the PhD. and 2 for the M.S.) subject to availability of slots in the overall project training program and acceptance by U.S. universities.

A slate of eleven potential nominees with the Ing. Agronome degree has been established should agreement with USAID be reached to provide training for this level of personnel. They will require from one to one and one half years of study in a U.S. University before they can be accepted for graduate study.

Local Training programs have been held for extension collaborators - agents of the DOA (Agronomes) and of cooperating organizations in both Bas Zaire and Bandundu.

D. Commodities

Laboratory equipment procured under project 077, but which had largely remained unused because of lack of power and water has been installed in the chemical, plant pathology and entomology laboratories and is being utilized.

Most of the vehicles and farm equipment procured under project 077 was in need of major repair or replacement. Of the original approximately 17 vehicles five are still serviceable, however are in need of repairs. At Kiyaka there was no serviceable vehicle at the time of our visit in August 1986.

New vehicles have been procured and are in use. Twelve have been assigned to PRONAM of which 8 are at Mvuazi and 2 at Gandajika, and 3 at Kiyaka. It was not possible from the material made available to us which of these vehicles were from the U.K. grant of land rovers or from project funds.

Much of the existing farm equipment tractors, plows, disc harrows, brush cutters etc. are either no longer serviceable or are in need of repairs.

No farm or laboratory equipment has been procured and received from project 091 funds. It was understood that a request has been made for procurement of about \$750,000.00 of equipment and supplies. The corresponding PIO/Cs are being prepared.

E. Infrastructure and Farm Development

Significant improvements have been made in living and working facilities at Mvuazi, some of which had been programmed under project 077. Power from the Inga-Kinshasa system has been extended to all buildings on the Mvuazi station with the exception of laborers' houses, a water supply system serving all buildings has been installed, a training center with accommodation for 14

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trainees has been rehabilitated from an existing building and a recreation center has been equiped in the basement of the administration building. Houses have been rehabilitated and equiped for senior national and expatriate staff.

Screen houses have been constructed for entomology and pathological work. Some rehabilitation of buildings have been made in the maintenance/shop complex shared with INERA and new construction - an extension of the administration building - is under way to provide additional office and laboratory space.

At Mvuazi and Gandajika satisfactory arrangements have been reached with INERA on use of land: approximately 20 ha at Mvuazi and 20 ha at Gandajika. At Kiyaka agreements are yet to be reached.

At Mvuazi approximately 200 ha of land - land which is more typical of that more generally found in Bas-Zaire than found on the station - has been obtained through arrangements with nearby communities. The station land is more fertile than that commonly encountered in Bas Zaire. Approximately 100 ha are contiguous with the station and are being developed for research use. This additional land provides more typical soil for selection work and fertility studies. The other 100 ha, about 10 km removed from the station have been developed for multiplication of planting stock.

F. Covenants on Organization and Operating Modalities

By Interdepartmented Decree of December 10, 1985 between the Department of Higher Education, Universities and Scientific Research (DEUSR) and the Department of Agriculture and Rural Development (DOA) the responsibility for research on cassava, maize and legume seeds was delegated to the DOA.

By the same decree the DOA established RAV within the Direction d'Administration Generale des Projets (DAGP) a Division for general administration of all externally financed projects. From a technical stand point the project is under the Division of Agricultural Research, Training and Information of the DOA.

Subsequent documents issued by the DOA (February 1986, March 1986) define the responsibilities of RAV with respect to each program and to INERA.

An agreement of November 1985 between INERA and RAV defined general modalities for use of INERA stations-land, buildings and facilities-by the national programs. Annexes to this agreement defined more specifically these modalities for each INERA station used by RAV. These annexes have been concluded for three stations - Mvuazi, Gandajika and Mulungu. A similar annex for Kiyaka remains to be drawn up.

Certain other covenants have been respected in whole or in part: e.g. electricity and water systems have been provided for Mvuazi only; separate budget line items for each of the national programs have been established in the national budget however only very limited funds have actually been released; the assignment of professional and technical personnel has surpassed that prescribed by the covenants; although the application of the Statut du Chercher (Research work statute providing special rates of compensation for

scientific personnel) is not being generally applied, provisions have been made for premium pay (PRIME) from counterpart funds to research, technical, and senior administrative personnel.

IV. PROJECT EVALUATION (PRONAM)

A. Technical

PRONAM is organized into 6 technical divisions supported by administration and finance, planting stock multiplication and garage units under the Director of PRONAM who is also Director of the principal station at Mvuazi. The Director also exercises direction of PRONAM at two other stations, at 3 substations and at 4 adaptation centers. Only two of the adaptation centers are currently operational. (See Organization charts)

In terms of use of resources the largest research program is the breeding program. The Program Director is head of the crop improvement (breeding and selection) division. A well structured program which follows six to seven steps from the first seedling nursery through a series of trials in which decreasing numbers of clones are included through the selection process. Each step or cycle requires one year. By the sixth to seventh year some 5-10 of the originally 1000-2000 selected plants from the seedling nursery are placed into multi-location trials. This process is similar to that adopted at IITA.

A number of criteria are used for selecting clones for succeeding steps: resistance to major insects and diseases; tuber quality-yellow flesh, resistance to rotting and deterioration when harvest is delayed; plant conformation-type and height of branching; leaf production; earliness; HCN content of roots and leaves; acceptability (taste) of products made from roots and leaves; establishment capability from stem cuttings, survival of cutting between harvest and planting, and, of course, yield. The selection process is carried out on the station only up through multilocational trials.

Carrying out selection for this large number of characteristics requires the close collaboration of the entomologist, pathologist and agronomist. Because serious occurrence of the several diseases and insect pests is usually sporadic, rigorous selection for the principal ones is carried out after artificial inoculation and infestation.

This same process is carried out at the three major stations - Mvuazi, Kiyaka, and Gandajika. Thus several tens of thousands of seedlings are produced each year from which only a few clones are expected to survive the selection process at each station through the 6-7 years.

The process is complicated by the large number of variables being considered. The high variation in varietal responses to many cultural practices used by farmers (e.g. soil fertility, season of planting, response to intercropping with different crops, leaf harvest, etc.) further complicates the process. Although each variable is important, it is likely that the process of developing improved varieties would move faster toward release and distribution of improved varieties if accent was placed on fewer of the most important characteristics. It would seem that yield (roots and leaf), disease and insect resistance, resistance to deterioration of roots in the ground after maturity impact of planting season on clone performance and wide regional adaptability should receive major attention while compromising some of the other characteristics.

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Because of differential response of varieties to the wide range of cultural practices used by farmers, it will become necessary to have a stable of several varieties each specifically adapted to given cultural practices and soil conditions. The process of moving selected clones to elite yield and multilocation trials appears to be very slow. During the first 9 years of the program one new variety Kinuani was released for Bas Zaire. One variety though not officially released or named (F100) is widely distributed and accepted in Bandundu. There appears not to be any other firm candidates for release although several clones have been in advanced yield and multilocation trials at each station for some time. A critical reappraisal of the selection process and criteria being used should be in order. Is it that the process is too rigorous in an attempt to produce a perfect or near perfect variety? Since numerous clones appear to have good characteristics with respect to some of the more important criteria, should not these be considered for release even if there are certain weaknesses? It would seem that as a general criterion for evaluating clones for release one should ask the question - can this clone make a difference or improve farmers productivity over a reasonably wide geographical area and under a reasonable range of cultural practices without undue risk? If the answer is yes the variety should be released even if it has certain weaknesses. Kinuani, for instance, has numerous defects. It nevertheless is being accepted and appears to be having some impact.

Two other technical divisions - entomology and pathology collaborate closely with the breeding program in acquiring understandings of the biology of the disease agents and pests and developing methods for evaluating resistance. Staff of the two divisions regularly make readings in practically all test plantings.

The entomology division has made extensive study of biological control of mealy bugs and green spider mite. Numerous exotic species of parasites and predators of these insect pests have been released. Some have become established in some areas and show promise in controlling the pests. The adaptation of native species as parasites and predators have also been observed. The intensity and length of drought during the dry period appears to greatly influence the severity of attack of these two important insect pests.

Bacterial blight is the most serious disease affecting cassava. Several other diseases, however, occur. One, the cause of which remains undetermined, can cause severe dieback under certain conditions on certain clones. Factors influencing the development of these diseases are being studied.

The agronomy division is studying the influence of yields of certain cultural practices, interplanted crops, soil fertility and means for maintaining/improving soil fertility response to NPK and lime and control of weeds. The application of lime, potassium and occasionally nitrogen increases yields. No response has been obtained with phosphorus applications. Mulching is beneficial. There are wide variation among varieties in their relationship to different interplanted crops. Difference due to time of planting (first or second seasons) and in response to leaf harvesting have been observed.

Soil management and fertility are the principal limiting factors to production. While diseases and insects can cause serious losses from time to time and usually in more limited localities, poor soil fertility and poor

water retention and supplying capabilities of the soil is characteristic of most of the soils in Bandundu and to an important degree in Bas Zaire and take their toll on a continuing basis. Moreover, the cost in terms of labor of the traditional practice whereby land is cleared, one crop is produced and the land is reverted to fallow is very high. Fallow plays an important role in maintaining soil fertility, however, at a high labor cost, approximately 1/3 of the total labor requirement of producing cassava. Some alternative to the traditional fallow-rotation with legume species, managed fallow with woody legume species, mulching and ultimately the use of chemical fertilizers, etc., could play an important role in increasing productivity and production. Attention to soil problems has not been given sufficient attention. The PRONAM staff is weak in soils and soil science. The IITA agronomist/soils will partially fill this gap. However, training in soils should be accelerated.

In the agronomy/soils research, some work is being done on alley cropping with Leucaena sp. It is felt that this approach to incorporation of legume species in cropping systems designed to maintain/improve soil physical structure and fertility is far too limited in scope. It would seem that before studying some preconceived approach to using legumes based on one or few species in cropping systems, the study of the performance of numerous legume species both woody and herbaceous should be made in sole plantings. Once such knowledge is obtained the study of how the more promising species could be fitted into cropping systems could follow. It is probable that several different objectives could be pursued with respect to the role of the legume species.

A fifth division is that of extension/plant multiplication. This was recently divided into two separate divisions, the one for extension standing on par with the technical divisions, and the one for plant multiplication as a service rather than a technical division. This appears to reflect the experience of the past several years, that the plant multiplication activity was requiring too much of the efforts of the combined division.

The extension division has worked mostly with existing development project organizations and commercial enterprises in Bas Zaire. Demonstrations are carried out in farmers' fields and planting stock is distributed through these structures. Little use has been made of the DOA extension agronomes in Bas Zaire. In Bandundu on the other hand while some collaborative work has been undertaken with organized projects and other entities, most of the activity has been with the DOA agents and women groups. At Gandajika DOA agents have also been the primary contact with farmers. This approach appears to be effective in spite of the general poor regard of the agents by the population and the total lack of facilities and support of the agents by the DOA. The general unsatisfactory state of the DOA extension service is a serious handicap to the outreach program. A possible restructuring and strengthening of the extension service with external assistance is being discussed.

The heavy load on PRONAM and its facilities and budget by plant multiplication for distribution is becoming an increasingly serious problem. While this is essential if improved varieties are to be distributed, some alternative is needed. The recent establishment of the Bureau National de Semence (BUNASEM) to coordinate seed production, together with a World Bank loan for carrying out seed production principally through contracting agencies offers an opportunity for PRONAM to farm out much of its plant production

activities. BUNASEM is apparently prepared to take foundation plant material from PRONAM and multiply it for distribution. This should relieve PRONAM of certain heavy expenses as well as permit reduction in the work force.

A sixth division, Service Technique et d'Aménagement (STA) has recently been created. This division is concerned with farm development and management and with equipment maintenance. The STA is weak in terms of personnel and is generally lacking in facilities. Two IITA personnel, one on board, one to come shortly - form the nucleus for the division. Their responsibilities, however, extend to the other programs, PNM and PNL. Their effectiveness will depend in large measure on staffing by nationals and training this staff. There has been virtually no training for these service positions. Consequently it will be some time before self continuing service by national will be available.

Personnel

Substantial progress has been made in developing and upgrading the GOZ personnel. Four of the six divisions are now headed by nationals, 2 of which have PhD degrees obtained under the original project 077. The other 2 have M.S. degrees. The heads of the secondary station - Kiyaka and Gandajika - also have M.S. degrees. Of 23 individuals, senior and junior or researchers and research assistants, there are two doctorates, nine M.S., 4 Ingenieur agronome (BS equivalent) and 8 Ingenieur Technicien (5 years of agricultural technical school). These are supported by 34 technicien (3-4 years of agriculture technical school). Three of the M.S. level individuals are currently in training in U.S. universities for the PhD.

The distribution of postgraduate degree holders is fairly uniformly distributed among divisions with 3-3-2-2-1, in plant breeding, entomology, plant pathology, agronomy general and agronomy FSR respectively. There are two important deficiencies in the senior staffing. There are no advanced degree holders in the extension/outreach division, and no economist at the graduate level. One economist is in training (there are some doubts that this individual will return to PRONAM) and one at the BS level is working in on-farm trials. The limited expertise in economics poses a serious handicap to organizing an FSR team and to effective participation of the IITA economist/FSR who is posted in RAV headquarters. An increase in the number of technicians would appear to be desirable to bring the ratio of research personnel to technician to approximately 1 to 2.

Job descriptions have been prepared for the senior technical staff, for station and division heads, and for administration and clerical position.

The staffing in the STA division (Service Technique d'aménagement), farm development, operations and maintenance is lacking in counterpart personnel in both numbers and level of training. The two expatriates - one farm development and management specialist and one for equipment maintenance (the latter -not yet on board) - have responsibility for the other two Programs - PNM and PNL involving 4 stations. Their effectiveness will depend upon having counterparts at each location with adequate levels of training.

A personnel office is charged with personnel management. Regular evaluations are reported to be practiced using a two page form providing for rating individuals with respect to seven elements on a scale of 1 to 10.

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There are also provisions for a general appraisal on a scale of 1 to 4 as well as for rating on aptitude for advancement.

The total personnel complement of PRONAM excluding the technical staff numbers 497 of which approximately 43, 89 and 365 are classed respectively as administrative, specialized labor and common labor. Among the common labor complement are a number of seasonal laborers. Moreover since the listing was made, there has been some reduction in full time labor. Overall it is estimated that there is an equivalent of about 350 full time laborers including specialized labor. These are distributed by stations as follows - Mvuazi and other points in Bas-Zaire - 220; Lubumbashi - 5; Gandajika - 52; Mulungu - 3 and Kiyaka 69.

These high figures for non technical personnel, especially at Mvuazi would appear to be excessive. Even if the large number given as employed in planting stock multiplication (76) and those involved in construction and maintenance approximately (60) are subtracted the remaining 85 for maintenance of research and off the farm trials in Bas Zaire would seem to be excessive.

C. Training

The level of training activity at professional levels is consistent with needs and availability of candidates. A reasonable balance with respect to technical levels within divisions has been maintained. Distribution among disciplines, however, has been poor. Only one person has been trained in economics and it appears that that individual will probably not be used in the program. Although short term training has been provided to lower level technicians and extension workers, long term training to develop individuals for senior leadership positions has not been done. While adequate levels of training have been provided in general agronomy, the soils specialization has been neglected.

Of the individuals currently in training, in progress or being considered for training there are: one economist FSR (PNL), one for soils (INERA) and none for extension.

Farm development and management and equipment and facilities maintenance are areas for which there have been virtually no training. The assignment of two IITA technicians to these areas reflect the need for competent personnel in those important activities. There appear to be, however, no current plan for training in those areas.

One constraint on training has been the lack of qualified candidate. Earlier project 077 experienced a lack of candidate for PhD level training and concentrated on the M.S. level. Currently there are numerous candidates among the M.S. holders for PhD training. The constraint is now B.S. candidates for M.S. degrees. There appear to be numerous qualified candidate at the Ingénierie Agronome/Technician level which according to estimates obtained from U.S. universities, could obtain B.S. degrees in 1 - 1 1/2 years and then be prepared for graduate study. It is understood that support for this type of individual is now precluded by the A.I.D. policy being applied to this project. Relaxation of this rule to allow particularly well qualified individuals to take advanced training would contribute much to maintaining a balanced training program.

While some local training has been provided to agents of organizations including the DOA which have collaborated with the extension program in Bas Zaire and in Bandundu, much more of this type of training is needed. Now that a center for this type of training is available at Mvuazi, training of extension agents can be accelerated.

D. Infrastructure

At M'Vuazi improvements in infrastructure, power, water, recreation room, screen houses, training center, etc. which have been completed during the past 2 years have corrected the more serious infrastructure deficiencies. There are still too few adequate houses to house staff. Plans and budgets have been established for constructing additional houses. Currently construction is underway on a wing to the administration building for additional office and laboratory space. While additional space especially for laboratories (soil) is clearly needed and additional offices would be desirable, given the shortage of local currency one may well question this construction at this stage. Moreover it would seem that some construction for support services, stores for equipment spare parts, etc. are at least as critical if not more so than additional offices.

Although the general agreement between RAV and INERA governing the use of facilities on INERA stations and the annex pertaining specifically to M'Vuazi provide for sharing certain cost, power, water, grounds and road maintenance, these costs are being borne almost entirely by PRONAM.

By agreement with INERA, PRONAM now has firm control of approximately 20 ha of suitable land on the station. Through arrangements with an adjacent community approximately 100 ha of land more typical of the region is available for research. In addition the use of approximately 100 ha has been negotiated with a community some 10 km from the station for planting stock multiplication. These arrangements provide adequate land at Mvuazi for the project for the foreseeable future.

At Kiyaka the situation is fluid. No agreement has been reached with respect to use of facilities by PRONAM. Furthermore there seem to be a continuing deliberate harrassment of PRONAM on the part of INERA. The proposed annex to the General Agreement between RAV and INERA on use of facilities by PRONAM has not been agreed upon. Some have suggested that Kiyaka be abandoned as a station for the project, and arrangements be made for land near Kikwit. This issue is discussed in greater detail in Appendix H.

At Gandajika the annex to the general agreement between RAV and INERA governing use of facilities there has been agreed upon and relationship appear to be satisfactory. Arrangements for use of land and facilities are satisfactory. However, there is need for substantial rehabilitation of facilities. Electric power and water supplies are specially unsatisfactory.

E. Equipment

Considerable delays have been experienced in placing orders for new equipment. Except for land rovers - in part from the U.K. grant and in part procured with local currency, virtually no equipment has been ordered under the project (091). RAV has provided USAID with a list of needed equipment in

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June 1986. PIO/Cs to initiate procurement, however, are yet to be completed. The long delay in processing procurement seems unreasonable. One can anticipate that at least one year will elapse before any new equipment is delivered.

Some equipment and vehicles from project 077 are still useable. Much of it however, is in need of repairs for which no spare parts are on hand. At Kiyaka for example there was not a single operational vehicle on the occasion of our visit there.

At the present time only equipment remaining from project 077 is available at the three stations.

