

PD-AAG-800-81
660-0077

AGENCY FOR INTERNATIONAL DEVELOPMENT
PROJECT PAPER FACESHEET

TRANSACTION CODE **660007704201** PP **(2)**

A ADD
C CHANGE
D DELETE

2 DOCUMENT CODE
3

3 COUNTRY ENTITY
Republic of Zaïre

4. DOCUMENT REVISION NUMBER

5. PROJECT NUMBER (7 digits) **660-077**

6. BUREAU OFFICE
A SYMBOL **AFR** B CODE

7. PROJECT TITLE (Maximum 40 characters)
MAMIOC OUTREACH

8. ESTIMATED FY OF PROJECT COMPLETION
FY **81**

9. ESTIMATED DATE OF OBLIGATION
A INITIAL FY **78** B QUARTER **4**
C FINAL FY **82** (Enter 1, 2, 3, or 4)

10. ESTIMATED COSTS (\$000 OR EQUIVALENT \$) - **Z 0,80**

A. FUNDING SOURCE	FIRST FY			LIFE OF PROJECT		
	B FX	C L C	D TOTAL	E FX	F L C	G TOTAL
AID APPROPRIATED TOTAL	1,500	-0-	1,500	4,500	-0-	4,500
GRANT	1,500	-0-	1,500		-0-	4,500
LOAN						
OTHER U.S.						
HQST COUNTRY	-0-	1,711	1,711	-0-	18,860	18,860
OTHER DONOR'S						
TOTALS	1,500	1,711	3,211	4,500	18,860	23,360

11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY 78		H. 2ND FY 79		K. 3RD FY 80	
		C GRANT	D LOAN	F GRANT	G LOAN	I GRANT	J LOAN	L GRANT	M LOAN
(1) SSA	113	080	N.A.	1,500	-0-	850	-0-	884	-0-
(2)									
(3)									
(4)									
TOTALS				1,500	-0-	850	-0-	884	-0-

A. APPROPRIATION	N. 4TH FY 81		O. 5TH FY 82		LIFE OF PROJECT		12. IN-DEPTH EVALUATION SCHEDULED MM YY 01 81
	P GRANT	Q LOAN	R GRANT	S LOAN	T GRANT	U LOAN	
(1) SSA	808.5	-0-	457.5		4,500	-0-	
(2)							
(3)							
(4)							
TOTALS	808.5	-0-	457.5		4,500	-0-	

13. DATA CHANGE INDICATOR WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

2 1 NO
2 YES

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE *Fermino J. Spencer*

TITLE **Fermino J. Spencer
DIRECTOR, USAID/ZAIRE**

DATE SIGNED
MM DD YY
06 08 78

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

CASSAVA OUTREACH PROPOSAL

TABLE OF CONTENTS

	PAGE
I. Project Summary and Recommendations	
A. Recommendations.....	1
B. Brief Description of the Project.....	1
C. Summary Findings.....	2
D. Issues.....	3
II. Project Background and Detailed Description	
A. Project Background.....	5
1. General.....	5
2. Economic Overview.....	5
3. Agricultural Sector.....	7
4. Importance of Cassava (Manioc) in Zaire.....	8
a. Cassava Bacterial Blight Disease (CBB).....	8
b. Cassava Mosaic Disease (CMD).....	9
c. Anthracnose.....	9
d. Cassava Mealybug (CMB).....	9
e. Green Cassava Mite.....	10
5. Establishment of Program National du Manioc (PRONAM)...	11
6. PRONAM Development, Research and Training Activities...	12
7. Future PRONAM Research and Training Strategies.....	12
8. PRONAM in the GOZ.....	13
9. AID Involvement.....	13
10. AID Experience Elsewhere.....	14
11. Other Donors.....	14
B. Project Description.....	15
1. Goal.....	15
2. Project Purpose.....	15
3. Outputs.....	18
4. Inputs.....	20
C. Detailed Project Description.....	22
1. Crop Research and Outreach.....	22
a. Crop Research Objectives.....	22
b. Crop Research Priorities.....	22
c. Crop Research Strategies.....	23
d. Outreach.....	24
e. Annual Research Activities.....	26
2. Training Activities.....	31
a. External Paraprofessional and Advanced Degree Training	32
b. Development of Technical Training Capability within Zaire.....	33
3. Machinery Maintenance Activities.....	35
D. Agricultural Economics Studies.....	37
1. Phase I.....	38
2. Phase II.....	38
a. Farm Level Production Systems.....	38
b. Cassava Processing Systems.....	39