The following lists the vehicles available to PRONAM at each station:

Mvuazi:

- 6 Landrovers
- 2 Station wagons
- 1 International truck

Kiyaka:

- 2 Landrovers
- 1 International truck

Gandajika

- 1 Landrover
- 1 International truck

F. Financial

The most glaring financial problem is the failure of the GOZ to provide the funds stipulated in the project paper. While payment of salaries of "mechanized" staff from the regular GOZ budget has been forthcoming, regular budget payments for non-"mechanized" staff has not. Counterpart funds have been drawn upon to make up this deficiency.

Whereas according to the project paper approximately 70 percent of the total local currency to be allocated to the project was to come from the "Fonds de Convention", it is understood that no contribution has been made from this source. As a result, counterpart funds have had to cover most local currency costs. With numerous demands for C.P. funds, it has been necessary to ration these resulting in reduction of C.P. budgets and occasionally delays in disbursements.

There appears to be some misunderstanding between USAID and RAV with respect to the precise current local currency budget which has been agreed upon for the project. According to USAID, there has been considerable overspending while RAV maintain that it has remained within the approved budget. Regularization of these discrepancies should receive immediate attention before relations between USAID and RAV are further strained.

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Every effort should be made to obtain additional funding from the GOZ. The performance of GOZ in meeting financial obligations to the project leaves serious doubt as to the priority accorded to the project.

If it should be determined that greater contributions cannot be expected from the GOZ, at least on the near-term, some other means should be investigated to acquire financing of the project.

The financial aspects of the project raises serious questions on the probability of the GOZ assuming financial responsibility for the institutions being built at the end of 10 year or even 20 years.

G. Management and Coordination

Reference to problems raised in sections IV E and IV F raises some questions with respect to USAID management which need no further elaboration.

USAID, however, is not wholly responsible for the delay in implementation start-up. It is understood that disagreements between USAID and AID/W/Contracts on the method for procuring technical services were largely responsible for this delay. To the credit of USAID was its continuing support of PRONAM during the time lapse by extending project 077. This permitted PRONAM to operate without serious interruption.

Management by RAV is dealt with in great detail in another section of the report. Comments here will be limited to management from a technical point of view.

A position of Deputy Director/Technical (essentially equal to "Director of Research" has recently been created. The precise role of this position is yet to be defined. The incumbent, a former director of PRONAM, has drawn a proposal defining the role of a technical Service Directorate (Service Technique RAV). The proposal is still in draft and has not been reviewed or discussed in RAV.

This Service could play an important role in coordination of technical aspects of the project. A number of issues relating to technical coordination are presented in the section "Highlights and Issues". Presently there are no mechanisms for defining priorities among programs, for effective joint planning or for assuring coordination and cooperation among programs.

A decision on the role of the Technical Services Directorate along the lines of the proposal prepared by the incumbent Deputy Director should be reached as soon as possible.

In this connection, there appears to be some concern for excessive staffing at RAV headquarters. This should not however, prevent providing technical support for this services. If sufficient authority and support is given to the Technical Director this position could play one of the most important of RAV roles.

Management at the PRONAM level appears to be satisfactory - see sections IV B and IV D. Relationship between the PRONAM director and staff and the IITA technical assistance team, after a few minor problems, have settled on a satisfactory note. A reasonable role for IITA staff has been defined - in

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advisory roles to their respective divisions where division heads are nationals; in other cases, IITA staff acts as division heads. One of the IITA staff has been assigned by the PRONAM director the role of principal advisor to him. While the director has established a definite routine with respect to division of his time between administrative matter and his technical responsibilities as head of the plant breeding department, the division of his time must inevitable impact adversely on performance of the plant breeding division, the largest technical division in the program. Regular staff meeting are held at monthly intervals.

VI. Highlights of Accomplishments and Overall Evaluation

PRONAM is now a well established Program/Institution. With few exceptions staffing is well balanced. The Personnel are well trained and are doing a commendable job. Weaknesses in Agronomy/Soils will be partly overcome by the assignment of an IITA Soils specialist. Training to strengthen National capability in soils is strongly urged. The extension and STA divisions are the weakest links in the PRONAM structure. Without any training currently programmed or in sight for nationals in those divisions the outlook is not particularly bright for eventually placing them on a solid basis.

Substantial improvements of infrastructure have been made: electric power and running water now serves all buildings, a training center has been developed and equiped and recreation facilities added at Mvazi.

These improvements along with the allocation of premium pay (primes) have contributed to good staff morale.

Staffed largely with trained nationals, further upgrading of staff by training in process and projected, PRONAM can now be considered to have reached the state of being self-sustaining from the technical and managerial standpoint. The program, however, will continue to depend heavily on external financial assistance.

It 's principally for this reason that the rapid expansion of PRONAM during the past 3 years and further projected expansion by undertaking work at other stations, substations and far flung trials stations is cause for concern, particularly in view of management and budgetary implications. Rather than expanding it would appear the next several years should be devoted to consolidation of progress already made.

Substantial contributions have been made towards understanding the problems and constraints on production. Important diseases and insect pests have been identified. Information gained on the biology and epidimology of these is contributing to the breeding program which seeks to incorporate as much resistance as possible in improved varieties. Two new varieties have been widely distributed. They appear to be finding good acceptance by farmers. The agronomists have undertaken studies on a wide range of cultural practices, soil fertility and management practices and study of crop associations. Greater emphasis should be given to soil and soil fertility management. Differential responses of varieties or clones to these practices have an important bearing on defining criteria for evaluation of clones in the breeding and selection program. Some reassessment of the breeding program is needed.

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The work of the research divisions is well complemented by the plant multiplication/extension division (this was recently separated into two Divisions).

In Bas Zaire the extension work has been carried out principally through organized agricultural development projects, commercial entities and other entities involved in agricultural extension and development. Some 19 entities have been involved (see annex 3). During 1985 demonstration plots were established in 100 sites. Collaboration with PNE has produced results from approximately 135 trial/demonstration plots.

In Bandundu, working mostly through DOA agents, demonstrations were established at 54 sites.

Feedback from demonstrations has been inadequate.

In Bas Zaire in 1985 approximately 675,000 meters of planting material of the new variety Kinuani were distributed. This brought total distribution of planting stock of this variety to over 1.5 million meters since the variety was released in 1983. Ninety ha are in multiplication.

In Bandundu 75,000 meters of the variety F100 was distributed in 1985. Thirty-five ha are in multiplication of this variety at Kiyaka. Four promising clones are being multiplied for eventual distribution at Gandajika.

A Farm development and management specialist has been added to the IITA technical assistance staff. This will improve management of field work and should result in reducing the usual high degree of variability in field trial. The effectiveness of this technical assistance as well as that of the equipment maintenance specialist will depend on developing nationals through training. This has so far been neglected.

PRONAM is thus carrying out an integrated multi-disciplinary research and extension program dealing with the principal problems and constraints to cassava production. There remains however a number of weaknesses and unresolved issues.

The personnel of PRONAM are still to a large extent adhering to the vertically structured single commodity approach to crop research. Within the context of project 091 it is not clear how technical collaboration will be effected among the three commodity programs involved. According to the plans there will be work on two or more of the crops at most stations and personnel of other programs will be stationed at stations which are operated by PRONAM. Just how these personnel will fit in the PRONAM organization and what will be the nature of collaboration between researchers from different commodity programs is not at all clear. One of the concepts of project 091 was that crop research should be on a multidisciplinary basis integrating research on the several crops. At PRONAM there are suggestions that researchers from other programs should be integrated into the PRONAM technical divisions. However, there seems to be little thought of how integration of research activities will be carried out.

An FSR/On-farm program has been moving along largely through the efforts of an agronomist who is posted away from the station. The concept of team

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work in FSR is largely missing. The absence of an economist/FSR at MVuazi is considered by the PRONAM staff to be a serious handicap in organizing an FSR activity. The view is strongly held that PRONAM must be totally self sufficient with respect to FSR. The concept for structuring FSR presented in the project paper and apparently accepted in RAV headquarters is clearly not acceptable to PRONAM.

There are also wide differences in concepts of what constitutes FSR. Some view FSR as a fourth program on par with the commodity programs while others see FSR as simply an approach or methodology for multidisciplinary research. The essence of the FSR approach is the determination and analysis of farmers' production practices and constraints and problems recognized by them; developing solutions to these and testing for adaptability and acceptability within the farmers' production system. There is a need for clearly defining the FSR concept and operational mechanisms for use of this approach. A more comprehensive treatment of FSR/On-Farm research is given in the report by the economist on the evaluation team.

The planning process by which research programs are defined and resources are allocated in relation to presumed priorities need to be reassessed. The usual practice is to hold an annual meeting at which the entire staff, including observers from collaborating entities, participate. The previous years work is reviewed and appraised and plans for the next years work are drawn up. These are done in some detail, down to the individual experiment and on a division by division basis. The latest planning document for 1986-87 lists experiments or trials, each with objectives, methods, etc. The document, however, fails to define overall strategy and priorities or how the individual operation of the several divisions related to these. The work plans consequently reflect what each division head and his staff propose to do in the coming year.

Planning is done by programs. However, directors from other programs are invited to participate. The review and planning meetings usually require two days. It has been proposed that in the future the review and planning exercise should be done jointly. It seem doubtful that a planning exercise involving all research personnel of the three programs could do an effective job. Rather it would seem that each program should plan its work and this to be followed by a joint session with other programs with only the Directors and division heads in attendance. At this joint meeting agreements should be reached on strategy and priorities and amendments made to the program plans be as needed to reflect these.

Relation to extension needs clarifying. To date PRONAM has developed an ad hoc approach to extension work, working with different groups, siezing targets of opportunity. While this approach has been useful and substantial results have been obtained, a more systematic approach needs to be developed. Moreover the extension programs have focussed almost exclusively an expansion of new varieties. Many other aspects of cassava production technology as information becomes available, should be included. The extension elements of PRONAM should also be intimately involved in FSR/On-Farm activities.

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ANNEX 1

SUGGESTIONS ON RESEARCH

AT PRONAM

Dr. J.A. Otoo
IITA

I arrived at Kinshasa on 15 August 1986 to join a team to evaluate PRONAM. I left Kinshasa on 18 August for M'Vuazi station where PRONAM is located. I toured research plots the following day in the company of Dr. Nsiama She and Mr. Landu, entomologist and agronomist respectively of PRONAM, and three other technicians.

Dr. Fran LeBeau, AID Consultant for the evaluation and Mr. Nkiere, AID representative on the team, arrived at M'Vuazi on 19 August. We had a meeting with the PRONAM Director, Dr. Mahungu, and the Head of Sections the following day. The Director introduced the administration and research programs and, especially the breeding program which he leads. The Heads of Sections also presented work plans, results and problems facing the Sections. We toured the research fields, laboratories and farmers plots with the Director and all Heads of Sections and other staff members. My suggestions are listed below.

I. THE ADMINISTRATION.

The PRONAM Director appears to be occupied with too much day-to-day administration of the program. This is bound to affect his research adversely. As the breeding of new varieties is an important task and a major role of PRONAM (the Director is the Plant Breeder), the administration of the personnel, accounts and other matters could be handled by an experienced and efficient administrative officer who would report to the Director. Heads of Sections would similarly be relieved to concentrate on research activities.

2. FARMING SYSTEMS RESEARCH AND EXTENSION

PRONAM is ready to establish a full FSR/E component. A farming systems economist should be posted to M'Vuazi to strengthen the team. The presence of FSR/E in each program (PRONAM, PNM, PNL) would strengthen and integrate the three programs. Elite breeding materials from each Program could be tested and utilized by the other programs in their FSR/E activities. At research planning and review sessions of each program, the other programs would be strongly represented to participate in the discussion. The performance of the elite breeding materials from the other programs would be discussed and any necessary steps taken. This would be one effective means of integrating the programs. Meetings of Program Directors with and without RAV Coordinators would also strengthen integration. The relationship is diagrammatically represented below.

RAV

PRONAM
FSR/E

PNM
FSR/E

PNL
FSR/E

3. RESEARCH

- a) The anthracnose disease was observed to be serious on the field plots. Effort should be intensified to perfect a methodology for screening the cassava plants for resistance to the disease.
- b) Stem tip-dieback has been reported by PRONAM as a serious new problem (or disease) affecting cassava plants in M'Vuazi. Selected progenies of TMS 30572 (an improved IITA cassava clone) and other PRONAM improved clones (KINUANI and F100) were all susceptible, though to varying degrees. Research has not yet identified the cause.

A Close look should be taken at the fibrous roots, their development during the dry season and possible infection by microorganisms. This should be done in addition to other efforts being made to identify the cause. So far, stems and tubers have been investigated.

- c) Weeds were a serious problem in many farms belonging to peasant farmers. Vigorous varieties with appropriate canopy structure that can suppress weeds should be developed.
- d) The clone 70453 which is reputed to be highly resistant to mealybugs may need verification because of the observation reported by the entomologist that a large number of mealybugs were observed on it.
- e) Multiplication of Planting Materials: A good effort is being made by PRONAM to rapidly multiply improved cassava clones for research and distribution. Farmer requests for planting materials of improved clones are heavy and difficult to meet. More efficient methods should be investigated which can increase the multiplication of more materials using the same, or less amount of labour. It is suggested that:

i)

the use of plastic mulch for rapid multiplication should be investigated. With plastic mulch, weeding is reduced to a minimum and labour can be used to plant more hectares. Plants grow faster and higher yields of planting material are obtained.

ii)

If direct planting of 2-node culting at 1m x 50cm spacing is practised under the plastic mulch conditions, a good plant population is established.

iii)

A simple machine which cuts stem cuttings at a much faster rate than when it is done manually has just been tested at IITA. It cuts down drastically on number of man-hours needed to prepare planting materials for planting. PRONAM could arrange to acquire some in the future for its multiplication program.

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ANNEX 2

CURRENT JOURNALS IN THE LIBRARY MUVAZI

Bulletin of the Entomological Society of America.

Annals of the Entomological Society of America

Journal of Economic Entomology

Annales de la Sociétés Entomologique de France

Environmental Entomology

Review of Plant Pathalogy - Commonwealth Agricultural Bureau

Scientific America

High Technology

The Furrow

Agronomie (Institit National de la Recherche Agronomique Paris)

Experimental Agriculture - successor to the Empire Journal of Experimental Agriculture

Euphytica - Netherlands

Bulletin of the British Mycological Society

Transactions of the British Mycological Society

Abstracts of Tropical Agriculture - Netherlands Agrochemical Age

Horizons (AID)

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ANNEX 3

COLLABORATORS
IN FIELD DEMONSTRATIONS
AND DISTRIBUTION OF PLANTING MATERIALS

Programme National Engrais : Zaire-GOZ
Project Agricole de Mbanza-Ngungu : GOZ France
OXFAM
Armee du Salut
Cooperation Agricole Italu-Zairois
Centre Developpment Communautaire (Baptist)
Office National de Transport
Cimenterie du Zaire
Eglise Catholique
Institut Technique Agricole
Eglise Baptist
Eglise Batholique
Diocese Catholique
Eglise Catholique
J.V.L. (Jules Van Lancken Ranch)
Compagnie Sucriere
Mission Catholique
Armed Forces GOZ
Ecole de Formation et d'Application de
Technique Troupe Blindée EFATBL

Mbanza-Ngungu
Mbanza-Ngungu
Mbanza-Ngungu
Mbanza Nzundu
Mongo Luaala, Luozi
Kimpese
Lufutoto
Lukala
M'Vuazi
Gombe Matadi
Sona Bata
Sona Bata
Kisantu
Luvaka
Kolo fuma
Kwilu-Kwango
Songololo
Mbanza-Ngungu
Mbanza-Nzungu

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ANNEX 4

INDIVIDUALS CONTACTED

USAID

Mr. <u>Chandler</u> , Dennis	Director/USAID
Mr. <u>Lezin</u> , Arthur	Deputy Director/USAID
Mr. <u>Brown</u> , Donald	Chief Agriculture and Rural Development
Ms. <u>McCarthy</u> , Cheryl	Project Manager 091
Mr. <u>Atteberry</u> , David	Assistant Manager Project 091
Mr. <u>Braddock</u> , Lee	Chief Program Development and Evaluation
Ms. <u>Rectenwald</u> , Debra	Program Development and Evaluation
Ms. <u>Alder</u> , Janet	Program Development and Evaluation
Cit. <u>Nkiere</u> Mbo Wassa	Assistant Manager Project 091, Agro-Economist

Kinshasa

RAV Headquarters	
Cit. <u>Mota</u> Bakajika	RAV Coordinator, Department of Agriculture and Rural Development GOZ.
Dr. <u>Brockman</u> , Frank	Chief of Party IITA Technical Assistance Team
Mr. <u>Servant</u> , Greg	Administrative Assistant IITA team
Dr. <u>Miller</u> , David	Training Officer/Outreach IITA team
Dr. <u>Bartlett</u> , Christopher	Economist/FSR IITA Team
Dr. <u>Lutaladio</u> ne Bambi	Deputy Director/Technical RAV
Cit. <u>Wanzalughendo</u> Musavuli	Deputy Director/Administration and Finance RAV.
Cit. <u>Kankonde</u> Dambu	Executive Secretary RAV.

Others

Mr. <u>Andriansens</u> , Jan Cooperation	Belgium Technical and Economic
---	--------------------------------

Bas-Zaire

Dr. Mahungu Nzola Meso Director PRONAM and Head Plant Breeding Mvuazi

Dr. Osiname, O.A. Agronomist/Soils and Principal Advisor IITA
Team Mvuazi

Cit. Landu Kalemba Head Agronomy Dept. Mvuazi

Cit. Moyolo Kilumba Head Pathology Dept. "

Dr. Nsiama Hatalman Head Entomology Dept. "

Dr. Pandey Sheo Head Dept of Outreach IITA Team

Dr. Babu, Buyyala Chitti Technical Service IITA

Cit. Kwanza Balamba Assistant in Extension Mvuazi

Cit. Massamba Ndokunsadio Agronome/Extension Nkolo

Cit. Dinamuene, Nena Encadreur Agricole Mvuazi

Cit. Ndombo, Mateso Director Ecole Matoko Nkolo

Cit. Dialundama Farmer, Songolo village

Cit. Bongola Extension Agent PNE Lombe

Cit. Bitwvova Secretarty of Cooperative, Lombe

Cit. Vumbi Farmer Kizaladio Village

Cit. Kampui Kabengele PRONAM Extension Agent to CEDECO Kimpese

Dr. Otoo IITA Cassava Program, Ibadan, Nigeria

Mr. <u>Lansman</u> , Emile	Dept. Director CIZA, Lukala
Mr. <u>Bera</u> , Alfred	Domaine N'gongo/Nkula
Mr. <u>Lalji</u> , Azad	Domaine N'gongo/Nkula
Cit. <u>Nyati</u>	Director CEDECO, Kimpese
Cit. <u>Mutshimuana</u>	Director CIZA, Lukala
Mr. <u>Delaporte</u> , J.	Conseiller Project Agricole (French) Mbanza-Ngungu.
Cit. <u>Soli</u> Kiatoko	Directeur Projet Agricole Mbanza-Ngungu
Cit. <u>Alingabo</u>	Representative Domaine Ngongo/Nkula
Mr. <u>Dealeeuw</u> , Marc	Director Regional PNE/FAO, Mbanza-Ngungu
Cit. <u>Makasa</u>	Co-Director PNE/FAO, Mbanza-Ngungu

Bandundu

Cit. <u>Muakatoko</u>	Entomologist, Head of PRONAM at Kiyaka, Kiyaka
Cit. <u>Mutumbo</u> Tshibadi	Extension Agronomist, Kiyaka
Mr. <u>Burn</u> , Cameron	Outreach (local contract), Kiyaka
Cit. <u>Kakala</u> Mozengo	Agronome (Technical Assistant), Kiyaka
Cit. <u>Sambu</u> Gambolo	" " " , "
Cit. <u>Kafiana</u> Mbuta	" " " , "
Cit. <u>Natensi</u>	" " " , "
Cit. <u>Bouila</u> Bakana	" " " , "
Cit. <u>Nungala</u> Nukoi	Chef de Collectivité, Yassa/Lokwa
Cit. <u>Kuyimba</u>	Agronome de Collectivité, Yassa/Lokwa
Cits. <u>Farmers</u>	Village of Makangu
Cits. <u>Farmers</u>	Village of Isungu
Citne. Woman Farmer	Village of Isungu
Mr. <u>Kelley</u> , David	USAID Representative in Kikwit

Cit. Nkoy Baumbu

Director USAID Project 102, Kikwit

Cit. Kaziama

Extension Sub-Contractor Agent Project 102,
Kikwit

Ms. Etian, Sylva

Coordinator for Project 079, Kikwit

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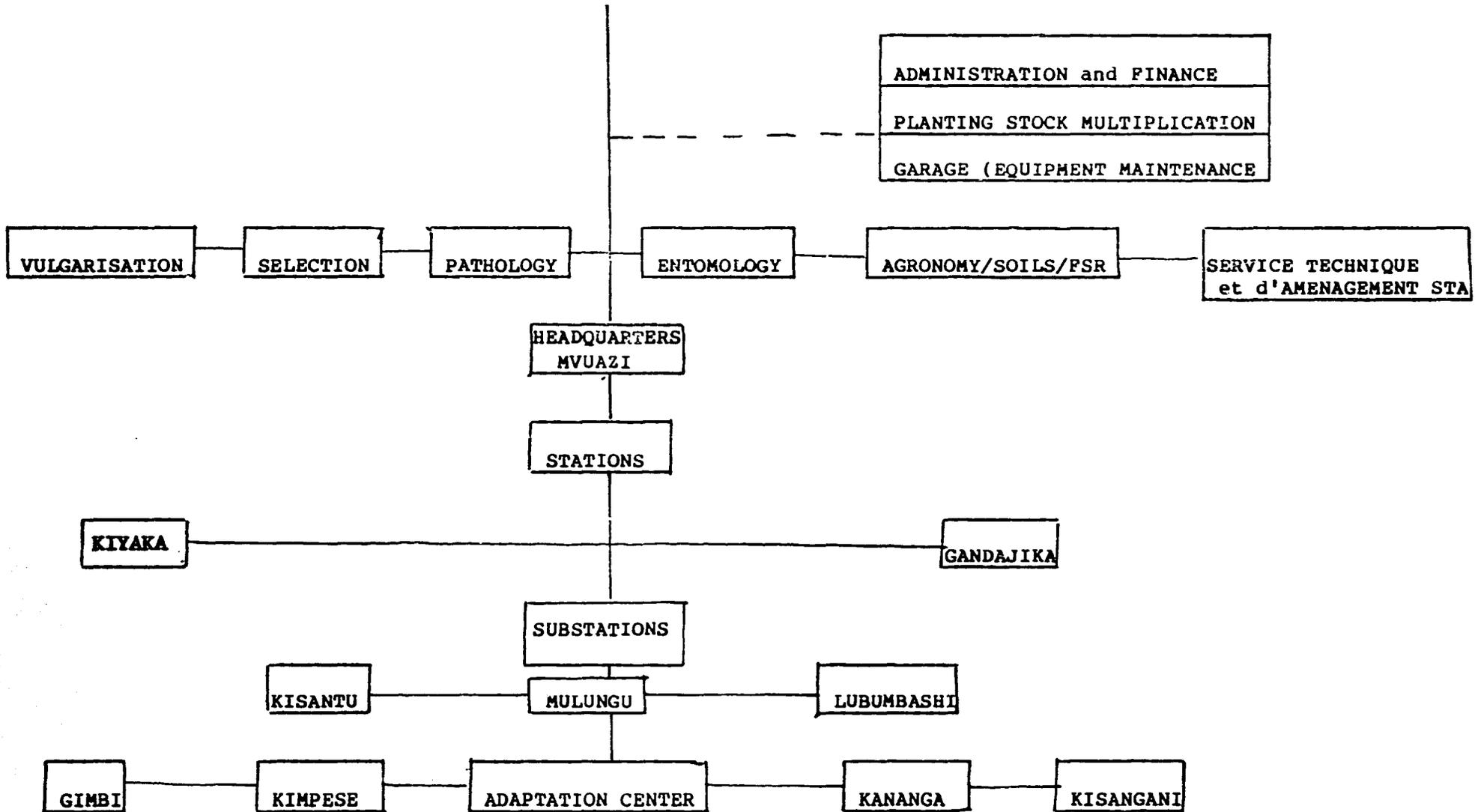
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ANNEX 6

ORGANOGRAM OF PRONAM

PRONAM ORGANIZATION

DIRECTION



APPENDIX D

EVALUATION
PROGRAM NATIONAL MAIS PNM

ZAIRE

SEPTEMBER 1986

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S U M M A R Y

THE ANALYSES AND EVALUATION ARE IN CHAPTER III. CHAPTERS I AND II PROVIDE THE SUPPORTING EVIDENCE.

The report begins by giving a background statement on the Applied Agricultural Research and Outreach Project 660-0091. This is followed by a summary of the purpose and objectives, and these are used as the guidelines for evaluation. The information gathered from a survey of activities of Programme National Maïs (PNM) is then presented. The information was gained through interviews with administrators, researchers, technicians, peasant farmers and some Zairian people, and by reference to reports and published material. An analysis of the knowledge gained in the survey allowed me to make an assessment vis-a-vis the objectives and to make recommendations. I have concluded that the project is off to as good a start as is possible under the circumstances. The senior research scientists in (PNM) are all competent in their fields. There have been some problems in the administration, most of which were due to poor communication, and five recommendations have been made which will reduce or eliminate problems due to poor communication. The direction of research needed some modification. The emphasis on breeding in the initial stages of PNM should be open pollinated cultivars; and an ecological survey should be completed on diseases before a major commitment is made to any one disease. An integrated pest management approach is suggested. Appreciation is given for the recommendations made on fertilizers in the absence of soil testing facilities. So, the agronomy department must strive to change the present recommendations to more appropriate ones, and the direction should be towards systems which use minimum to no chemical fertilizers. It is recommended that one FSR scientist be placed at PNM Lubumbashi, and special attention be given to the soil conditions at Kaniameshi. The young Zairian scientists are promising researchers but need training. The facilities at all stations are in need of repair. GOZ is commended for having commenced to honor its covenants, and then asked to carry them through to completion. I have recorded information on personnel, libraries, training, marketing, and annual evaluation, but have offered no suggestions on the latter three.

AARP	Applied Agricultural Research and Outreach Project
AID	Agency for International Development
BUNASEM	Bureau National de Semences
CEDECO	
CEDERIM	
CEPC	Centre d'Etude des Problemes Communautaires
CENTRO CIMMYT	
CIMSHABA	Cemeteries du Shaba
CODEMINES	Compagnie D'Explortation des Mines
CREN - K (Zaire)	Centre Regional d'Etudes Nucléaires à Kinshasa (Zaire)
DOA	Department of Agriculture
DSR	Department of Science and Research Technology
FSR	Farming Systems Research
GECAMINES	General des Carrières et des Mines
GOZ	Government of Zaire
IFAD	
IITA	International Institute of Tropical Agriculture
INEAC	Institut National pour l'Etude Agronomique du Congo Belge
INERA	Institut National pour l'Etude et la Recherche Agronomique
IPM	Integrated Pest Management
ISNAR	International Service for National Agricultural Research
MSV	Maize Streak Virus
PAFEK	
PMKO	Projet Mais au Kasai Oriental
PNE	Programme National Engrais
PNL	Programme National Légumineuses
PNM	Programme National Mais
PNMVT	Programme National Mais Variety Trial
PNR	Programme National Riz
PNS	Projet Nord Shaba
PRODALU	
PRONAM	Programme National Manioc
PVO	Private Voluntary Organisation
RAV	Recherche Agronomique Appliquée et Vulgarisation
SHALAMO	Shamba la Umoja
SODIMIZA	Société Développement Industriel et Minier du Zaire
TABAZAIRE	
TRABEZA	Traverses et Bétonnerie du Zaire
USAID	U.S. Agency for International Development

I. INTRODUCTION

- A. Rationale
- B. Purpose of Evaluation
 - 1. The Project Goal
 - 2. The Project Purpose
 - 3. The Project Objectives

I

I N T R O D U C T I O N

A. RATIONALE

It appears reasonable to present a background statement which describes the environment at project site.

The information for such a statement has been extracted mainly from three documents -- the AARP-PP (660-091), the Cooperative Agreement/Grant No. AFR-0091-A-00-5034-00, and the Etude de la Reorganisation du Système National de Recherche Agronomique du Zaire, usually identified as the ISNAR report.

The following paragraphs describe the status of agricultural research on or about the time of the signing of the PP in September 1983 by Arthur F. Lezin, Acting Director USAID/Zaire. There is uncertainty as to the date on which operations of the project officially began, because the Cooperative Agreement between USAID and the International Institute of Tropical Agriculture (IITA) was not ratified until July 1985, almost two years later. This information is contained in a letter from Wesley Hawley in the USAID office of Contract Management to Heinz Gasser of IITA. However, the status of agricultural research in Zaire in 1983 and 1985 is almost identical; (see AARP-PP 1983 and ISNAR report 1985). Therefore, the information which follows can be used as the initial point - be it 1983 or 1985 - for evaluating the rate of implementation as published in Annex N, Implementation Plan of PP, but with modifications made for the actual start up date.

L'Institut National pour l'Etude Agronomique du Congo Belge (INEAC) conducted agricultural research in Zaire prior to the country's independence. After independence the facilities of INEAC were ceded to the Zairian Institut National pour l'Etude et la Recherche Agronomique (INERA) under the Department of Agriculture (DOA). The output of agricultural research from INERA deteriorated to the extent that the Government of Zaire (GOZ) implemented separate research programs in the DOA on important local crops and on fertilizers. INERA has continued more recently to function in the Department of Science and Research Technology (DSR). The programs under DOA are:

- (1) Programme National Manioc (PRONAM)
- (2) Programme National Légumineuses (PNL)
- (3) Programme National Mais (PNM)
- (4) Programme National Riz (PNR)
- (5) Programme National Engrais (PNE)

USAID gave assistance to PRONAM and PNL in the past; and AARP was designed to support PRONAM, PNL and PNM under a central coordinating unit. This unit is Recherche Agronomique Appliquée et Vulgarisation (RAV).

Organogram, figure I entitled "The Position of RAV in the Administration Structure of GOZ" is for easy reference.

B. PURPOSE OF EVALUATION

The Evaluation Team has been given the responsibility by USAID (see USAID-Purdue Contract) of:

- (1) assessing the project progress viz-a-viz project objectives as identified in the PP.
- (2) determining if the project is on track, and
- (3) making recommendations for the necessary revisions of the project paper.

A component of this responsibility is that the maize agronomist of the Evaluation Team visit centers concentrating on maize research and examine ALL issues concerning maize research. The information gained from these visits and examinations will allow the evaluator to make the judgements required by (1), (2) and (3) above.

The responsibility of assessing and evaluating presupposes that there are standards and guidelines of measurement. In the case of a project, the determinations are made by using as guidelines the goals, the purposes, the objectives and the inputs of the PP. Also, consideration has to be given to relevant statements made in the cooperative agreement.

The Project Goal

The project goal is identically stated in Annex C item 2 of PP, and on page 7, Attachment 2 Program Description of the Cooperative Agreement as:

"The goal of the project is to increase the marginal labor productivity of small farmers"

There is also a statement on page 9 of the attachment which reads:

"Project Goal

The organizational structure, the trained manpower, and the physical facilities of the project will be developed and maintained so as to allow the country to benefit from adequate and viable institutions capable of carrying out applied and adaptive agricultural research and outreach liaison activities at the end of the project, without resorting to major outside assistance."

This is obviously a statement of a long range goal of institution building, of which AARP is an initial step.

The Project Purpose

The purpose given both on the cover page and on page 9 of the PP in 1983 reads:

"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."

The Project Objectives

The Consultant maize agronomist must be guided by the objectives stated in the PP for research in maize agronomy, maize breeding, plant protection, farming systems, extension; and the degree of project progress or otherwise will be judged in relation as AARP has followed objectives which are briefly outlined below:

An adequate PNM main research station for maize will be built at Kaniamesh: with funds from the AARP budget. AARP will assist the existing PNM by infusion of staff, supplies and training in its research activities. The activities described in the project paper are (1) breeding of maize varieties resistant to prevailing insects and pathogens (2) research into the control of such insects and pathogens (3) multilocational agronomic studies on cultivar x soil x fertilizer trails (4) cooperation with national and private voluntary organizations (PVOs) and (5) an overall Farming Systems Research (FSR) approach where the peasant farmer is the ultimate beneficiary. Also on one hand the Evaluation Team will ascertain whether GOZ has initiated and kept the covenants promised in PP, VII: COVENANTS; and on the other, whether USAID has been properly monitoring the project according to V: MONITORING PLAN, pages 51 and 26 respectively of the PP.

II. I M P L E M E N T A T I O N

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II

PROJECT IMPLEMENTATION

This chapter is the summary narrative of each interview held or visit made during the evaluation period, and each follows the same format except where it was obviously impossible to do so. The regular format is:

- a) The name of person/s interviewed and the association with RAV
- b) Previous research programs in RAV
- c) Research programs in progress
- d) Research programs planned for the future
- e) Construction
- f) Training
- g) Interdisciplinary research
- h) Documents submitted and reviewed

In addition to the documents submitted by the participants in the discussions, the following were reviewed.

- 1) Programme National Maïs 8eme Rapport, 1980
- 2) Programme National Mais 11eme Rapport, 1983
- 3) \Programme National Mais 12eme Rapport, 1984
- 4) 'Report of the U.S. President Agricultural Task Force to Zaire, 1985
- 5) Solving the Problems of Maize Streak Virus: ITTA, 1986

A. BREEDING PROGRAM

- a) 1) Dr. Mulamba Ngandu Nyindu ... Ph.D. (Iowa St.).
Member PNM, Dr. Mulamba is the Director PNM. Joined RAV/PNM 1985.
- 2) Dr. Kenric Johnson ... Ph.D., (North Dakota).
Member of IITA. Joined IITA/RAV/PNM November 1985. Dr. Johnson is
the IITA Advisor to Dr. Mulamba.

Dr. Mulamba presented the section on previous work, which was essentially a report on the results of the 1985-1986 breeding experiments; Dr. Johnson followed with the program for 1986-1987; and both of them expressed views about the future direction of maize breeding in PNM.

b) PREVIOUS RESEARCH PROGRAMS

Work on the breeding program based predominantly on yield increases and adaptability to predefined climatic zones has continued. Thus, trials were located in different provinces:

Kaniameshi	:	South Shaba, South East Zaire
Kaniama	:	North Shaba, South East Zaire
Gandajika	:	Kasai Oriental, Central Zaire
M'Vuazi	:	Bas-Zaire, East Zaire
Kiyaka	:	Bandundu, South Central Zaire

Sites were selected to cover rainfall zones and degrees of elevation, continuing a multilocational system of trials which was operative for a long time. The details of the several experiments were given in which it was indicated that there were:

1. Cooperative trials with international organizations - CIMMYT and IITA.
2. Trials with commercial hybrids.
3. National cultivar trials - PNMVT.
4. Cooperative experiments with national organizations.
5. Other cultivar trials; including tests for streak tolerance or resistance, and for early bearing cultivars to be used in intercropping, or second season crops.

Some of the dominant observations repeated in most of the experiments are that:

1. CIMMYT standardized procedures are used.
2. Cooperation with IITA continued especially with streak and downy mildew tolerant IITA cultivars.

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3. SHABA I, KASAI I and SALONGO II are the overall open-pollinated yielders including international entrants.

- (i) SHABA I in South Shaba
- (ii) KASAI I in Western Zaire
- (iii) SALONGO II in Kasai

4. The SR-32 hybrid often does as well as the best open-pollinated cultivars.

5. BABUNGA-83 TZMSR-W yielded well and showed streak tolerance.

6. There is preference for white cultivars throughout Zaire except in Bandundu province where yellow is preferred.

c) RESEARCH PROGRAMS IN PROGRESS

Preparations are being made for the crop season which begins in early to mid September. At the visit to the Kisanga station, workers were busy packaging seeds etc. for the field.

d) RESEARCH PROGRAMS PLANNED FOR THE FUTURE

This section of the breeders' program was presented by Dr. Johnson. In the 1986-1987 program, Mulamba and Johnson have grouped their trials as follows:

1. Cooperative trials with international organizations
 - (i) CIMMYT
 - (ii) IITA
2. Trials with commercial hybrids such as Pioneer (South Africa), Dekalb, Pfizer, Dumon-Agro (France) and CREN-K (Zaire).
3. National varietal Maize Trials (PNMVT).
4. Cooperative experiments with national organizations such as
 - Bureau National de Semences (BUNASEM)
 - Société de Développement Industriel et Minier du Zaire (SODIMIZA)
 - Traverses et Bétonnerie du Zaire (TRABEZA)
 - (PRODALU)
 - (CEDECO)
 - Cimenteries du Shaba (CIMSHABA)
5. Other cultivar trials leading to development of a nursery through specific breeding techniques, e.g. back crossing for short term returns, recurrent selection for short to long term returns etc. This research will also include study on comparative methods of selection, and the evaluation of hybrid strength; and resulting good cultivars will be the nucleus of a collection of germplasm for future use.

As in previous years, cultivar trials will be multilocational, and will include sites where national organizations have stations e.g. BUNASEM's Pindi station in Bandundu. Objectives will continue to be yield increase, and resistance to streak and mildew, in cooperation with the entomologist and pathologist. Also there will be, additional experiments in cooperation with the agronomist, on cultivar and soil fertility interactions.

During the visit to the station at Kisanga, the two breeders showed a laboratory where germination tests were being done, and seeds were being prepared for distribution to various sites for upcoming trials. SHABA I was the preferred cultivar.