TABLE OF CONTENTS (CONTINUED)

	<u>PAGE</u>
c. Cassava Marketing Systems.....	39
3. Phase III.....	39
III. Project Analysis	
A. Technical Analysis.....	44
B. Financial Analysis and Plan.....	44
C. Socio-Economic Analysis.....	53
1. Cassava Production.....	53
a. Extent of Cassava Cultivation.....	53
b. The Technology of Cassava Production and Use.....	54
c. Factors Influencing Cassava Production.....	56
2. Cassava Consumption Factors.....	57
a. Consumer Preference and Consumption of Cassava.....	57
b. Relative Prices Among Foods.....	57
3. Nutritional Consideration.....	58
4. Future Food Requirements.....	58
5. Beneficiaries.....	59
6. The Role of Women.....	61
7. Measuring the Project's Economic Value.....	62
IV. Implementation Plan and Evaluation	
A. Administrative Arrangements.....	64
1. Receptient	64
2. USAID.....	64
3. IITA.....	65
4. GOZ Budget for Project Operations.....	65
B. Evaluation Plan.....	66
1. On-going (formative) Evaluation.....	66
2. Annual Evaluation.....	66
3. In-depth mid-project Evaluation.....	57
4. End of Project Evaluation.....	68

LIST OF ANNEXES

	<u>ANNEX</u>
Logical Framework Matrix.....	A
Technical Analysis Supplemental Information.....	B
Equipment List.....	C
Socio-Economic Analysis.....	D
Organizational Charts and Job Descriptions.....	E
Initial Environmental Examination.....	F
Statutory Check List.....	G
GOZ Request for Assistance. (Kinshasa 8709).....	H
Draft Project Agreement.....	J

PROJECT DESIGN COMMITTEE

Dr. S.K. Hahn, Leader Root and Tuber Improvement Program,
IITA/Ibadan

Dr. Wade Reeves, Assistant Director, Head of Training,
IITA/Ibadan

Mr. Daniel Goodman, Jr., Administrator, Special Projects,
IITA/Ibadan

Mr. Fenton B. Sands, USAID/Zaire, Food and Agriculture Office

Mr. David Fredrick, USAID/Zaire, Program Office

Dr. Humphrey Ezumah, PRONAM Technical Coordinator

Mr. Jake Willbeck-Lemair, DS/ENGR, AID/W

I. PROJECT SUMMARY AND RECOMMENDATIONS

A. RECOMMENDATIONS

1. Grantee = Department of Agriculture, Government of Zaire
2. Implementing Agency: National Cassava Program (PRONAM)
3. Technical Assistance Contractor: International Institute of Tropical Agriculture (IITA), Ibadan/Nigeria
4. Financing:
AID Grant.....\$ 4,500,000
GOZ Funding.....\$ 18,860,000
TOTAL.....\$ 23,360,000

B. Description of Project:

Cassava is Zaire's most important food crop. Production of cassava is not keeping pace with consumer demand, largely due to serious cassava disease outbreaks and insect infestations which have appeared since 1974. The GOZ has contracted technical assistance from IITA since 1974 to specify diseases and pests and to develop disease/insect resistant lines of cassava, and to evaluate other methods of eliminating/reducing these problems. These past four years of GOZ/IITA effort have produced many promising lines of disease/insect resistant cassava, and some interesting possibilities in cultural and biological control of cassava diseases/pests.