Dr. Johnson circulated a mimeographed paper, which dealt with future programs for maize breeding. The paper entitled "Programme National Maïs - An Analysis of Present Research and Recommendations for Future Growth" second edition by Kenric Johnson, was dated in Lubumbashi August 1986. The document is a thoughtful review of previous annual reports and discussions with personnel involved with the PNM. Dr. Johnson stated objectives for the breeding program in PNM, and went into detail on how these objectives can be met. He presented data on the past history of germplasm used by PNM -- germplasm from INERA, CIMMYT, PNM and IITA -- and then he proceeded to discuss methodology, varietal selection strategy, and suitable sites for trials in different agro-climatic zones in Zaire. He explained the need for, and ways in which there could be interdisciplinary programs with other agricultural scientists. Using the knowledge gained from the review, Johnson made recommendations for the future direction of maize breeding in Zaire. He even gave some suggestions for training and support facilities. RAV supplied the Evaluation Team with a paper prepared by Dr. Mulamba entitled "Programme National Maïs - Programme d'Action Quinquennale, 03/06/1985. This paper also discusses maize breeding with consideration given to interdisciplinary research training and seed production. Both papers are of a later date, and therefore more applicable than the 1975 pamphlet entitled "Zaire's Strategy for Maize Research and Production" requested by the Government from an advisory panel of CIMMYT members. Also, both studies are well-thought out, well-presented analyses and are worthy of careful consideration by RAV/PNM.

e) CONSTRUCTION

Included in the plans for the Kaniameshi station are adequate facilities for breeding, inclusive of storage with temperature and humidity control.

f) TRAINING

The breeders teach Zairian technicians. Thus on-the-job training is taking place within the breeding component of PNM; but for overall training, have been referred to David Miller, Training and Research Officer.

g) INTERDISCIPLINARY RESEARCH

The two breeders are working collaboratively apparently well; but there have been conflicts at the administrative and managerial levels between the PNM Director and the IITA consultant. The matter is discussed in chapter III,

Evaluation. In addition an interdisciplinary team approach with the entomologist, the pathologist, and the agronomist has been initiated with emphasis on the control of streak and mildew.

There is an experiment on cassava at the Kaniameshi station which indicates some degree of cooperation between PNM and PRONAM, and in the future PNL may also have trials at Kaniameshi. PNM is committed to work collaboratively with PNL and PRONAM, but no well defined system of cooperation is yet described.

The distribution of foundation seed is properly handled under SEED PRODUCTION.

g) DOCUMENTS REVIEWED

The documents reviewed are:

1. Report for 1985-1986, Amélioration et Selection.
2. Programme 1986-1987, Selection Amélioration et Selection.
3. Programme National Maïs : Programme d'Action Quinquennale, 1985
4. Programme National Mais: An Analysis of Present Research and Recommendations for Future Growth.
5. Report of African Maize Program, IITA, 1986.
6. Zaire Project (091) Team Members Meeting with IITA Maize Scientists at IITA, Ibadan, 1985.
7. Constraints on Maize Production in Zaire.
8. Programme National Mais: Five Year Maize-Testing Proposal to South Shaba Project (I.P.A.D. - BUNASEM) presented by John Pelissier (World Bank).
9. Perspective d'une Industrie de Sémences au Zaïre: Cas de Maïs, 1985.

B: SEED PRODUCTION PROGRAM

a) Dr. MulambaPNM Director

b) There are two self-explanatory documents supplied under this heading. The one entitled "Agencies Cooperating with PNM" lists 17 agencies in the public and private sector with which PNM cooperates. The second one "PNM-Seed Production During the Last Three Years" will allow an estimate of the number of farmers who can be served with quality seed derived from foundation seed of PNM.

TABLE I

AGENCIES COOPERATING WITH P.N.M.

1. SHABA:

- a) P.N.E. : National Fertilizer Program
- b) Projet Lubudi : Seed production and extension
- c) Projet Nord Shaba : Seed production and extension
- d) Centre d'Etude des Problèmes Communautaires (CEPC) : Extension
- e) Domaine Pilote de Kaniama-Kasese : Seed production, maize production and extension
- f) SHALAMO (Shamba la Umoja) : Extension headed by a catholic priest
- g) BUNASEM : Seed production at SODIMIZA and TRABEZA
- h) TABAZAIRE : Tobacco and maize production

2. KASAI-ORIENTAL:

- a) PMKO (Projet Mais au Kasai-Oriental) : Extension
- b) BUNASEM : Seed production at Mpoy
- c) TABAZAIRE : Tobacco and maize production

3. KASAI-OCCIDENTAL:

- a) PRODALU : Extension and seed production
- b) CEDERIM - MWEKA : Extension and seed Production

4. BANDUNDU:

- a) Projet FESHI : Extension

5. BAS-ZAIRE:

- a) Projet Maraicher de Mbanza-Ngungu : Extension
- b) Compagnie Jules Van Lancker : Maize production
- c) PAPEK : Maize production

TABLE II

P.N.M. - SEED PRODUCTION DURING THE LAST 3 YEARS

	<u>Foundation Seed</u>		<u>Commercial Seed</u>	
	<u>Variety</u>	<u>Quantity</u>	<u>Variety</u>	<u>Quantity</u>
1984:	Shaba-1	760 Kg	Shaba-1	3,875 Kg
	PNM-1	-	PNM-1	450 Kg
	Kasai-1	1,300 Kg	Kasa-1	1,549 Kg
	Salongo-2	250 Kg	Salongo-2	500 Kg
1985:	Shaba-1	2,100 Kg	Shaba-1	21,000 Kg
	Kasai-1	1,150 Kg	Kasai-1	26,000 Kg
	Salongo-2	6,950 Kg	Salongo-2	5,000 Kg
1986:	Shaba-1	4,800 Kg	Shaba-1	
	Kasai-1	500 Kg	Kasai-1	15,000 Kg
	Salongo-2	90 Kg	Salongo-2	3,600 Kg

* : Seed processing is not yet completed.

C. MAIZE ENTOMOLOGY

a) Dr. Ronald Hennessey ... Ph. D. (California).

Transferred from IITA PRONAM to IITA/RAV/PNM 1985.

b) PREVIOUS RESEARCH PROGRAMS

None, the entomologist has been on site for only 2 months.

c) RESEARCH PROGRAMS IN PROGRESS

1) Streak Control

Maize streak virus (MSV) has been identified as one of the main entomological problems in south east Zaire - - Shaba province. Therefore, although the entomologist only arrived two months prior to this evaluation, he has been asked to implement a program which is directed towards streak control.

The present approach is to put heavy pressure of streak on the maize crop. To do this, he needs to have large populations of the leaf-hopper (vectors) which will transmit the virus. He has built a temporary insectary, has commenced to produce hoppers, and plans to produce 25,000 hoppers per week by November. This is his main interest; and on the visit to Kisanga station he gave a lecture tour of his simple laboratory, and of his experiments. It is expected that next year's production will be 10 times (250,000) as many hoppers per week. This figure is not arbitrary; it is calculated from the planned experimental procedures - (insects/plants/rows/replicates). The streak program also includes a preliminary study on an indigeneous grass which is believed to be an intermediate and off-crop-season host for the virus.

The experimental methods used in the streak control program have been developed by IITA, and published in IITA's submission for the King Badouin Award 1986. It is entitled Solving the Problems of Maize Streak Virus.

2) Assessment of Yield Losses due to Insects

The entomologist is not aware of any accurate survey which has been made of yield losses of maize due to insects in the Shaba region. It came out in the discussion that almost all entomological work done by INEAC or INERA was on export crops. Therefore, in this first year the entomologist made a rapid, spot survey of the corn stem borer (Busseola fusea) after harvest. His present estimate is 7,500 insects per hectare left in the field, after harvesting. This is considered a high population.

a) RESEARCH PROGRAMS PLANNED FOR THE FUTURE

1) Streak Control

The research on breeding of leaf hoppers will be continued. This will progress into transmitting the virus on to the crop, causing heavy disease pressure on the plant, and then determining the degree of

susceptibility to infection as a means of measuring resistance. The results of these studies will be useful to the breeders in their selection of streak tolerant or resistant cultivars.

2) Assessment of Yield Losses due to Insects

The entomologist plans to carry out a large scale ecological study -- survey of the incidences of insect pests of corn in selected areas of the region. "Hearsay" estimates are not acceptable, and in the 1986-1987 crop year, he will carry out an accurate survey of pest infestation - borers, termites, mites, etc.

The results of this survey will allow the entomologist to determine the priorities for future entomological research. The method of collecting data in the survey is based on FAO guidelines which have been used at IITA.

3) Prevention of Spread of *Protephanus truncatus*

This insect which attacks maize and also cassava is known to be spreading in some neighboring African countries, Tanzania for example. The entomologist will introduce methods to prevent the entry and spread of *Protephanus* in Zaire.

e) CONSTRUCTION

Plans have been submitted through the Director of PNM, and the Co-ordinator of RAV to USAID for the construction of an insectary at Kaniameshi. This will probably be the largest insectary in Africa.

f) TRAINING

The entomologist does on-the-job training of two Zairian technicians.

g) INTERDISCIPLINARY RESEARCH

The entomologist and breeders are working collaboratively in search of cultivars which are tolerant or resistant to streak.

He will plan to work with pathologists and economists in his surveys of plant infestations by insects; but for his first year, 1986-1987 survey, he advocates that he should work alone. Although the guidelines for survey are described by FAO, he believes that there are refinements to be made before beginning a co-operative program with other scientists, but he will keep them informed of his survey.

In the statement on future work, he indicated that he has a reasoned preference for biological control over chemical control of insects in Zaire.

h) DOCUMENTS REVIEWED

One document in French and English was submitted by Dr. Hennessey. It is entitled Section de l'Entomologie, Programme de Recherche 1986-1987.

D. MAIZE PATHOLOGY

a) Citoyen Kasongo Kapompo B.S. (Zaire) and CIMMYT.
Transferred from PNM to PNM/RAV 1986.

b) PREVIOUS RESEARCH

None. Kasongo has just returned from a short course at IITA, and will do his first research experiments during 1986-1987 growing season.

c) RESEARCH PROGRAMS IN PROGRESS

None. The pathologist has just received locally bought material including a microscope; and he will begin to set up a laboratory shortly.

d) RESEARCH PROGRAMS PLANNED

The pathologist presented a plan of work for the 1986-1987 crop year. The experiments have been designed cooperatively with the scientists in the PNM breeding unit. Thus, he will study resistance of maize to streak and mildew at selected locations in the country using inoculation techniques, which he recently learned at IITA. These series of experiments will also monitor the effects of planting dates, and fertilizer levels on streak. There will be entrants from PNM and IITA, and the trials should verify that certain cultivars, tested in 1985-86, showed signs of resistance.

Kasongo also plans to make a survey of maize during the growing season, to determine what the principal pathogenic diseases of corn are in the areas where PNM operates.

Kasongo will use his recently acquired microscope to study fungi in maize.

Dr. Johnson helped Cit. Kasongo to prepare the latter's plan of work which shows signs of developing into a research program. Also, Johnson's assistance was obvious in the way the orders were made for laboratory equipment. The order showed catalogues, numbers, prices etc., and is an example of in-service training in the management for research.

e) CONSTRUCTION

The pathologist is stationed at the INERA Station in Kaniama. He has a room in the main administration building, which will be converted into a laboratory-office in 1986-1987.

f) TRAINING

Cit. Kasongo returned from a training course at IITA in August, 1986.

g) INTERDISCIPLINARY RESEARCH

The pathologist is conducting joint experiments with the breeding entomology, and agronomy units.

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h) DOCUMENTS REVIEWED

Citoyen Kasongo's contribution was Section de Pathologie, Plan d'Action 1986-1987, with appendices on the operating costs for trials, and an estimate of the minimum and maximum amount required to equip a pathology laboratory.

E. AGRONOMY PROGRAM

a) Citoyen Bakelana - ba - Kufimfutu B.S. (Zaire), M.S. (Kansas State). Transferred from PNM to RAV/PNM - 1985,

The agronomist, Cit. Bakelana is stationed at Gandajika. His report was presented at Lubumbashi by Dr. Mulamba on Friday 08/22/1986, in order to give Dr. Sanders the opportunity to discuss the program. Dr. Sanders' schedule did not allow him to meet with the agronomist. However, the program was discussed in more detail in Gandajika by the agronomist on 08/24/1986.

b) PREVIOUS RESEARCH PROGRAMS

The 1985 - 1986 program was essentially a continuation of on-going trials from years past, with minimum variations, suggested by results from previous years. Examples of the experiments reported for 1985-1986 are:

1. NPK trials with increased level of K suggested from 1984/1985 results
2. Dates of Planting
3. Study of residual effects of fertilizer
4. Special high-level fertilizer treatment for certain areas of Bas-Zaire
5. Herbicide trials
6. Cultivar trials for testing resistance to streak and mildew
7. Foundation seed production.

The results presented by the Agronomist for his 1985-1986 experiments allow this Evaluator to record some general observations.

- 1) The agronomist produced a little under 10,000 kg of foundation seed - 2,100 of SHABA-I, 6,950 of SALONGA-II and 1,150 of Kasai I
- 2) An experiment on dates of planting indicated that the best time for seeding in the M'Vuazi region is from mid-October to mid-November.
- 3) There are inconclusive but to-be-continued studies on the effectiveness of the herbicides Primagram 500 and Gesaprim, on mixed cropping of corn and legumes, on defoliations, and on lime.
- 4) Cultivar trials are usually treated with 64-46-0 or 60-40-0 fertilizer without any confirmatory soil test.
- 5) There are several NPK trials. One of the results is that phosphorous gives the greatest yield increase in some regions. Another is that potassium may be the limiting factor in some soils.
- 6) Experiments were conducted at four stations - M'Vuazi, Gandajika, Kaniama, Kaniameshi.

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c) RESEARCH PROGRAMS IN PROGRESS

Preparations are being made for the 1986 - 1987 crop year.

d) RESEARCH PROGRAMS PLANNED FOR THE FUTURE

This is a list of experiments planned for 1986. Clear descriptions of procedures to be used in each experiment were given.

1. NPK trials with increased high doses of K
2. Times of application of fertilizer
3. Herbicide trials (not for peasant farmer extension but for medium to large farm utilization)
4. Application of lime (suggested from results of experiments 1985 - 1986)
5. Dates of planting
6. Types of labor
7. Mixed cropping - corn, manioc and a variety of legumes
8. Effect of defoliation on corn
9. Effect of burning.

Trials will always include as check samples, those cultivars which are known to be adapted to the region;

I pointed out to the agronomist that he had presented a series of individual experiments and not a program of work with specific agronomic objectives. Before I left Gandajika, the agronomist in association with the PNM Director prepared a program for agronomy which is acceptable with certain modifications. All the studies are applied investigations which will support increased agricultural production in Zaire.

There are eight sections proposed by the agronomist, and the section can be developed into a clearly defined program with specific objectives for which experiments can be designed. The objectives will be

1. Constant monitoring of fertilizer recommendations used by peasant farmers with a view to advising them on changes for the better. There is a package of recommendations given by PNM and PNE, but fertilizer applications recommended are identical for all ecological zones, and there is need for change.
2. Seeking to define appropriate cropping systems --- multiple cropping, planting dates, etc --- for different agro-climatic zones of Zaire.
3. Making advance studies on cultivar X fertilizer X fertility trials in areas where maize production is likely to be extended or intensified.

Such a program is operative even if there be a change in research personnel. It will be flexible enough to include some other studies e.g. lime, high K levels and pesticides. However, it indicates the necessity for the services of a soils agronomist with training in fertility.

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e) CONSTRUCTION

There is no large construction envisaged for agronomic work.

f) TRAINING

Cit. Bakelana is scheduled to go to U.S. for training to the Ph.D level soon.

g) INTERDISCIPLINARY RESEARCH

There is cooperation between the agronomist and the breeders in their field research.

h) DOCUMENTS REVIEWED

1. Section Agronomie : Resultats des Essais Agronomiques (Campagne 1985 - 1986)
2. Section Agronomie : Plan d'Action 1986 - 1987
3. Influence de l'azote, du phosphore et du potassium sur la surface foliaire du maïs.
4. RAV PNM Programme de Travail.
5. Guide pour la culture du maïs, au Zaïre.

F. FARMING SYSTEMS RESEARCH AND EXTENSION PROGRAM

(a) Participants in Discussions

Dr. Osiname	IITA/RAV/PRONAM	Cit. Kilumba	RAV/PNL
Dr. Shannon	IITA/RAV/PNL	Dr. Brockman	IITA/RAV
Dr. Johnson	IITA/RAV/PNM	Dr. Bartlett	IITA/RAV
Dr. Hennesey	IITA/RAV/PNM	Cit. Mota	RAV
Dr. Malumba	RAV/PNM	Cit. Luzola	DOA
Cit. Bakelana	RAV/PNM	Dr. Efrom	IITA
Cit. Kanku	RAV/PNM	Dr. Sanders	Project Evaluator
Cit. Kanku	RAV/PNM	Dr. Erickson	Project Evaluator
Cit. Kasongo	RAV/PNM		

(b) The Evaluation Team is required to ascertain whether any attempt is being made to establish the FSR approach, and to make recommendations concerning FSR.

Drs. Sanders, Johnson, Hennesey, Mulamba and I spent many hours discussing the topic "Farming System Research" in an effort to determine if the food crops research program of RAV, particularly the PNM component, is using the FSR approach.

Also, the topic was discussed at length with the following RAV members during my visit to Gandajika, Kaniama and Kaniama-Kasese: Drs. Shannon, and Cit. Kilumba (PNL); Dr. Mulamba, Cit. Bakelana and Cit. Kasongo (PNM). Dr. Homer Erickson of the Evaluation Team took part in at least one of the lengthy discussions. There were brief interviews with others who are listed in the previous section a).

Three issues have been identified.

1. A definition of FSR which is acceptable to by all the parties who will work in FSR.
2. The position of the FSR advisor/s in the research organization of PNM.
3. The recognition that extension work formerly done by PNM parallels FSR. (PNM claims its extension work is identical with FSR).

THE DEFINITION

The Director of PNM interprets FSR as being very similar, almost identical with extension as PNM practised extension, in the past. He also stated that he has received different definitions of FSR from the IITA socio-economists. He named Dr. Christopher Bartlett, Dr. Wolfgang Vogel and another IITA economist as supplying non-identical descriptions of what the FSR approach is. Although he claims that Sanders' definition is clearer and he appreciates the methodology which Sanders describes, I am not quite sure he accepts it fully. Therefore, I have asked the Director of PNM to supply a copy of his definition, so that Sanders will have a written statement.

2. THE POSITION

The agreement on the definition becomes important, when an attempt is made to place the IITA-FSR advisors to RAV in the hierarchy of PNM. I am speaking of the advisor, not the FSR interdisciplinary team. The advisor may be seen by PNM as a socio-economist with a section of his own in the PNM organization, or he may be seen as an aid to the agronomist and there may be other possibilities; but PNM wants the FSR advisor to work with (under) the agronomist. This is a distinct and burning issue which the Evaluation Team must face.

3) THE RECOGNITION

PNM has done extension work in the past, and is continuing its extension through co-operation with private agencies. In the past PNM studied and published data on land preparation, suitable cultivars of maize, and fertilizer applications to the crop. The information was distributed to farmers, but ceased because of lack of funding. At the present, these extension activities are handled through agencies set up by the GOZ, e.g. PNE and BUNASEM, or by private companies, e.g. GECAMINES. The change has been brought about as a result of decisions taken by GOZ.

PNM asserts that it has completed the FSR cycle in its work on "Ridges used by Farmers". PNM went to the field and examined this practice commonly used by peasant farmers in Zaire. Researchers of PNM tested the system at the research station and found no economic gains from ridges. However, the researchers were able, as a result of this study, to advise farmers on spacings that would improve yield. The PNM want credit for its Extension/Farming System work. PNM is not using the FSR approach directly. It is doing extension through cooperating agencies, which was indicated under II.B SEED PRODUCTION PROGRAM.

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Several organograms were suggested as the means by which the FSR approach may work satisfactorily in RAV. None of them agrees with FSR organization described in the PP, but it is general knowledge that this earlier model is to be modified. Two of the suggested organograms will be presented in the next chapter on Evaluation in the sub-section FARMING SYSTEMS RESEARCH AND EXTENSION PROGRAM, III.K.

G. LIBRARIES

Dr. Mulamba
Dr. Johnson
Dr. Shannon RAV/PNL at Gandajika
Cit. Mulamba M'Comba INERA Gandajika

The libraries at Kaniameshi and Gandajika were inspected. Each is a single room with some shelves. The materials in the libraries are very old, and very poorly maintained. From looking at the periodicals, it is clear that prior to 1972 these facilities were satisfactory reading rooms.

There is extreme need to improve the library facilities.

Here are two useful bits of data collected during the interview with Cit. Mulamba M'Comba, Director of the INERA station at Gandajika.

1. When an external fund for library support ceased, the GOZ did not supply any more scientific literature to the research center. Unless funds are donated by some external funding agency, he does not believe that the library facilities will be improved. Some funds were made available by an unidentified agency in 1985, and some books were bought. I estimate that the new books displayed on the shelves could all be bought for less than US\$250.00.

2. I examined the library record on borrowing at Gandajika. Unfortunately I did not make an accurate count of entries, but it was very clear that the borrowing of books was high until about 1976, then it fell off rapidly until 1984. It picked up in 1985 and is again high in 1986. The explanation given by the INERA Director, is that there were very few employees in the interim but with the present RAV project, there are more scientific workers on the station, who make use of the library facilities.

H. TRAINING

a) Dr. Mulamba

PNM directs me to discuss the basic points about training with David Miller, Training and Outreach Officer in the central coordination office, RAV in Kinshasa. However, I read David Miller's Plan for Short Term Training, Jan. 1986 and I collected the following information.

Long Term Training

1. Azanzi M'Bey Yames on long-term training for Ph.D. in entomology
2. Koko N'Zenza is on long term training for an M.S. in soil fertility.

3. Bakelana-ba-Kifimfutu is expected to go to the U.S. for training to the Ph.D. level.
4. Tubajika Kayimbi is on long term training to M.S. in phytopothology.
5. M'Buyi at IITA - Maize Production
6. Tchibanda Kashidi at IITA - Maize Production
7. Majambu Banga Banga at IITA - Maize Production
8. Bakelana at IITA
9. Kassongo Ngindu at IITA - Phytopathology

A comparison which has been made by members of PNM who are eligible for advanced training in the U.S. is that under the IITA programs trainees take their families to U.S. USAID policy does not allow such support. A list of PNM participants trained by CIMMYT was submitted and reviewed.

I. ANNUAL EVALUATION AND PLANNING MEETING of RAV/PNM

Dr. Mulamba
Dr. Johnson
Dr. Hennesey

The first Annual Evaluation Meeting of RAV/PNM was held on the fifth and sixth of August at Lubumbashi. Present at the meeting were representatives from:

1. USAID
2. RAV Coordination
3. Regional Department of Agriculture
4. PNE: Project National Engrais, the National Fertilizer Project
5. PNS: Project North Shaba
6. GECAMINES: Générale des Carrières et des Mines (General Company of Quarries and Mines). GECAMINES has an agricultural division for producing commercial seed and food for its employees.

Each researcher in RAV/PNM reported on his work for 1985/1986, and presented his program of work for 1986/1987. Questions were asked, responses and explanations were given, and apparently there were suggestions for modifications of trials to be done in 1986/1987. After the meeting, accepted changes were made to the plans of work.

Copies of the 1985-1986 annual reports, and 1986-1987 work plans were submitted by the Director of PNM to the RAV Coordinator. It is believed that copies were sent to GOZ and USAID Kinshasa

J. COVENANTS AND MONITORING OF PROJECT

- a) 1) David Attembery USAID/PNM Project Manager
- 2) Frank Brockman RAV Coordination

There are six special covenants which GOZ has promised to honor. They are explained under VII: COVENANTS, page 55 of the PP. Covenants effect the total program so that the information gathered at these interviews does not only influence progress of PNM, but touches all three national programs. GOZ has promised by covenant to:

- 1: Establish an Interim Agricultural Research Policy Commission composed of ministerial level members.

GOZ has established the commission, which is called Groupe d'Etude de la Reorganization du Système National de Recherche Agronomique. This commission formed an active and integral part of the ISNAR study group, and recommended the formation of an agency on national seed policy.

- 2: Authorize the inclusion of the following national programs -- PRONAM, PNM, PNL and PNR into the DOA.

PNR is not a member of RAV. GOZ did not complete the transfer of PNL into DOA until late last year, so that PNL remained underfunded for some time.

- 3: Negotiate a definite agreement for vesting of certain INERA properties and holdings in RAV.

These negotiations have not been fully accomplished. RAV acting on behalf of GOZ has had general agreements made with INERA; but final arrangements with each individual station are incomplete. So, PNM is unable to satisfy some of its commitments because of lack of facilities. There is only one house at Kaniama and one room in the main administration building of the INERA station available to PNM. At the same time there are three PNM staff members, the pathologist and two agronomes, to be housed. There is no electricity. INERA shares its land, storage and drying facilities with PNM.

4. Place line items in the local budget for the support of certain RAV activities

This has been done but GOZ allocations are very small in comparison to the total budget of RAV. See table III below.

TABLE III

FUND ALLOCATION TO RAV IN LOCAL CURRENCY
(Z. 1,000,000)

	1985	1986
Counterpart funds	18.3	16.7
GOZ	0.0	1.0
Other Receipts	1.5	Not yet calculated

5. Staff the project with no less 66 A-3 or higher personnel.

The coordinator of RAV stated that there are already 81 agronomes classified A-1, on the project. This number is higher than that promised by covenant, and the candidates are of a higher quality. He predicts that the number will reach 93 in 1986/1987.

It should also be recorded that it has been said that RAV is finding it difficult to recruit and retain well-qualified staff because the emoluments are lower than in the private sector. This is particularly true of university graduates.

6. Establish an evaluation program to monitor the progress of the project.

There are meetings between GOZ and AID, at which project progress is discussed.

K. FIELD TRIPS

1. NOTE ON VISIT TO LUBUMBASHI MARKET

The Observations

P = price per kilo

a) BEANS/PEAS

All the beans are from Shaba - one case approximately 11 kilometers South Lubumbashi, others north.

SAMPLE 1 : Ordinary bean (Phaeseolus vulgaris) common red bean, medium sized grain elongate, 1 -1.5 cm. (Jamaica red, typical U.S. red) with less than 5% insect damage.
P = 40%. Seasonal range 40% to 80%.

SAMPLE 2 : Mixed multicolored Phaeseolus, 0.5 cm semi-round --prominent red, yellow, white - some black, striped, less than 5% insect damage.
P = 75 %

SAMPLE 3 : Mixed multicored Phaeseolus, elongate but predominantly red with less than 5% insect damage.
P = 45 %

SAMPLE 4 : Mixture of 5/6 varieties cowpea. Very clean. Less than 10% insect damage.
P = 35 %

SAMPLE 5 : A white bean exactly like a cowpea but totally white, with no black eye. It is a white eye. Less than 10% insect damage.
Soya?
P = 60%

b) PEANUTS

SAMPLE 1 : Red aril, predominatly large peanut with 1 to 1.5 cm, elongated grain. Dr. Mulamba identified as JAVA, a local variety low in oil content. Less than 10% insect damage.
P = 65 %

SAMPLE 2 : A small rounded uniform variety with very little variation in size, 0.5 cm with red aril. Identified by Dr. Mulamba as variety A/65 (Valencia) with high oil content. Less than 10% insect damage.
P = 40 %

SAMPLE 3 : Similar to 2 but with whitish yellow skins. INERA A/43. Less than 10% insect damage.
P = 43 %

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c) GRAINS / FLOUR

SAMPLE 1 : Rice, short broken grain
P = 40 Z

SAMPLE 2 : Rice, clean long grain
P = 80 Z

SAMPLE 3 : Corn flour from Zambia 50 kg. sold for 570Z.
Variation on the spot 700 Z to 500 Z.

The government agent in the market advised that
50kg of flour in Zambia = 350 Z
Transportation average = 50 Z

SAMPLE 4 : Local corn flour (not identified) will sell for
650 -700 Z

2. NOTE ON VISIT TO GANDAJIKA MARKET

The Observations

Produce was from Kasai.

P = price per kilo.

a) BEANS / PEAS

SAMPLE 1 : Cowpeas (Vigna unguiculata) regular size, mixed colors,
predominantly red with no single-color sample. Relatively
clean, less than 5% insect damage. It is reported that these
peas were recently harvested, but infestation will increase in
a month's time.

P = 35 to 45 Z

SAMPLE 2 : Mung Bean, greenish-grey, slate colored. Very clean bean, less
than 5% insect damage.

P = 20 Z

SAMPLE 3 : Soya Bean. Egg white. Little insect infection, less than 5%
damage.

P = 40 Z

SAMPLE 4 : Soya Bean Meal (Flour)

P = 200 Z

*There were several vendors selling the same types in the market place.
Phaseolus was the predominant legume.

b) PEANUTS

SAMPLE 1 : The only peanuts were the small rounded INERA variety A/65.
There were no local varieties. Unshelled
P = 22 Z

SAMPLE 2 : Same as above, but shelled.
P = 150 Z

SAMPLE 3 : Peanut oil
P = 65 Z/Litre

c) GRAINS/FLOUR

SAMPLE 1 : Local Variety of maize, heavily insect infested, greater than
50%.
P = 15 Z

SAMPLE 2 : Mixed Salonga II and local maize, approximately same level of
insect infestation as sample 1, just about 50%
P = 15 Z

SAMPLE 3 : Salonga II pure. There is less infestation, approximately 25%
P = 16 Z

*The maize in Lubumbashi was very clean.

SAMPLE 4 : Maize flour
P = 25%

d) MELON SEEDS

Several different melon seeds were on sale. They were relatively free of
insects. Looked like zero infestation.

P = 50 Z

In August there was a lot of cassava in the market at Gandajika but
little corn. The reverse is true at Lubumbashi. There were a lot of cowpeas
at Gandajika but little common bean. The reverse was true at Lubumbashi.

3. NOTE ON A VISIT TO THE KISANGA RESEARCH STATION

Dr. Mulamba
Dr. Johnson
Dr. Hennessey
Dr. Sanders
Mr. Atterbery

Kisanga is a agricultural research station approximately 13 kilometers from Lubumbashi previously operated by INEAC and more recently by INERA. PNM has carried out research side by side with INERA at Kisanga. Kisanga station has recently been attached to the office of the President of Zaire, and future agronomic work by PNM will be changed to recently acquired Kaniameshi research station.

Sanders, Atterbery, Johnson and I visited the station. The soil is a heavily weathered red soil identified as an OXISOL. It is difficult to work but we were advised it produced acceptable yields of corn. Shaba-I corn is the preferred variety of the region. One field had been ploughed in preparation for the growing season which begins in late september. Animal traction on this soil would reduce labor and increase yields but introduction of farm animals for tractor was not likely to be a successful addition. I was informed that the indigenous tribes of this region of Zaire had not developed skills as animal husbandrymen. Introduction of animals for traction will therefore contrary to tradition.

There were several buildings on the station. We toured the storeroom, the pathologists' simple laboratory and the main office complex which included the seed preparation laboratory and library.

All buildings are in poor shape. The storeroom, although in great need of repair, was still being used. Workers in the seed laboratory were preparing Shaba-I seeds for their 1986-1984 trials; and they were also conducting an experiment on germination of maize.

Examination of the books in the library showed that no new literature had been received since the mid-seventies. The library is properly described as dusty untidy and neglected.

Ron Hennessey showed us his simple laboratory and his experiments on rearing leaf hoppers which will be used in experiments on control of streak virus in maize. There is more detail of his research work in the section on maize pathology

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4. NOTE ON A VISIT TO THE KANIAMESHI RESEARCH STATION

DR. MULAMBA
DR. JOHNSON
DR. SANDERS
MR. ATTERBERY

Kaniameshi is about 30 km from Lubumbashi and less than 5 km from Kipushi, a modern mining town with available running water and electricity.

The Kaniameshi farm is described in section C of Annex M1 of the PP. The old buildings are to be rehabilitated and plans have already been drawn and approved for the work. Kaniameshi is not a good soil site for an agricultural research farm, and the decision to select Kaniameshi as a research farm could not have been particularly influenced by the nature of the soil. The PP states that of the total area of 200 hectares, 40 are gravelly loams, 100 are dominated by termite hills and approximately 30 have been described as of good physical structure. This is not a very suitable site for an agronomy research farm.

5) NOTE ON A VISIT TO GANDAJIKA, KANIAMA AND KANIAMA-KASESE

There is an INERA Station at Gandajika and PNM uses some of its facilities. The facilities are in poor shape. There is a note elsewhere in this report on the Gandajika INERA library II. G., and also one on a visit to the Gandajika market II. K. 2). There were no maize experiments in the field.

A team including Drs. Mulamba, Johnson, Cit. Bakelana and I visited some farmers in their fields. There were some young farmers. They were aware of the extension recommendations of PNM, and they use fertilizers when they can afford. At the present time, they were not using fertilizers because the price of corn was too low. In addition when they receive credit from PNE for fertilizer, they were required to repay their debts at an unfavorable time. Payment was demanded immediately after harvest at a time when corn prices were at the lowest level. They would prefer a change in this policy so that they hold their corn until the prices rise. They claimed that they could not afford to buy fertilizers, in 1985 and they wished to see corn prices go up and fertilizer prices go down. They were aware of the benefits of legumes in the cropping system.

One farming family was headed by an older man. Years ago, he used fertilizers, but he could not afford to purchase "l'engrais" at the present time. He also, is aware of the extension recommendations and he is using the practices recommended by PNM for the 'no fertilizer' cropping system. His yield is approximately half of what it used to be, with fertilizers.

At Kaniama we toured the INERA station. I noted that facilities were also very poor. INERA shared its drying sheds, storage rooms, fields, one house and one room in the administration building with PNM.

The interest at Kaniama - Kasese was the large seed multiplication enterprise operating as Domaine Pilote de Kaniama-Kasese. Operations are almost completely mechanized, but many of the farm machines are not working. Commercial seed is produced from PNM foundation. Fertilizers are used. The NPK concentration is decided by what is available on the market; and this in turn depended on what NPK concentrations are given by international donors. The Director, at Cit. M'Kende had several tons of 17:17:17 in storage. I presume that 17:17:17 will be the preferred fertilizer for the 1986-1987 crop year. The Director also indicated that he has a large clientele of medium sized and large-sized farmers who use the hybrid SR-52, which Domaine Kaniama-Kasese imports.

III. EVALUATION

- A. COMMENCEMENT DATE
- B. FIELD RESEARCH EVALUATION
- C. COOPERATION BETWEEN PNM/PNL AND PRONAM
- D. JOB DESCRIPTIONS
- E. ADMINISTRATIVE RESPONSIBILITIES
- F. COMMUNICATION USAID/RAV/PNM
- G. BREEDING PROGRAM
- H. SEED PRODUCTION PROGRAM
- I. ENTOMOLOGY AND PATHOLOGY - PLANT PROTECTION
- J. AGRONOMY PROGRAM
- K. FARMING SYSTEMS RESEARCH AND EXTENSION PROGRAM
- L. COVENANTS
- M. KANIAMESHI
- N. PERSONNEL AND LIBRARIES

III

EVALUATION

At this time, after having completed an analysis of the separate components of PNM, it is possible to make an assessment of the progress or otherwise of PNM vis-a-vis the objectives of the AAPR-PP. Then, the assessment is followed by recommendations. One way to approach this exercise is to itemize each subject. The other is to give a running commentary, to refer back to the narrative in early chapters and then follow the commentary with recommendations. I shall follow the second method.

PNM has gotten off to a good start.

A. COMMENCEMENT DATE

The first situation of concern is stated in the first chapter and deals with the start-up date of project. There is some misunderstanding as to the commencement date of the project. This has been identified as a matter of concern to IITA Technical Assistants and it should be clarified.

RECOMMENDATION 1: COMMENCEMENT DATE

It is recommended that RAV clarify this point with USAID and then advise its IITA consultants.

B. FIELD RESEARCH EVALUATION

The uncertainty of start-up date has led some IITA members to consider this to be a mid-term evaluation. Two IITA members attached to PNM have expressed dissatisfaction with the arrival of an evaluation team when less than one year's research has been accomplished. They considered August/September as an inopportune time for a maize agronomist to do field evaluations when the growing season does not start until September. It seems to be very important to USAID to evaluate the managerial and institutional development part of the project at an early date. This may be the reason for such an early evaluation. AID should clearly inform RAV that this is the mid-term evaluation called for in the PP. Nevertheless, it remains that evaluations of field research cannot be done at this time.

RECOMMENDATION 2: FIELD RESEARCH EVALUATION

It is recommended that a field research evaluation team including a maize breeder and soil specialist be brought to Zaire during the growing season to examine and make recommendations on the field experiments of PNM.

C. COOPERATION BETWEEN PNM/PNL AND PRONAM IN FIELD RESEARCH

Although it was the off-crop season for maize there was an experiment on manioc (PRONAM) at Kaniameshi, which is the principal maize research (PNM) station. This is a nucleus of cooperation between PNM and PRONAM. It is important to make a recommendation here because it has come out in several conversations that the programs are inclined to continue as they were before. Prior to RAV they were autonomous and instead of being complementary may have been competitive, surely for funds.

RECOMMENDATION 3: COOPERATION BETWEEN PNM/PNL AND PRONAM

It is recommended that there should be closer cooperation in field research between PNM, PNL and PRONAM.