Zaire is a large country with a variety of cassava growing conditions. Thus, the Cassava Outreach Project will continue the GOZ effort begun in 1974 by introducing the cassava technology proven at the M'Vuazi station to five substations and to farmers in the surrounding areas. The project's goal is to increase the availability and nutritional quality of food for the low income majority in Zaire.

USAID project inputs consist of 30 person years of technical assistance (agronomy, extension, training, physical plant services); training for up to 16 Zairians to M.S. level and 6 to Ph.D. level (plant breeding, agronomy, entomology, pathology, ag. economics, food technology, and ag. education); short-term paraprofessional training for 32 Zairians at IITA/Ibadan in various technical fields; in-country short-term training for 160 intermediate level extension workers, farmer group leaders, etc; training equipment/supplies; research/extension equipment; vehicles, physical plant equipment/supplies; and radio communications. GOZ project inputs consist of local support costs of foreign technical assistance, station grounds and facilities, FX cost of pure research TA at M'Vuazi, vehicles, rehabilitation/construction of project facilities and housing, POL products, PRONAM staff salaries and operating costs. IITA project input is a biological control entomologist.

These inputs will generate outputs:

1. The M'Vuazi station will be staffed and established as PRONAM's national center for cassava research and training.

2. Zairian professionals and paraprofessionals will replace expatriate technicians in PRONAM.
3. Five PRONAM substations will be established throughout Zaire to test and disseminate new cassava lines and technology.
4. PRONAM will have an ongoing capability to train extension and research personnel for cassava.
5. PRONAM will have in-house capability to maintain and repair facilities, vehicles and machinery.
6. Improved information on the economics of cassava production, processing and marketing will be available.

These outputs will assure the project purpose which is to develop the institutional capability of PRONAM to conduct adaptive and applied research on cassava, and to make new cassava technology available for distribution to subsistence farmers in Zaire.

At the conclusion of USAID project assistance, PRONAM will, on a continuous basis, identify high yielding, disease and insect resistant cassava varieties and improved cultural practices responsive to small farmers' needs; multiply and distribute promising cassava varieties to farmers, serve a front-line role in the identification and control of cassava disease and insect problems; have identified an improved quality of cassava product.

C. SUMMARY FINDINGS

1. Research and extension methodology proposed are suitable and feasible for Zaire.
2. Local currency costs during project life are assured from GOZ counterpart funds and regular budget.
3. Project inputs are judged to be reasonable price, based upon findings of AID engineer's review and project design activities.
4. We are convinced that GOZ FX commitments in this project will be met, given cassava's basic importance in Zaire.
5. Collaborative project design activities have produced a revised and more efficacious project administration system, and have contributed to clarifying relations between USAID, Department of Agriculture, INERA, PRONAM, and IITA.
6. Given the ongoing nature of the PRONAM activity, and IITA's current assistance to PRONAM, this project is ready now for implementation.
7. The project meets all applicable statutory criteria (See Annex).

D. PROJECT ISSUES

1. Beneficiaries. This project will not have an instantaneous impact on hundreds of thousands of poor farmers. It will extend proven cassava technology which counters serious disease and insect problems to five field stations and surrounding farming areas. Beneficiaries in the LOP will undoubtedly be less than 10,000 farm families. There is no feasible alternative to this intermediate Cassava Outreach project.

2. Logistics in Zaire. Support of a central research and five outreach research/extension stations, requires a solid infrastructure of project transportation and facilities/housing repairs and maintenance. A considerable part of this project's total cost and design effort is devoted to physical plant services and transportation. Project implementation experience has shown that such problems can best be resolved in Zaire by proper project design and a recognition that added costs are necessary for logistical support.

3. "Is there too much "basic research" in this project?" Virtually all basic research has been done at IITA/Ibadan, and little is expected to be done at the M'Vuazi station requiring little or no USAID funding. USAID project funding is for applied substation research, logistics support services across-the-board, and training of Zairian researchers and extension agents.