D. JOB DESCRIPTIONS

The PNM breeding unit has done a commendable technical job so far, but there has been a serious problem dealing with management which was identified under maize breeding, chapter II: A. Neither the PNM Director nor IITA Technical Assistant was clear as to what his managerial responsibilities were in the RAV program. This problem can be related all the way back to the fact that the IITA Technical Assistants assigned to PNM never received proper job descriptions from IITA or RAV. Also, the IITA Technical Assistant at PNL Gandajika and one of the IITA PRONAM Technical Assistants made the same complaint. The situation occurs in all three programs.

RECOMMENDATION 4: JOB DESCRIPTIONS

It is recommended that all Zairian and IITA appointees be given precise job descriptions.

E. ADMINISTRATIVE RESPONSIBILITIES

Because of the lack of clearly defined job descriptions and therefore the distribution of administrative duties a serious conflict arose at Lubumbashi. The PNM Director was unwilling to relinquish any authority to an expatriate consultant not only because it appears to be inherent in Zairian society to concentrate power at the top, but also because there was no written document which could be used as a guideline. Similar situations occurred in PNL and PRONAM. The matter was finally addressed by directives in a joint document by DOA/GOZ and RAV/USAID. The document is entitled Definitions du Competence Devolues aux Differents Partenaires Ouvrant au RAV. The essence is the IITA Technical Assistant is classified as Advisor to the PNM Director, but with power to exercise checks and balances on certain actions, such as expenditure. The two administrators at PNM-Lubumbashi have accepted the directives but RAV has failed to clarify all the points of this correspondence to its administrators in PNM.

RECOMMENDATION 5: ADMINISTRATIVE RESPONSIBILITIES

It is recommended that RAV give a clear interpretation of the document cited above, to all its administrators on the AARP project.

F. COMMUNICATION

These first five recommendations are associated with lack of proper communication among AID, RAV and PNM. I shall trace one specific case of poor communication and this was pointed out at our first meeting with the Mission, our first meeting with RAV and my first meeting with PNM. It must be an important issue. I have traced the history of one case. PNM prepared the required monthly and quarterly reports and forwarded them to RAV, but had no confirmation that RAV had received the reports. Fortunately RAV had received them and claimed that they had been forwarded to USAID, but they also had no

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record that AID received the reports. Unfortunately AID claimed only to have received one report from RAV, and only after several requests. The documenting of this sequence may appear mean and nit-picking; but it is an accurate documentation, and good supportive evidence. Lack of communication is an apparent problem.

RECOMMENDATION 6: COMMUNICATION

It is recommended that communication between AID and RAV, on the one hand, and RAV and PNM (PNL and PRONAM) on the other be improved. Records of communications should be kept, and there should be regularly scheduled meetings with written minutes between the Mission and the Coordination Unit of the project.

G. BREEDING PROGRAM

It is repeated and emphasized that PNM breeding unit has done a commendable job of breeding maize cultivars chapter II.A; but there has been a conflict as to the major thrust of the breeding for the future. This conflict has arisen from the fact that the PNM Director, Dr. Malumba, and the IITA Advisor, Dr. Johnson are both maize breeders. Dr. Malumba is a competent maize breeder with many years of experience at CIMMYT, Zaire (See C.V.). Open pollination has been the principal emphasis of CIMMYT. He has preference for research leading to overall better cultivars of open pollinated corn for foundation and commercial seed. Because of his long association with CIMMYT and his reasoned conviction that the Zairian peasant farmer is not ready for hybrids, Malumba is inclined to focus the maximum effort of research on open pollinated cultivars such as SHABA I, KASAI I, SALONGA II and other PNM populations, and to do minimum research on hybrids. He supports his view with the knowledge that the Zairian peasant farmer is unable to afford the cost of annual purchase of seeds and amendments needed to obtain the economic benefits to be derived from hybrids. The 8th Annual Report 1980, (page 2) of PNM makes a very strong and convincing case for placing emphasis of research on open pollinated rather than hybrids in Zaire. Dr. Malumba is definitely in support of the PNM's view, and is not readily willing to increase hybrid research rapidly. His view, based on years of experience, must be respected.

On the other hand Dr. Johnson, recently arrived from IITA headquarters has interest in hybrids. IITA was recently nominated for an award for its outstanding work on hybrids with resistance to streak. IITA has been slowly, but definitely increasing its research on hybrids. Johnson is predisposed to request more than minimum research on hybrids, and is inclined to increase research activities on the streak tolerant hybrids of the TZMSR-W populations developed at IITA. The two scientists have agreed to pursue research on open pollinated and some hybrid varieties in the 1986 - 1987 crop year; but the direction of future research is not clear. Priorities of research must be set.

RECOMMENDATION 7: BREEDING PROGRAM

It is recommended that the emphasis of research at the beginning of this project be no more than 20% on hybrids, and this percentage be gradually increased as it is shown that the farming community is ready for hybrids.

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H. SEED PRODUCTION PROGRAM

If the sequence of the last chapter be followed the next item to be evaluated is II.B: SEED PRODUCTION. The production of foundation seeds and their multiplication for distribution to small farmers increased from 1984 to 1985, but the final yield for 1986 is not yet available.

	<u>Foundation SEEDS kg</u>	<u>Commercial Seed /of</u>	
1984	- 2,210	6,374	
1985	- 8,100	52,000	
1986*	- 5,440	18,600	*(Processing incomplete)

Foundation seeds suitable for the regions are produced at Kisanga and Kaniameshi.

SHABA I for South Shaba
KASAI I for Western Zaire, and
SALONGA 2 for Kasai

Some of the foundation seed are multiplied and converted to commercial seed at Kisanga and Kaniameshi; but the bulk is sent to multiplication centers which are listed in Table I. The multiplication centers are government organisations -- PNE, BUNASEM; projects -- Lubundu, North Shaba; religions - SHALAMO and private -- Compagnie Jules Van Lake. These organizations produce commercial seed and complete the distribution to farmers. PNM has prepared a pamphlet with the RAV caption entitled Guide pour la Cultura de Mais au Zaire, which is distributed with the seed. The pamphlet gives information on spacing, fertilizer and management of corn. There is one fertilizer practice (of three levels) recommended for the entire country. The decision to transfer the production of commercial seed away from the research station is supported by GOZ, and this is emphasized by the creation of BUNASEM - National Bureau of Seeds.

I see here a good seed distribution program moving in the right direction where commercial seed will ultimately be produced by the private sector, and the research station will concentrate on production of suitable foundation seed. The question of the pamphlet and fertilizer practices will be taken up under chapter III:J. AGRONOMY PROGRAM

Finally it is noted that RAV accepts that in the case of seed its responsibilities are limited to the production of good foundation seed.

RECOMMENDATION 8 : SEED PRODUCTION PROGRAM

The technical program of foundation seed at the research station and commercial seed by other agencies is on target and should be strengthened.

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I: ENTOMOLOGY AND PLANT PATHOLOGY PROGRAMS - PLANT PROTECTION

If reference be made to the chapter II. IMPLEMENTATION, the subject to be taken up at this time is plant protection - C. ENTOMOLOGY and D. PATHOLOGY. The scientists in this field have geared their research for seeking methods for breeding locally adapted streak resistant maize.

No documented evidence was presented to prove that streak is the most important malady of corn in the Shaba - Kasai region. I do not doubt that it may be. There are data from the North Shaba Project (PNS) supplied by Bruce Spake, project manager that streak is a very important disease in the North Shaba region. The November 1985 and January 1986 monthly reports document that streak is devastating in season B, especially if rainfall is low in North Shaba. There is no such evidence for the rest of the region. Indeed, both the entomologist and pathologist have accepted the lack of evidence by stating in their 1986-1987 plans of work, that they intend to carry out ecological surveys to determine incidence of disease, Chapter II C. and D. Further, the entomologist states he will determine the future direction of his research from these surveys. It is therefore not wise to invest heavily in streak research until after the survey. This analysis of the facts is not meant to suggest eliminating the 1986-1987 trials on streak but merely to indicate that until hard evidence is available PNM should not predominantly finance streak research. I am aware that one year's survey will not be enough to determine whether streak and mildew are equally important. Other diseases may be more important, or even be regionally more important. Only after the priorities for research have been determined should the long-term research program be finally approved.

RECOMMENDATION 9: ENTOMOLOGY AND PATHOMOLOGY - PANT PROTECTION

It is recommended that:

- (1) a long-term program of plant protection be initiated only after the entomologist and pathologist complete their surveys of 1986-1987.
- (2) PNM should make a study to determine whether a weed scientist is needed on the program, and if so ear-mark one Zairian for an advanced degree in weed science.
- (3) Plant protection should work towards an integrated pest management (IPM) program and,
- 4) The experiments on the books for the year should be continued in the interim.

Both the entomologist and the pathologist have been associated with recent research at IITA. The streak program is a very important research effort at IITA, but it should be demonstrated to be important in Zaire before embarking on an expensive research undertaking. It borders on the same philosophy of PNM breeding program involving hybrid corn. Hybrid corn is important to IITA but the Zairian small farmer is not ready for hybrids as yet

J: AGRONOMY PROGRAM

The agronomist is young, energetic and well recommended by his supervisors. He lacks the experience to direct agronomy research, and he has sensibly depended heavily on the Director and the IITA Advisor for guidance.

The present fertilizer recommendations cannot be correct, since they are the same (3 levels) for all ecological zones with no differences due to soil, climate, altitude and cultivars. As an agronomist-soil scientist, I am aware of the difficulties involved in determining a fertilizer recommendation program without the supporting soil data. So, I record my appreciation for the work done. Then I make some recommendations.

RECOMMENDATION 10: AGRONOMY

I recommend:

- (1) that the Zairian Agronomist be sent early to study for a Ph. D.
- (2) The present fertilizer recommendations be followed only until correct determination of fertilizer needs are made.
- (3) The agronomist's research should be directed towards discovering cropping systems which use minimum to no fertilizer e.g. legumes in the rotation, incorporation of green manure, economical length of fallow.

K. FARMING SYSTEMS RESEARCH AND EXTENSION

I gather from James Jones' paper. The farming Systems Approach to Research and Extension, Annex E-3 of the PP that it is essential for scientists attempting to do FSR to have clear directives. PNM agreed with this, and so at my request as stated in the IMPLEMENTATION II.E, decided to write a paper on FSR addressing the three issues raised in the chapter on IMPLEMENTATION viz definition, position of FS in the organizational structure of PNM, and giving recognition for previous work in extension done by PNM. The paper has been submitted and is acceptable to John Sanders, the FSR Evaluator. It includes the basic principles of FSR which he advocates.

I do not agree that the FSR unit should be stationed in Kinshasa. It must be in the field to do FS research. With the above information I can make some recommendations.

RECOMMENDATIONS 11 - FARMING SYSTEMS RESEARCH AND EXTENSION

I recommend that:

- (1) The FSR unit should not be stationed in Kinshasa.
- (2) In the beginning, one of the three specialists should be stationed at PNM headquarters in Lubumbashi, one at PNL and one at PRONAM.
- (3) The FSR scientist would be in a position in the organizational structure of the PNM like the entomologist, pathologist or agronomist.

(4) The FSR scientist will work cooperatively with all the other scientists just as the plant pathologists and entomologists do, but he will have closer linkages with the agronomist similar to, but not identical with the way in which pathologists and entomologists are linked together as plant protection specialists. Attached organograms give a general idea of the administrative structure showing where FSR fits.

L. THE COVENANTS

Covenants are always difficult to finalize. The rate at which covenants move through any bureaucracy are slow because they are not routine and often have to be delayed to meet statutory limits. Therefore, I must conclude that in several cases the GOZ has moved with good speed. See chapter II.J.
COVENANTS.

GOZ has set up the national policy commission, has transferred PNL to RAV, has had some negotiations through RAV with INERA etc.

One does not recommend to a Government, but one may make suggestions.

SUGGESTION 12: COVENANTS

It is suggested that the GOZ be encouraged by AID and RAV to pursue honoring its covenants by implementing the recommendations of the ISNAR Committees re INERA and a national seed policy. There are also the issues of increased and timely budget allocations.

M. KANIAMESHI RESEARCH STATION

I visited the Kaniameshi Research Station. I draw attention to the reported fraction of 15% of the farm that had suitable land for agricultural research. I note, based on the reported description of the landform in the PP that it was a poor site for agronomic research. I now make the assumption that plans are too far advanced to reverse the decision, and then proceed to make some recommendations. In the initial years, when the research farm is in the process of development, researchers and foundation seed producers will be able to get by on 30 hectares. However, as research extends, 5 to 10 years from the present, suitable land for meaningful agricultural research will become limited.

RECOMMENDATION 13: SOIL AT KANIAMESHI

I recommend:

(1) that a detailed soil survey and land use classification be made of the entire farm including mechanical analyses and analyses for the major and more important minor plant nutrient elements, to scientifically determine where suitable land is, and

(2) that provisions should be made in the budget for the purchase or long-term rental of suitable uniform land near to the farm for research on soil x fertilizer x cultivar trials.

It may be argued that there is not much uniform land in the vicinity. Then, several small sites may work although this will include more personnel to oversee the land. Or, one may argue that the Kaniameshi farm is representative of the land that farmers use. In this latter case, because of the non-uniformity of the land, each soil x fertility x cultivar trial will be so site-specific that results could not be extended.

N. PERSONNEL AND LIBRARIES

Finally I make a brief comment on personnel and libraries.

1) PERSONNEL

Members of the IITA Technical staff assigned to PNM are specified by positions -- one breeder and one entomologist already at Lubumbashi, and one agronomist not yet on the job. If the project is to move forward according to schedule the contractors must find and place an agronomist on site quickly or another crop year will be lost without top-level agronomic research.

I did not obtain a list of the Zairian staff assigned to PNM, but the financial plan tables Annex K Table 5A of the PP shows the entire project as funded to support 240 support staff in the early years and 360 in the later years. I have seen a document which shows that PRONAM alone has more than 360 junior staff members. Even with this meager amount of information I can make a recommendation.

RECOMMENDATION 14: PERSONNEL

A careful study of the employment practices of the components of RAV should be made, and corrective measures be applied to bring the expenses in line with the budget allocations, even if that entail reduced staff and some curtailed work. Superfluous labor should be released.

LIBRARIES

There is no mention of library under C. Project Inputs, page 16 of the PP. However in appendix M - 3, Physical Plant Review, there is a single mention of libraries under 3. Accommodation needs for new use: (a) Offices, library, conference, meeting room. Also on page 10 of Appendix K - 7, there are very small sums of Z 20,000 in 1985 and Z 25,000 annually from 1986 through 1989 for technical publications in the GOZ Commodities Budget. This is a totally inadequate sum for all of RAV.

Johnson made a library order for \$US 1,000.00. I presume it came out of commodities, and this is the correct place for such costs at the present time.

RECOMMENDATION 15: LIBRARIES

However (1) there should be a line item in the budget for library material, if one is not already there. The amount should be based on a careful study of the needs, not only of PNM, but of all components of RAV and it must be extremely thrifty in the way it purchases material. (2) Also consider having someone trained immediately in librarianship, who will fully

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manage the libraries. This will include cataloguing the present books, ordering new material, arranging and managing a proper lending and distribution service. Such training should be easily available. The details for efficiency can be worked out by RAV and may include a central unit at Kaniameshi with duplicating capabilities. Library support is essential for good research.

ANNEX
to
Agronomist's Report

DOCUMENTS READ
PERSONS

C.B. BROWN

NAMES OF PERSONS CONTACTED

1. IBEKE, S.M. Lomena
Department Head, Exploitations CODEMINES
2. DE GROOT, Soya Bean Breeding
IITA
3. EFRON, Yole
Director of Maize Program
IITA
4. MULAMBA, M'Komb Lubila
Director of INERA Station
Gandajika
5. WASKIN, Skip
USAID Development Officer
Lubumbashi
6. WILLIAMS, David
USAID Management Officer
Lubumbashi
7. MURARO-THORNE, Suzane
USAID Secretary
Lubumbashi
8. VAUDANO, Mirella
USAID Secretary
Lubumbashi
9. KILUMBA, N'Dayi
Director PNL
Gandajika
10. MUKENDI, N'Kashama
Director, GECAMINES
Kamina Kasese
11. MOTA, Bakajika
Coordinator RAV
Kinshasa
12. LULAMBA, Matambua
Peasant Farmer
Gandajika
13. LINPOR, Notete
Peasant Farmer (same as 13)
Gandajika

14. SPADUA, Banza
 Peasant Farmer
 Gandajika

15. SENGA, Koniaka
 Peasant Farmer
 Gandajika

16. KALOMBO Mukele
 Peasant Farmer, Group Leader
 Gandajika

17. M'PIOENU, Discua
 Peasant Farmer
 Gandajika

18. LJBOYA, M'Windumwiya
 Peasant Farmer
 Gandajika

19. BRADDOCK, Lee
 USAID Design and Evaluation Officer (DEO)
 Kinshasa

20. RECTENWALD, Debra
 USAID Project Evaluation Officer (PEO)
 Kinshasa

21. MCCARTHY, Cheryl
 USAID Project Officer for 091
 Kinshasa

22. ATTERBERY David
 USAID Project Manager PNM
 Kinshasa

23. BROCKMAN, Frank
 IITA/RAV Coordinator
 Kinshasa

24. ALDER, Janet
 USAID
 Kinshasa

25. SHANNON, Dennis
 IITA/RAV Research Agronomist PNL
 Gandajika

26. SERVANT, GREG
IITA/RAV Administrative Asst.
Kinshasa
27. JOHNSON, KENRIC
IITA/RAV Maize Breeder PNM
Lubumbashi
28. HENNESSEY, RON
IITA/RAV Entomologist PNM
Lubumbashi
29. BARTLETT, Christopher
IITA/RAV Socio-economist FSR
Kinshasa
30. MILLER, David
IITA/RAV Training/Outreach Officer
Kinshasa
31. MUNGANGA, Chimango
Chief of INERA Station
Kaniama
32. MULAMBA Nganda Nyindu
Director, PNM
Lubumbashi
33. MAJAMBU, Bangabanga
Agronome PNM
Kaniama
34. OYUMBO, Kallinda
Agronome PNM
Kaniama
35. KANGUDI, Yeta
Head, Multiplication Center PNS
Kongolo
36. LUZOLO, Suania
Dept. of Agriculture & Rural Development
Kinshasa
37. OSINAME, Olu
Soil Scientist PRONAM
M'VUAZI

38. KANKU, Breeder, Station Manager PNM
Lubumbashi
39. BROWN, Donald
USAID Agricultural Development Officer
Kinshasa
40. BAKELANA, ba Kufimfuti
Agronomist
Gandajika
41. KASONGO, Kapompo
Pathologist, PNM
Kamiana

List of Documents Reviewed

1. Agencies Cooperating with PNM
2. Cartes des Solo et de la Vegetation du Congo Belge et du Rwanda-Burundi. Noted de la Carte des Sols et de la Vegetation INEAC 1960
3. Constraints on Maize Production in Zaire
4. Cooperative Agreement/Grant No. AFR-0091-A-5034-00
5. Definitions du Competence Devoles aux Differents Partenaires Ouvrant au RAV.
6. Etude de la Reorganisation du Systems National de Recherche Agronomique de Zaire. (the ISNAR report)
7. Guide pour la culture du mais, au Zaire
8. Influence de l'azote, du phosphore et du potassium sur la surface foliaire du mais.
9. Library Records at INERA Gandajika
10. Perspective d'un Industrie de Semaine a Zaire: Cas de Mais
11. Plan for Short Term Training RAV.
12. Plant Breeding (Maize) Fatemisin IITA 1983
13. Programme 1986-1987, Selection Amélioration et Selection.
14. PNM - Seed Production during last three years
15. Programme National Maiz 8eme Rapport 1980
16. Programme National Maiz 11eme Rapport 1983
17. Programme National Maiz 12eme Rapport 1984
18. Programme National Maiz: An Analysis of Present Research and Recommendations for Future Growth.
19. Programme National Mais: Five Year Maize-Testing Proposal to South Shaba Project (I.F.A.D. - BUNASEM) presented by John Pelissier (World Bank).
20. Programme National Mais: Programme d'Action Quinque-Nalle, 1985

21. Project Paper AARP (660-091)
 22. RAV PNM Programme de Travail
 23. Report of African Maize Program, IITA, February 24-28, 1986, Dr. Kenric Johnson
 24. Report for 1985-1986, Amélioration et Selection.
 25. Report of the U.S. President Task Force to Zaire - 1985
 26. Section Agronomie: Plan d'action 1986 - 1987
 27. Section Agronomie: Resultats des Essais Agronomiques
(Campagne 1985-1986)
 28. Section de L'Entomologie, Programme de Recherche 1986-1987
 29. Section de Pathologie, Plan d'Action 1986-1987
 30. Solving the Problems of Maize Streak Virus IITA's submission for the King Badouin Award, 1986
 31. Zaire Project (091) Team Members Meeting with IITA Maize Scientists at IITA, Ibadan, August 1985.
 32. Zaire's strategy for Maize Research and Production.
- Doc: 3364e

APPENDIX E

EVALUATION

PROGRAMME NATIONAL LEGUMENEUSE

PNL

ZAIRE

SEPTEMBER 1986

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SUMMARY - Prepared by PNL Evaluation

1. The national legume program (PNL) is just getting underway. It is headquartered at Gandajika.
2. Program emphasis is placed on developing improved cultivars and on agronomic research and farming systems, especially alley cropping.
3. Four grain legume species are included in the program: beans, cowpeas, groundnuts and soybeans.
4. For the breeding component, soybeans have been selected as top priority, a soybean breeder will arrive shortly.
5. The evaluation team feels the priority order should be changed, with groundnuts and beans of most importance in that order followed by cowpeas and then soybeans.
6. Agronomic research independent of alley cropping should be expanded for each crop.
7. Water and electricity require attention at Gandajika, and seed storage facilities are desperately in need of construction.
8. Postgraduate training, and English locally, should to be implemented without delay.
9. Consultants for post-harvest storage problem of legumes, and for weed control should be provided.
10. The bean breeder should be located at either Mulungu or M'vuazi after returning from training.
11. Responsibilities of all professionals need to be clearly articulated and lines of authority established.
12. While little research information is yet available from PNL a specific extension strategy must be formulated.
13. Decisions have to be made on the role each satellite station will play in complementing research at Gandajika.
14. On-farm testing of alley cropping needs to be initiated to determine farmer acceptance of non-food, non-cash crops in the system.
15. Evaluation of the PNL program was handicapped by the absence of any material in the field at this season. Furthermore no trained specialists in beans, or groundnuts, the most important species, were available for consultation. Only one professional legume breeder, for soybeans, is provided and he has never before been in Zaire.

Evaluation of PNL Project

I. Project Objectives:

Goals stated in the Project Paper

The National Legume Project (PNL) has had USAID funding since 1979-1980 but at a low level until August 1985 when O91 became fully operational. The general program goal for USAID assistance to Zaire is "to develop institution, manpower capability and physical infrastructure that are essential to major development programs in food production, health, nutrition and family planning."

Crop improvement and production improvement research was stated to be the cornerstone for greater commodity output. Six research components were listed to achieve this. They are:

- (a) genetic improvement (beans, groundnuts and soybeans were specified for grain legumes)
- (b) improvement of agronomic practices,
- (c) farming systems research,
- (d) soil fertility,
- (e) an outreach element,
- (f) cooperation with ISNAR and possibly the World Bank for organizational and managerial structure.

In reference to legume research the Paper stated "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. The grain legume program will be expanded to include groundnuts."

The principle legume research station was to be located at Gandajika with soybeans and groundnuts the main research focus. Bean research was to be centered at Mulungu in the Kivu Region, a main production area.

Provision was made for one expatriate legume breeder for a period of three person years.

Goals as currently articulated by field personnel

Concern was expressed over the ability to deliver research results with sufficient impact in the short term to effectively mobilize political and popular support for PNL. Plant improvement research demands a time frame of several years from inception to demonstrated achievement.

The Contractor opted to face this challenge by concentrating on soybeans in the initial phase of the project. Advanced breeding material is already in hand that appears to be superior to cultivars now grown in Zaire. With a minimum of testing, and perhaps some additional selection, releases can be made in as little as two or three years, with a high success probability.

Over the longer term, however, it was felt that other species merit major input for cultivar improvement. Beans, cowpeas and groundnuts were mentioned, with beans and cowpeas especially challenging because of the large number of bean diseases and the known insect problems of cowpeas.

Alley cropping utilizing an array of legumes is also a stated research priority. Combinations of numerous crop and soil building species are being studied in an agronomic and farming systems thrust that promises to expand over the years. Long years of fallow is no longer possible with pressure on the land. The concept of alley cropping has been seized upon as a method of gaining benefits of shifting agriculture through continuous cropping.

II. Status of grain legumes in Zaire

An attempt was made to gain a subjective evaluation of the relative importance of the various grain legumes in Zaire. Through discussions with a number of specialists, both Zairian and expatriate, the following order was agreed upon.

1) Groundnuts

They are grown throughout the country with no one region clearly more important than the others. In Gandajika the recommended policy is to plant groundnuts in the first season and some other grain legume in the second, mostly because the alternative legume performs better in the second planting, as the weather is more reliably dry following maturity at that time, and post-harvest problems are fewer.

The groundnut cultivar grown around Gandajika is A-65. It is an oil seed selection introduced by INERA from Brazilian material (ultimately all groundnuts came from Brazil.) It has spread throughout the area and is used for general consumption despite its primary value for oil extraction. Size is small. Another INERA variety, G-17, has not yet been distributed.

Groundnuts were prominent in all markets visited in two regions and the capital, which supported the contention of their premier status among grain legumes. New cultivars are much earlier maturing than the older local types.

2) Common bean (Phaseolus vulgaris)

Principle production regions are Shaba, Kivu, Bas and Haut Zaire. Of a national total of about 180,000 Ha (1980), Kivu had 37,000, Haut Zaire 30,000 and Bas Zaire 16,000. Production is more localized than groundnuts but they are of great importance where grown and considerable internal distribution is observed within the market system. Per hectare yields average from 600-700kg. Those observed in the market were extremely heterogeneous with reference to color and markings.

No plantings were observed but information obtained suggests that only bush types are grown. The contention is that climbing types are advantageous only under high fertility condition, and that they don't easily fit into conventional farming systems.

Rust Uromyces appendiculatus was a serious problem at Gandajika. Some resistance is said to exist among low yielding cultivars. Beans in the humid tropic are subject to a wide range of serious diseases. Among them are viral mosaic diseases, some seed-borne and Isariopsis griseola, Ascochyta anthracnosa, to name a few. Those most prevalent in a given region must be identified and their importance determined.

3) Cowpeas

This species is most widely grown in the two Kasais, Bandundu and Bas Zaire, with some production in Haut Zaire. Cowpeas are prone to insect depredation at every stage of their life cycle. Termites, aphids, thrips, marouca pod borers, stink bugs and bruchids can be problems. Thrips reduce pollination and consequently seed set. High productivity is seen as unlikely without insecticides.

The cowpea grown in Kasai Oriental is red seeded and is considered to fortify the blood. White types, nevertheless, command good market prices.

4) Soybeans

Scattered pockets of production exist throughout the country with no major concentration, and where grown soybeans are highly localized. Soybeans were introduced in Zaire in 1936. There was no acceptable local food product made from soybeans until the concept of soybean flour, mixed with corn and manioc flour, to produce an enriched fufu, was promoted in 1965. This mixture is recommended by missionaries and some hospitals and as a consequence soybeans now have the status of a health food. A former director of INERA, Father Vanneste, was a zealous soybean advocate who promoted the crop throughout the country. Adapted varieties were released and distributed by INERA. However, the crop has not caught on. The flavor is considered objectionable, and preparation of the seed is difficult and time consuming.

Apparently soybeans are less prone to insect and disease than the other grain legumes, and storage insects are not a problem. Their nutritional value is high. Some of the newer IITA lines nodulate freely and are quite productive. Consumer acceptance remains the major constraint to expansion.

5) Green gram (Mung bean)

Mung beans were frequently encountered in the markets of Kasai Oriental, at times in substantial amounts. They appeared to be generally free of storage pests. No additional information on the species was obtained.

III. Status of the legume program (PNL)
Personnel (current technical)

Director - Kilumba, Ndayi (MS)

Advisor - Shannon, Dennis (PhD)

Speciality areas:

Soybeans - Kadima, Ngeleka

Common beans - Mvita, Bambi

Peanuts - no primary leader named

Cowpeas - no primary leader named

Germplasm collection - Kolombo, Mwembela (MS)

Agronomy - Ngoyi, Mwabilu

Phytopathology - no primary leader named

Entomology - Zantoko, Lubaki

Seed multiplication - Muyumba, wa Nyembo

Agricultural Economics - Murumbi, Kabangie

The projected work force for technical and support functions at PNL, exclusive of laborers but including scientists, administrative types and their technicians with some training is:

	<u>Projected</u>	<u>Employed</u>
Technical and Scientific	40	21
Administrative and support	<u>32</u>	<u>31</u>
Total	72	52

The support staff is essentially in place whereas the technical is only half filled. The Advisor clearly has excellent rapport with the Ing. Agronomes and has been exceedingly helpful in directing their research.

Only one of the speciality area leaders has taken advanced training but most are programmed to do so. In the meantime they are gaining experience working closely with the Director and the Advisor in the design and implementation of experiments, data analysis, report writing, etc. Fourteen assistants with lower level of training are also assigned to these research divisions. In August 1986 an additional 11 graduates (A₂ and A₃) were offered positions in PNL.

PNL employees in all categories now totals 175. The agreement with INERA calls for PNL to furnish personnel for maintenance on the infrastructure and grounds of the station and they are included in the above figure.

Physical Plant

The station at Ghandajika lies at an altitude of 780 m. above sea level at 6°45' S latitude and 23°37' E longitude. The rainfall over a 23 year period averaged 1398.6 mm. The land is savannah, although it was probably forest covered at some time in the distant past. The nearest large city is Mbuji-Mayi, 80 km distant over a dirt road. Total area is 1,000 ha.

All buildings are the legacy of INERA, which established the facility in 1936. They consist of 3 administration - office - laboratory structures, several support buildings such as storage sheds and greenhouses, and staff dwellings. All had fallen into various stages of disrepair but have recently

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undergone some renovation. The main research and office structures would be costly to remodel and will be replaced by new buildings. Specifications have been submitted and architectural designs should be forthcoming soon. (see report of Buyyala C. Babu, RAV Kinshasa B.P. 11635 Kinshasa I)

The library is located in a building being renovated for expatriate housing and will be moved to a small outbuilding about 13x28 feet. It, too, is in the process of being refurbished. Attempts to visit the library were not successful because it was always locked. Apparently it is spare and badly outdated, another legacy of INERA.

A non-functional range of combination screen-glass houses for growing plants under somewhat controlled conditions remains. One has been repaired by PNL and contained soybean plants for crossing. The structure was determined to be of limited value and a newer screenhouse design will be utilized for future expansion, of a type being used at IITA.

Seed storage buildings, for experimental materials, germplasm and seed increase, are old and unsuitable. Ambient temperature and humidity conditions prevail. Humidity of 60-99% and a temperature range of 22-30 degrees C are normal. Under such an environment it is not uncommon for seeds of some species to lose viability between harvest and the following planting season. Maintaining germplasm is an impossibility.

Adequate seed storage demands controlled temperature and humidity. This brings up the most critical deficiencies of the station, inadequate electricity and absence of a water system. Attention to these two needs is a matter of top priority. A generator now operates 3 1/2 hours daily, during the early part of the night. There is no electricity during working hours. A back-up generator is in need of repair. A water system had functioned in the past, with a well, water tower and a network of water lines to homes, office buildings, etc. It has not been in use for years. Now cistern water, collected from roofs, is supplemented by spring water trucked in by tanker. Delivered water is used for drinking and other domestic use.

Arrangements are progressing for drilling at least one new well. An engineer was present in late August, 1986 surveying the location for drilling. It is unknown how much of the old infrastructure can be used.

Internal roads are mostly in good repair. Erosion isn't a serious problem on the flat topography that covers most of the station.

Research Thrust

Cultivar testing and development among four legume species represents a primary focus of the program. Whereas the other two programs, PNM and PRONAM, have primary responsibility for a single crop PNL must make priority decisions among several species. This is complicated by the fact that the species differ in importance in different regions of the country, and requirements within a species between high and low altitudes, or in forest and savannah environments, may be quite different. Study of documents dealing with the evolution of the project reveal understandable vacillation over time in articulation of a coherent research plan.

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Current policy appears to follow guidelines stated in a paper "New directions - toward a realistic approach to grain legume research in Zaire". This statement proclaimed soybeans the number one priority, followed by groundnuts, common beans and cowpeas. Rationale for placing soybeans first is based on the belief that greater achievement can be realized over the near term utilizing advanced breeding lines from IITA that exhibit promiscuous nodulation and improved seed storage capability. These, it is felt, can rapidly replace cultivars such as S4 127, 1R 09, PK 308 and others now being grown. Cultivar replacement will be facilitated by the localized nature of soybean production to areas where it has been vigorously promoted.

A soybean breeder is scheduled to arrive at Gandajika in November, 1986. He will be the first legume breeder at that location and represents the beginning of implementation of the priority scheme.

Among the young staff in place, scheduled for advanced degree work, is a soybean breeder and a bean breeder. These will be joined by groundnut and cowpea breeders. Presumably all four eventually will be out of the country for extended periods of study.

Also programmed for advanced training are a soil fertility specialist, an entomologist and a farming systems economist.

Another research thrust concerns agronomic practices and farming systems in a closely coordinated effort. Extensive alley cropping plots are in place utilizing an array of woody legume species such as Glyricidia, Cassia, and Lueuceana intercropped with manioc, corn and grain legumes. Among the latter, groundnuts are considered best for the first rainy season, and soybeans and cowpeas for the second.

Two professional staff are already working on these projects, the PNL Director and the Project Advisor. The advisor has been conducting research relating to the breeding work, such as cultivar evaluation and germplasm assembly, but may relinquish this responsibility when the soybean breeder arrives.

Legumes planted in the 1985-86 season were as follows:

Soybeans	412	lines
Groundnuts	376	"
Cowpeas	59	"
<u>Vigna subteranea</u>	12	"
Pigeon Pea	12	"

For seed multiplication

Groundnut cultivar G-17	0.1 Ha
Soybean cultivar S4 127	3.9 HA

Each of the programs is expected to furnish BUNASEM with foundation seed of their respective crops. Three crops are the responsibility of PNL. Projected quantities for a 5-year period are given below for groundnuts, beans and soybeans.

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Hectares that can be planted from foundation seed provided:

<u>Year</u>	<u>Groundnuts</u>	<u>Beans</u>	<u>Soybeans</u>
1985-86	19	6	0
1986-87	101	39	49
1987-88	182	84	90
1988-89	348	97	149
1989-90	363	109	156

Out Station

No out-stations having legume research were visited and it is not possible to comment on their physical condition, research direction or appropriateness of location from personal observation. The following impressions are based on documents and conversations.

1) Mulungu:

Located in Kivu Region in an important bean production area this facility represents a high altitude environment in a densely populated part of Zaire. The original project paper had called for the legume breeder to be located at Mulungu for the first phase of the project, to be replaced when the first trainee returns, and then relocated to another region. This recommendation is not being followed.

The only research staff on the project at Mulungu are two INERA personnel seconded to PNL. They are Cit. Pyndji M.S., University of Illinois (Pathologist) and Cit. Mkikayi M.S., Tuskegee (Breeder/Agronomist). Most of the work is with common beans but some soybean research is included. This is a good location for testing high altitude adaptability and for various disease studies, including Pyrenochaeta glycinis on soybeans. Apparently this location is not being utilized as heavily by PNL as originally conceived. In the past much work had been done there in cooperation with CIAT. Relations with INERA, who manages facility, have been strained at Mulungu and the status of future work there is in doubt.

2) M'Vuazi

One agronome, supervised by Cit. Landu is located at MVuazi. When the bean breeder is trained he may be stationed there (instead of at Mulungu). This is a lower altitude site in Bas Zaire, in an area with considerable bean production. Cultivar testing of beans, soybeans and groundnuts is to be the main thrust, with agronomic studies conducted in cooperation with PRONAM.

3) Kaniemeshi:

A mid-altitude station with reliable power and irrigation, this is considered a prime location for seed multiplication and for foundation seed production of beans and soybeans, as well as for germplasm collections. It is certainly better than Gandajika in its present state of development. Thought has been given to eventually locate the soybean breeding program at this location. Plantings of soybeans, beans and cowpeas were made last year.

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Extension

No extension staff has been assigned to PNL. Indeed the program has been in place for too brief a time to have generated new research information. However, consideration needs to be given to the structure of an extension network relating to PNL when the need arises. Information obtained prior to the PNL project, from Mulungu for example, could be packaged now for dissemination.

Sentiment exists for having all primary extension personnel located at RAV where they would deal with crops of all three projects rather than being crop specific. According to this reasoning Gandajika is too isolated and inaccessible to serve as a functional base for legume extension at the national level. Furthermore, energies of the research staff risk being diverted to extension activities if both were to co-exist there.

In any event the extension structure needs to utilize appropriate organizations and agencies at all levels, missionary groups, parastatal entities, commercial enterprises, etc. with the emphasis placed on training their personnel who will, in turn, reach the ultimate target group.

Farming Systems

Alley cropping research is being implemented on a large scale at PNL in Gandajika. Within two years, after additional data has been collected and yield trends established, these combinations and permutations of crops should be tested under farm conditions. There seems to be a widespread belief that farmers will be reluctant to include species that do not contribute directly to food production or to cash gain. This theory needs to be tested and resolved by studying on-farm response to growing non-food, non-cash species.