4. "Why \$ 1,500,000 in year one of this project?"
Commodity procurement for Zaire has been characterized as taking 1.5 to 2.5 years from issuance of procurement instruction to delivery on site. To avoid implementation delays experienced in other USAID/Zaire projects, most commodities will be funded and ordered by the contractor (IITA) during the first year of the project.

II. PROJECT BACKGROUND AND DETAILED DESCRIPTION

A. PROJECT BACKGROUND

1. General

Zaire, the third largest country in Africa, covers an area of 2.3 million square kilometers. Diverse climate, topography and soils allow for a wide range of crops including coffee and tea at higher altitudes and palm oil and rubber at lower altitudes.

The country has abundant natural resources, including timber reserves, and important deposits of copper, zinc, lead, cadmium, and manganese. Commercially exploitable deposits of diamonds, gold, tin, and tungsten are also found.

The population of Zaire is estimated to be 22 million persons with a current annual growth rate of 2.9%. The urban/rural ratio is about 30/70. Increased recent migration is expected to result in a 36/64 ratio in 1980.

2. Economic Overview

After steady economic growth from 1968 to 1974, Zaire experienced severe retrogression, commencing in 1975. Despite a real rate of economic growth of seven percent per year for the earlier period, per capita income remained low. At about \$ 150, it is only sixty percent that of the Africa regional average, excluding South Africa. A large potentially productive agriculture sector produces far below potential, with production of several main food and cash crops below levels achieved in the immediate post-independence period. Only one percent of the total land surface is under cultivation. Large areas of arable land are not used. Low agricultural productivity has resulted in rural incomes that are only one-third those of the urban sector. Agriculture employes, about seventy percent of the work-force, contribute only 15 percent to net domestic product. This sector has a large potential for improvement. Most food crop production is consumed on the farm. Urban sector consumption of food and raw materials is heavily dependent upon imports. Approximately 15 to 20 percent of merchandise imports is composed of foodstuffs and agricultural raw materials, while domestic agricultural production remains stagnant.

The high rate of growth in Zaire's economy from 1968 to 1974 was facilitated by high copper prices. The strong demand in the western industrial economies for this product provided the financing for accelerated consumption and investment. Over two-thirds of export receipts and one-fifth of government revenues have come from copper. Copper prices doubled between 1972 and the second quarter of 1974 and production rose 25 percent during the same period. Growth of exports and debt proceeded apace with

the latter rising to \$ 2.6 billion at the end of 1976, as compared to \$ 760 million three years earlier.

The lack of sufficient investment in agriculture by public authorities during this period, the uncertainties created by nationalization of foreign-owned properties, the deteriorating transportation infrastructure and declining rolling stocks, and the lack of sufficient price incentives led to stagnation in the agricultural sector. For some crops, this meant declining production, which accentuated the economy's dependence upon copper and its vulnerability to volatile price changes for this commodity. From mid-1974 to the end of 1975 copper prices declined by over one-half. This combined with supply and marketing constraints which limited copper production, caused foreign exchange receipts to decline by a third, the trade deficit to double, and the proportion of debt service payment to export receipts to rise to 24 percent at the end of 1975. Gross external reserves declined to the equivalent of less than two months of imports. Zairian authorities suspended most debt service payments, and tightened import restrictions. A continuing budgetary deficit, expansion of credit in the face of supply shortages, and adverse terms of trade led to domestic price inflation at an annual rate of between 65-80 percent by the beginning of 1976.

The USAID program has concentrated upon support of Zaire's development efforts, especially in the agricultural sector in collaboration with other donor countries and international organizations. The IMF has concluded two stabilization agreements with Zaire. The World Bank convened the Consultative Group (CG) for Zaire in early June, 1977. Led by the IBRD, the donors (including the U.S.) at this meeting encouraged Zaire to reorient its development investment priorities toward agriculture. The U.S. continues to work closely with the Agricultural Working Group (chaired by the IBRD) to help the GOZ delineate its major problems and objectives in the agriculture sector. The first meeting of the Working Group was held in March 1978, to discuss the government's proposed agricultural recovery program.