Likewise, given the research emphasis on soybean variety development, grower and consumer acceptance of the species needs to be determined at their levels. If promotion of soybeans is pushing on a string, this has to be resolved as soon as possible. Forthcoming new cultivars will provide an incentive to do so, as releases will be coupled with renewed promotional initiatives at farm and consumer levels.

IV. Commentary and Recommendations

Evaluation of physical facilities

The Gandajika location has a serious problem of accessibility, and not entirely because of its remoteness. Government policy of restricting movement in and out of Kasai Oriental Region amounts to harassment of expatriates and perhaps of nationals as well. Presumably proper documentation would forestall the type of interdictions experienced by the evaluation team. If so, it becomes imperative that the U.S. Embassy or USAID learn the requirements and meet them. If "requirements" are indeed capricious serious consideration should be given to abandoning work in that region and transferring PNL to more hospitable surroundings, or withdrawing from the project.

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As for the station itself top priority has to be given to installing workable power and water systems. Having electricity for 3 1/2 hours in the evening, and none during working hours, from a generator with no functional back-up, is simply absurd for the headquarters of a national research project. Likewise, the absence of a water system, where laboratories and controlled plant growing facilities, not to mention offices and residences, are supposed to be functioning is likewise untenable. Evidently some movement is occurring in the latter.

All research at Gandajika now is field oriented, indeed there is no other choice. But this is appropriate. The extensive field plots installed last year were well laid out and arranged and land appears generally suitable for the type of work programmed. Desperately needed, however, are seed handling and seed storage facilities. The latter require controlled temperature and humidity, which relates back to the power supply. Under prevailing ambient conditions most legume seed seriously deteriorate in viability in a few months. Not to mention depredations by seed insects.

The office-laboratory complexes exist in old buildings that require substantial modification to become efficient. There is some question whether renovation will be done or a new structure built. This needs to be firmed up in the near future, whatever the decision.

A functional research establishment requires a reference library. The small structure being prepared to house library materials should be regarded as temporary and a more spacious and inviting location chosen for the permanent installation. Complete sets of scientific journals frequently become available from retiring professionals. Someone should strive to publicize these needs and perhaps the station could be the beneficiary. In any event the library needs attention and development, and eventually a librarian.

Staff residences are inadequate now with new recruits being added to the program. In the interest of morale, and productivity, this is especially important in a rather isolated location. It is easy to develop a mind set that hardship and inconvenience are imperatives to working in a developing country. Normally they enter into the equation but technical problems have to be solved in terms of professional achievement, not on the ability to cope. To the extent that amenities encourage achievement every effort should be made to provide them.

Greenhouses for growing plants in a controlled setting are among the most important components of a crops research installation. Without air-conditioning they are impractical in this climate. However, screen houses, that protect from weather, insects and predators, are functional and essential. Plans have been developed to provide houses of a design used at IITA.

Physical plant construction is budgeted at 46.9 million Z.

Procurement of supplies and equipment is in its early stages. The following list is being processed.

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<u>Item</u>	<u>No.</u>	<u>Unit Cost \$</u>	<u>Total \$</u>
Camera	1	500	500
Vogel Thresher	1	11,000	11,000
Heavy Duty Thresher	1	1,345	1,345
Screen House (Rossel)	2	7,500	15,000
Lominar flow cabinet	2	6,500	13,000
Plant grinder	1	2,500	2,500
Pathology supplies			
Microscope	1	2,930	2,930
Chemicals			4,365
Equipment			5,183

RESEARCH THRUST

Plant breeding, specifically the development of elite cultivars, is the primary program emphasis, and soybeans have been proclaimed the number one crop priority. The first professional breeder is scheduled to arrive in two months, so in effect this work has not yet begun. Germplasm has been assembled, however, and extensive cultivar evaluation trials were installed last year for several legume species.

It must be emphasized that plant breeding is a long term enterprise. Eight to ten years minimum from inception to cultivar release is normal. Even proponents of genetic engineering, after initially claiming they could accelerate the process, now realize the difficulty of doing so. The testing phase must be done over years, and follow the cropping cycle. There are few short cuts.

The danger in a ten-year project as proposed for PNL is that measurable achievements are expected (demanded) during the course of the project. If success is based on cultivar releases and their public acceptability, then it is highly improbable that this component will have any successes at all in the given time frame. The one exception is projected soybean releases from plant material already in advanced stages of development.

The hazard of imposing unrealistic expectations is that rapid pay off initiatives may be chosen over those of greater national importance, but more intractable of solution.

A decision to concentrate on soybeans is probably a case in point. IITA is of the opinion that some of its breeding lines may be well suited to Zaire and that a few seasons of testing should lead to elite cultivars that will totally displace those now grown. This would be a notable achievement, clear evidence of success. No question.

But should soybeans be accorded this status? By all accounts three grain legumes are grown much more extensively than soybeans, and are far more important in the national diet. Soybeans are a "new" crop. But even after 20 years of rather intense promotion acceptance is minimal. It is considered a "health food" by many of those who know it, and deservedly so. But it hasn't become an accepted foodstuff, a component of fufu as proposed. Preparation time and objectionable flavor are blamed. The situation is unlikely to change soon. Introducing a new food crop is not easy, and a very small percent ever become important. Soybean should be a lower priority legume in the research strategy of this project.

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The other major research thrust is combination cropping or "alley cropping". A woody legume interplanted with herbaceous crops is the prevailing design. Many species of woody legumes have been suggested and several have been selected for this research. This work, too, will require data over years and should be regarded as long-term.

Skepticism prevails over the issue of whether small farmers will choose to devote precious land area prepared with great effort (120 man-days per hectare) to plants whose utility is, in their view, questionable. Perhaps a food species such as pigeon pea, which is semi-woody, would be more acceptable than some others.

Future research emphasis

A re-ordering of stated priority species is strongly recommended. Groundnuts, beans, and cowpeas, in that order, are the important grain legumes of Zaire. Research efforts following a similar order would be appropriate. Beans (Phaseolus vulgaris) in the humid tropics are generally not successful in lowland locations (below 1,000 feet). The one cultivated Phaseolus species adapted to such environments is P. lunatus, the lima bean. It is grown in some parts of tropical Africa, but has not been observed in Zaire by the evaluation team.

As young staff are trained and return to PNL the plant improvement work in groundnuts, beans and cowpeas will begin in earnest. This is, however, years in the future. In the interim every effort should be made to assemble and field test cultivars developed in other tropical countries. Conceivably some already exist that would have a place in Zairian agriculture.

Problems of production for each of the crops need to be carefully evaluated and catalogued, and research priorities articulated. If this is done before the breeding programs begin valuable time will be saved.

There is also time for making decisions on where the primary focus of each of the breeding programs should be. For example Bas-Zaire has been proposed for bean improvement. Such decisions need to be carefully studied, from the standpoint of biological appropriateness, administrative efficiency, and national needs.

Storage insects cause great losses in legumes. Some post-harvest research designed to address this problem should be considered. It might be good to bring in a post-harvest consultant.

Weeds are an enormous problem, and the project makes no provision for a weeds specialist. This is probably a serious oversight. Again, a consultant should be engaged at the minimum, and a national student trained in the speciality. One has only to look at the vast tracts of Imperata to gain a perspective of the weed problem.

Agronomic and soils research, beyond the alley cropping component, should be developed to a greater extent than it is. In selected locations, with easy access to water, irrigation studies might be initiated.

All the above need to be coordinated in the farming systems studies and incorporated into on-farm research at the appropriate time.

Personnel

The future of legume research rests squarely with the group of young scientists preparing to go for advanced training. There is no RAV cadre of senior scientists trained in legumes. The Ing. Agronomes at Gandajika appear to be excellent. They desperately need English training, and it is difficult to arrange. At the minimum, tapes and other study materials should be provided, and soon. Their departure should not be delayed excessively. The longer one is away from formal study the more difficult it becomes, for some of us at least. The most lasting effect and the greatest impact the project will have rests in the human development component. This needs to be pursued vigorously and astutely. More and more U.S. universities are requiring the GRE (Graduate Record Exams). Biological science is moving rapidly and in directions these students may not be well prepared for. Placement could be a problem, compounded by inadequate English.

Clearly defined areas of responsibility and a job description for each professional position need to be provided to avoid conflicts and misunderstandings.

A general observation about personnel. The pressures to have an excessively large work force must be resisted. Management has to be firm in determining optimum numbers and quality, and stick to the decision. At some point these research entities will have to become self-sustaining (by the Zaire government) and must not become bogged down by their own weight.

This concern was expressed by the young scientists at Gandajika when they asked "what will happen to us when the project ends?" The environment must be created to allow professionalism and productivity for the indefinite future. We owe it to them.

Reports Studied

1. RAV January 1986. Definition des Competences
Devolves aux Differentes Portennoires Oeuvrant au RAV.
2. Report of activities for first quarter 1986 from Mulungu station.
April, 1986
3. Applied agriculture research and outreach project.
Quarterly report. Fourth Quarter 1985
4. Applied agriculture research and outreach project
Quarterly report. First Quarter 1986
5. Individual research reports - Ing. Agromes PNL
6. Anon. No date. III New directions - towards a realistic approach to
grain legume research in Zaire.
7. Programme National Legumineuses - Liste Nominative du Personnel
8. Production et commercialisation des haricots au Zaire. Aug. 1983.
Bureau d'Analyse Economique.

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Itinerary and Primary Contacts

Aug 14-	Arrive in Kinshasa
15-	At USAID McCarthy, Atterbury
16-	" "
17-	In Kinshasa
18-	RAV - Brockman, Miller, Otoo
19-	To Gandajika - Shannon, Kilumba
20-	In Gandajika
21-	" " " Brockman
22-	" " " "
23-	" " " Root
24-	" " " "
25-	To Mbuji-Maji
26-	To Kinshasa
27-	To Kiayaka. Burn, Mahungu, Muski-Toko, Miller
28-	Vacinity of Kikwit. Burn, Mahungu, Muakatoko, Miller
29-	Return to Kinshasa (Etian CEPLANT)
30-	In Kinshasa. Prepare report
31-	" " " "
Sept. 1-	" " " "
2-	" " " McCarthy
3-	" " " "
4-	" " " "
5-	" " " "
6-	" " " "
7-	" " " Submit report
8-	Leave Kinshasa

Doc: 3360e

APPENDIX F

GOVERNMENT OF ZAIRE

RESPECT OF COVENANT

ZAIRE

SEPTEMBER 1986

Covenants on Organization and Operational Modalities

A number of covenants were proposed in the Project Paper, and included in abbreviated form in the Project Authorization document, some of which implied significant impact on project implementation:

1. To place authority for coordination of the National Food Crops Programs in the Division of Agronomic Research, Training and Information within the Service d'Etudes et de Planification of the DA.
2. negotiation of definitive agreements which INERA on the use of facilities at INERA stations on which the project programmes are operational.
3. provide adequate utilities-electricity, water and sewage system at those stations.
4. establish separate budget line items for each program and to maintain these separate from those of INERA.
5. to employ no less than 66 A3 or higher level personnel, this number increasing to 93 in 1988.
6. to establish salary scales for project personnel competitive with those of the Institute Facultataire d'Agronomic (IFA)

By Interdepartmented Decree of December 10, 1985 between the Department of Higher Education, Universities and Scientific Research (DEUSR) and the Department of Agriculture and Rural Development (DOA) the responsibility for research on cassava, maize and legume seeds was delegated to the DOA.

By the same decree the DOA established RAV within the Direction d'Administration Generale des Projets (DAGP), a Division for general administration for all externally financed projects. From a technical standpoint the project is under the Division of Agricultural Research, Training and Information of the DOA.

Subsequent documents issued by the DOA (February 1986, March 1986) defined the responsibilities of RAV with respect to each program and to INERA.

An agreement of November 1985 between INERA and RAV defined general modalities for use of INERA stations-land, buildings and facilities- by the national programs. Annexes have been concluded for three stations - Mvuazi, Gandajika and Mulungu. A similar annex for Kiyaka remains to be drawn up.

Certain other covenants have been respected in whole or in part: e.g. electricity and water systems have been provided for Mvuazi only; separate budget line items for each of the national programs have been established in the national budget however only very limited funds have actually been released; the assignment of professional and technical personnel has surpassed that prescribed by the covenants; although the application of the Statut du Cherche (Research work statute providing special rates of compensation for scientific personnel) is not being generally applied. Provisions have been made for premium pay (PRIM) from counterpart funds to increase salaries of research, technical and senior administrative personnel.

Doc: 3442e

APPENDIX G
TEAM MEMBERS AND
ITINERARIES

Dr. J.D. Paschke, Team Leader, Purdue University

Dr. J. Sanders, Economist/PSR, Purdue University

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APPENDIX H
EVALUATION
THE KIYAKA SITUATION:
ANALYSIS AND PROPOSED SOLUTION

The Kiyaka Problem: Analysis and Proposed Solution

Because of numerous problems and work impediments at the Kiyaka station there have been strong proposals for PRONAM, and for that matter the other programs, to abandon Kiyaka. Because it is recognized that Kiyaka represents such a large ecologically similar area soil, vegetation and rainfall, total abandonment of research in the area cannot be considered.

It has been proposed that a new station near Kikwit be established. Suitable land could be found within 5-15 km of Kikwit which would be representative of the Bandundu ecology. A minimal amount of construction on this land will be required. Major construction of station headquarters office and work building and housing would be in Kikwit. Such a move would eliminate the problems of dealing with INERA. It would also eliminate the problems of _____ and provide reasonable living conditions and social services to the personnel. It is argued that since about 5,000,000 zaires have been programmed to improve facilities at Kiyaka these funds would make a good start towards establishing the new station.

In spite of all of the valid arguments for creating a new station, it remains that Kiyaka is a well established station, though deficient in many respects, in an important ecological zone. It is one of the nine stations marked for retention in a restructured agricultural research system recommended by a Zairian Study Group and ISNAR. In spite of the difficulties of working at Kiyaka, the establishment of a new station within about 70-80 km is extremely difficult to justify, especially on the long run. In addition to the state of utilities (water and power) which can be remedied by making the necessary investments at Kiyaka, the major problem are the access road and problems with INERA. While in the short run neither of these problems may be easy to solve, on the longer run - one must think in terms of decades in considering the building of institutions - neither are insolvable. The problem then is to find a short term solution - one to carry through the first phase i.e. until about 1990, given the delayed start-up of project 091.

As a short term solution it is proposed that a minimal research program be continued in the area. Such a program would involve posting junior technicians in Kikwit to manage day to day operations. Work would be planned by the respective technical divisions. The scientist involved would monitor the work and record the necessary data by regular travel to the area. A field work area of some 50-100 ha would be required which appear not to be difficult to obtain. A simple work shed on the land for housing farm equipment and storage of materials would be the only construction requirement. The junior personnel would be provided with housing in Kikwit would be provided with motorbikes for daily travel. The existing Land-Rover and heavy truck would continue to serve for more distant travel for demonstration and planting stock distribution.

APPENDIX I
EVALUATION
BUDGETS AND OPERATING COSTS

During 1986 there were long delays between releases of PL-480 funds. In addition, RAV, Coordination and the three programs, had cutbacks from their original budget requests. In the PRONAM budget USAID requested additional funds for the construction component, more than PRONAM had requested. According to USAID, this increase was to take into account inflation and additional costs due to design changes. According to the PRONAM Director, Dr. Mahungu, USAID was not allowing shifts between line items in their operating budget and there was only a minimal contingency fund. Hence, there was very little flexibility in funding operating expenses. The PRONAM budget was based upon actual expenditures in 1984 and 1985 and included a 25% inflation factor for major items. Dr. Mahungu stated that PRONAM extension operations in Kiyaka practically came to a halt with the operating expense crunch. The question: Why was there insufficient funds to operate at Kiyaka? Rather than flexibility, it appears that the Kiyaka budget was overspent.

However, there are various institutional reasons for USAID to maintain tight control on expenditures. USAID has engaged Price Waterhouse to help the commodity programs improve their auditing procedures. However, it is extremely difficult to make exact estimates of operating expenditures for research over a year. Some flexibility would substantially help the commodity program directors to maintain a smooth program operation. Cutting operating costs or even reducing them would be expected to disproportionately affect the newest programs such as farming systems/economics or extension.

The evaluation team noted a very strong expansionist push among all three directors. All three were principally concerned in our travels with obtaining the programmed capital expenditures and with expanding their personnel. The team was very impressed with the drive and enthusiasm of the three Program Directors.

We are concerned, however, that at this phase of the RAV project there is a need to consolidate the research programs and to maintain intact the operating budgets. PRONAM and PNM are strong programs turning out new cultivars. They have been sending out their people for training. They have good momentum going and need to be recognized for this.

The budgetary crisis of last spring of this shortfall of PL-480 funds can undoubtedly occur in the coming years. These shortfalls should be prevented from forcing slow downs in the research operations by reducing the operating funds.

The proposed capital expenditures for 1986 were:

PNM - Rebuilding of Kaniameshi	45.6 million Z
PNL - Gandajika	47
PRONAM - Housing in Mvuazi	25.5
PRONAM Kiyaka	5

This capital expenditure has still not begun. It is recommended that the expenditure for Gandajika be reduced by approximately 30 million Z and that only the water and electricity expenditures be undertaken there. Then these

funds can be set aside in an operating budget reserve fund to make sure that there are sufficient funds for the regular operation of the research and multiplication - extension activities including the new activities of FSR and the economists.

This slowdown in expansion of the PNL program is also consistent with the team's concern with the re definition of research priorities in this program. The evaluation team feels that priorities should be reconsidered in this program and that outside consultants should be engaged to consider both the:

- a) soybean consumer acceptability problem;
- b) research possibilities and priorities in groundnuts (ICRISAT)

While this re-evaluation is taking place, the capital expenditures on Gandajika and some of the proposed capital expenditures for PRONAM need to be set aside to protect the operating research budgets of the three commodity programs.

The INEAC - INERA system made capital construction all over the country. Developing GOZ support for a research program requires the steady provision of operating expenses. Capital expenditures on facilities make nice monuments but need to be put in a secondary position as compared with continuing good agricultural research programs. AID should not isolate and withdraw this capital expenditure fund from access by Program Directors for their operating budgets. Improved auditing is a better solution for fiscal responsibility. Slowing or shutting down parts of the research operation should not be a methodology to pressure for better budgeting or planning procedures.

It is recommended that USAID estimate the possible shortfalls in the Z funds over the next three years and rephase their capital expenditures so that this fund can cover the necessary operating funds.

Related to the above financial decisions is the observed lack of GOZ support to the RAV program. The failure of the GOZ to put in their agreed upon financial contribution is a matter of substantial concern to the long run prospects of this program. The Commodity (PRONAM, PNM, and PNL) Program Directors need to document for the GOZ government officials at all levels the impact of the new cultivars and they need to continue to put pressure on them to support these agricultural research activities. In the long run (10-20 years) an accommodation of the RAV program within the INERA structure is expected to take place. However, fundamental reforms of the INERA structure must first take place (see the ISNAR report, 1984). Moreover, funding an adequate nationwide system of agricultural research will require a much higher GOZ agricultural research budget.

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