On-going USAID/Zaire technical assistance activities focus largely on agriculture with a lesser emphasis on health and human resources development. In addition, U.S. AID has provided balance of payments assistance with loans designed to provide foreign exchange for essential imports, and to import essential agricultural commodities (PL 480 Title L).

In FY 1978 and FY 1979 the AID activities in food and nutrition are intended to increase food production, improve nutritional intake, provide more jobs, increase income in rural areas and generally improve the quality of rural life.

A one year stand-by arrangement was concluded with the IMF in April 1977, in the amount of SDR 45 million. A semi-annual

performance review by the IMF in November found government performance deficient in meeting the rigorous domestic fiscal objectives.

3. Agricultural Sector

Agriculture provides employment for about 75% of the people in Zaire. Males and females have about equal work roles in agriculture.

Zaire's agricultural sector has two technological types: traditional and commercial. The traditional type is based on mixed cropping of maize, cassava (manioc), rice, bananas, and peanuts. Over three million families work in traditional-type agriculture which can be characterized as high labor input, nil input of fertilizer, negligible animal or mechanized traction, and limited market accessibility.

Commercial agriculture is characterized by extensive farming and ranching, employment of advanced technology and management, and satisfactory market accessibility. Crops include oil palm, rubber, coffee, tea, sugar, and livestock. Zaire's general economic problems have resulted in under-capitalization of commercial agriculture, and consequently, a state of stagnation and decline in productivity.

Nutritional levels have suffered from low per capita levels of food production. Malnutrition is likely the principal or associative cause of perhaps 60% of Zaire's high morbidity and mortality rates. It is estimated that average daily per capita intake is estimated to be only 50% of the recommended minimum.

The Agricultural Recovery Program (ARP) for 1978-1980 of the GOZ was produced in early 1978. The document and meetings held in March 1978 to discuss the ARP noted primary constraints to agricultural development in Zaire as follows:

- inadequate transport infrastructure;
- unsatisfactory marketing arrangements;
- shortcomings in research;
- high cost of inputs;
- absence of a system of agricultural credit;
- lack of capital investment;
- inappropriate price policies;
- failure of the education system to meet the needs of agriculture;
- lack of interest in farm work among young Zairians;
- insufficient cooperation between territorial authorities and agricultural officials.

Top priority was assigned to maize, cassava, rice, timber, and fish production.

Within the agricultural research sub-sector, priority is placed upon three types of activities:

- research on maize, rice, cassava, cotton, oil palm, and animal husbandry.
- operations-type projects based on multiplication and provision of high-quality seeds, cuttings, and stock.
- conservation projects designed to maintain Zaire's heritage of plant and animal resources.

4. Importance of Cassava (Manioc) in Zaire

Cassava was brought to Africa from Latin America in the late 16th century by the Portuguese who introduced the crop first in Zaire. Since that time, it has been widely accepted and grown by the people. Cassava has spread into the interior via the Zaire River. Before cassava was introduced, there were few domesticated food crops in Zaire. Cassava made it possible for Zairians to settle in most high rainfall areas. Cassava has the potential to produce more food calories per unit of area than any other food crop, due to its high yield potential, its adaptability to diverse climatic and cultural conditions, and its ability to survive long (4-6 months) dry periods. It requires less labor, fewer inputs and less management than cereal crops. For these reasons, it is now grown on about 50% of all cultivated land in Zaire (AnnexD, Table 1). It provides 70% of the population with about 60% of their caloric intake. Though cassava tuber is basically a carbohydrate source of food (AnnexD, Table 5) in Zaire, cassava leaves are a very important source of protein with good amino acid profile, and vitamins (AnnexD, Table 6).

Zaire is the third largest cassava-producing country in the world and the largest in Africa (FAO Production Year Book, 1975). Tuber production approximates over 10 million tons per year. Although there is little data on leaf production, it is estimated that about one million tons of leaves are harvested annually. The GOZ Department of Agriculture projects a need to increase production to 13 million tons per annum in 1980 to maintain consumption at current levels. In reality, the current stagnation may continue, aggravated by the current epidemic incidence of three serious diseases, cassava bacterial blight (CBB), cassava mosaic disease (CMD), anthracnose, and two very destructive insects: the mealybug and green spider mite.

a) Cassava Bacterial Blight Disease (CBB)

A serious disease of cassava was noted in the Bandundu region in 1969/70 and began to appear in epidemic proportions in Bas-Zaire and the two Kasai regions. In these regions, cassava

prices went up by 10 fold and many cassava fields were completely abandoned due to this disease. Farmers call the disease "Cassava Cholera" which indicates how seriously they perceive this disease. The Commissioner of Agriculture and USAID/Zaire in March 1973 urgently requested the International Institute of Tropical Agriculture (IITA) to send scientists to Zaire to study the extent of the disease and to identify the cause of the disease. An IITA team reported to the Commissioner of Agriculture and USAID/Zaire that the major cause of the disease is cassava bacterial blight (CBB), Xanthomonas manihoti. The severity of CBB varies with time, location and among varieties. CBB causes an average tuber yield reduction of about 50% and can cause 100% yield loss of both tuber and leaves. Follow-on surveys on the distribution of the CBB disease made by IITA scientists report that it has spread to most cassava-growing areas of Zaire and to the Republic of Congo, Rwanda, Uganda, and Lake Victoria areas of Kenya and Tanzania.

b) Cassava Mosaic Disease (CMD)

CMD was first reported in Africa as early as 1894. This disease, which is transmitted by the white fly, is believed to be caused by a virus. CMD is extremely widespread throughout the cassava growing areas of Africa and yield losses from this disease have been reported as ranging from 20-90 percent.

c) Anthracnose

Anthracnose was first reported in Madagascar in 1946, in Zaire, Burundi, and Rwanda in 1962 and then was noted in various West African countries in the late 1960s and early 1970s. This fungal disease was recently reported to have caused a complete loss of cassava yield in various areas of Zaire's Bandundu Region. The distribution and severity of this disease appears to be increasing at an alarming rate especially in Bandundu Region which produces much of the cassava consumed in Kinshasa.

d) Cassava Mealybug (CMB)

The 1973 IITA Team found, in cassava fields near Kinshasa, a high incidence of bunched-top symptom associated with large colonies of mealybugs. Infested plants were stunted in growth and considerable yield reduction of both leaves and tubers appeared to result. Neither the pest nor the symptom were observed at this time in Bas-Zaire and Bandundu areas.

PRONAM recently reported serious CMB infestation in the Bandundu region. Root yield reduction of about 83% and leaf yield reduction as high as 100% on heavily infested plants during dry seasons have been observed. Infested top leaves cannot be used as a vegetable and have no market value.

In mid 1975 the GOZ's National Manioc Program (PRONAM) reported an outbreak of CMB in the Bas-Zaire region. In late 1975, Dr. S.K. Hahn, Assistant Director of IITA's Root and Tuber Improvement Program, after a trip to Zaire's principal cassava producing areas, stated "...I have concluded that cassava growth in the areas of Mbanza-Ngungu, Kimpese and Matadi in the Bas-Zaire region and Kikwit, Kiyaka, Vanga and Tono in the Bandundu region, is the worst compared to other parts of the world; contrary to the fact that cassava is the most important staple food crop in these areas. These areas are also the major suppliers of cassava to Kinshasa with population of about 1.5 million (at that time)."

In 1976 a specimen of the CMB sent to Commonwealth Institute of Entomological Research was identified as a new species which occurs in Brazil and Central Africa. This species has been named Phenacoccus manihoti (M-F.).

In November 1976, the executive members of IITA Board of Trustees visited M'Vuazi (Bas-Zaire) and observed the serious mealybug problem. They unanimously agreed that PRONAM should give high research priority to the control of this insect pest. They instructed IITA/PRONAM scientists to research means to control the insect. IITA held a Cassava Mealybug Workshop at the PRONAM station at M'Vuazi which was attended by international scientists in fields of taxonomy, biological control, insect physiology, entomology with a specialization in host plant resistance, and plant breeding. The Secretary of the Phytosanitary Council of the Organization of Africa Unity (OAU) was also invited. It was concluded that the CMB was introduced into Africa from Latin America. There are no natural enemies of the insect in Africa, so it has spread without resistance in Zaire and to the Republic of Congo, Gabon and Angola. The workshop recommended research on biological control of the insect as the best long-run solution. This recommendation is supported by successful biological control of the citrus mealybug in California and of other mealybugs in Hawaii.

e) Green Cassava Mite

In November 1976, Dr. Hahn of IITA hypothesized that green cassava mite (Mononychellus tanajoa) might be spreading in Zaire, as he had observed the insect at the border of Burundi and Zaire. PRONAM and IITA scientists visited the Kivu area in 1977 and confirmed the presence of the insect. The insect was accidentally introduced into Uganda in 1972 from Latin America and spread throughout Uganda and the Lake Victoria areas of Tanzania and Kenya in 1973. The insect scarifies top leaves and stems which then die back. Tuber yield is reduced as much as 40% and leaf yield reduction is high since the mite attacks leaves. There are no statistical estimations of leaf yield loss at this time.

If the insect spreads at the present rate it will reach Zaire's major cassava-growing regions (Bandundu, the Kasais, and Bas-Zaire) in a few years, as it took only two years for it to spread from the Lake Victoria areas to the east coast of Tanzania.

5. Establishment of Program National Du Manioc (PRONAM)

In 1974 the GOZ requested IITA to assist in establishing PRONAM. The 1974 Memorandum of Understanding between the GOZ and IITA to establish PRONAM contained these provisions:

a) The GOZ will provide foreign exchange to IITA for salaries, insurance, etc. for expatriate scientists, for training of Zairians, for equipment and supplies, and for approved program activities.

b) The GOZ will provide funds for housing, transportation and operational expenses as may be required for operations of the program.

c) The GOZ will make available to PRONAM such land, buildings and facilities at the central station (M'Vuazi) and at regional INERA Stations, as are mutually deemed to be necessary.

d) IITA will recruit and assign to the program fully qualified scientists.

e) IITA will provide scholarships as well as travel and study grants for qualified Zairian scientists and agricultural leaders within the limits of the agreed budget.

f) IITA will assist the organization and conduct of in-service training programs for scientists and technicians engaged in cassava research and extension in Zaire.

The main object of PRONAM is to increase cassava production in Zaire through research and training. Research are to:

a) Identify and develop cassava varieties having high yield potential;

b) Identify sources of resistance to major diseases and pests of cassava and to incorporate this resistance into high yielding potential varieties;

c) Develop a package of cultural practices which will enable yield to reach maximum economic levels; and

d) Develop a high quality in cassava including high protein in leaf, good palatability and low levels of hydrocyanic acid (HCN).

6. PRONAM Development, Research and Training Activities

IITA/PRONAM is currently staffed with four expatriate scientists (agronomist, plant breeder, entomologist, and pathologist). The Root and Tuber Improvement Program of IITA provides technical support and short-term specialized consultants. Zairian scientists have been trained at IITA in cassava plant improvement and are stationed at the PRONAM Station at M'Vuazi, at Kiyaka, Gandajika and Mulungu sub-stations. About 10 more Zairians will have gone to IITA for training in May 1978. One has been sent to the United States for advanced degree training and five will soon go for advanced degree training at universities in the United States or at the University of Ibadan, Nigeria.

IITA has produced improved cassava lines which yield about 50 to 100 percent more than the local varieties, and are resistant to cassava bacterial blight disease, cassava mosaic disease, and anthracnose disease. The most promising lines have been rapidly multiplied and distributed to state ministries and farmers in Nigeria and by many national cassava programs throughout the world. IITA cassava breeding materials were sent to Tanzania where some families have demonstrated resistance to green cassava mite. IITA has introduced into Zaire improved cassava seeds with high yield potentials and resistance to cassava bacterial blight disease, cassava mosaic disease and anthracnose disease. PRONAM has produced about 100,000 genotypes every year since late 1974. They have been screened for resistance to mealybug under two environmental conditions. Those cassava lines which outyielded the local variety by about 30% and which are resistant to the major diseases were selected. Several promising families which appear to be tolerant to mealybug were identified. The most promising lines were put forward for further evaluation for yield, quality, and wide adaptation under different ecological conditions in Zaire.

The biology and distribution of mealybugs has been well investigated. This will be useful for control and screening for resistance to the insect. Research on biological control of mealybug has been initiated in collaboration with the University of California at Riverside and the Commonwealth Institute of Biological Control. Natural enemies of mealybug for possible biological control have been surveyed in Africa. Many breeding lines of cassava have been planted in Kivu region to screen for resistance to the green spider mite.

7. Future PRONAM Research and Training Strategies

PRONAM has produced improved lines with high yield and multiple resistance to cassava bacterial blight, cassava mosaic disease and anthracnose. The improved lines and populations need to be tested for wide adaptation under various types of environments and screened for location-specific problems as well.

Environmental, biological, cultural and consumer preference problems can vary widely by location in the country. Most elite lines from field trials will be rapidly multiplied and tested at the farm level. The most promising lines will be selected by farmers and made available to them. To carry on these activities efficiently and effectively, it is necessary to continue and strengthen the research and physical capacity of the PRONAM center at M'Vuazi, and to establish sub-stations for testing and distribution of promising lines at selected locations covering the strategic cassava production regions. It is also essential to have facilities to train research/extension specialists at the PRONAM center. The training center may eventually accommodate trainees from the other neighboring countries with similar problems in cassava production.

The Agricultural Recovery section of the Mobutu Plan recommends the establishment of a total of nine field extension/adaptation/research stations to introduce improved manioc lines and cultural practices being generated by the PRONAM headquarters at M'Vuazi.

8. PRONAM in the GOZ

The Department of Agriculture is a major line ministry, headed by a Commissioner of State. The National Institute for Agricultural Research (INERA) has authority over all agricultural research, and is headed by a Delegate-General. Within INERA, there are several research stations, each of which pursues broad-gauged agricultural research. INERA has a historical bias towards non-food crop research, but is beginning to develop strategies and research activities in soils, food crops and extension and training. PRONAM, and the National Maize Program (PNM) which is assisted by CIMMYT, are the most progressive GOZ institutions in agricultural research, and are part of INERA. Limited regular budget funds have been received by PRONAM and PNM from the Department of Finance. The Department of Agriculture has also received foreign exchange allocations from the Bank of Zaire to pay for foreign technicians from IITA and CIMMYT for the PRONAM and PNM activities.

9. AID Involvement

USAID's involvement in support of the agricultural research in Zaire has included the following:

a) Programming of Counterpart Funds - USAID supported the GOZ Department of Agriculture's successful request to the Department of Plan for Counterpart Funds for PRONAM.

b) USAID is also assisting GOZ agricultural research in the National Maize Program, through the North Shaba Rural Development project.

c) The USAID North Shaba Rural Development project area has significant cassava cultivation, and will benefit from propagation of improved cassava varieties.

d) The USAID INERA Support project concentrates on soils analysis, bean crops and research strategy.

Thus USAID is making a substantial contribution toward improved agricultural food research of Zaire's two most important food crops - corn and cassava (rice is the third most important). These efforts are complemented by the assistance in soils analysis.

10. AID Experience Elsewhere

A. Cassava Projects

AID has nil experience in either a research or an outreach project with cassava as the emphasis crop.

B. Research, Extension and Training

A number of recent AID projects have undertaken to introduce new crop varieties. Evaluations of projects 6250305 (West Africa) and 6640205 (Tunisia) emphasized the integration of efforts between participating agencies, particularly those involved in research and extension. The Cassava Outreach project addresses this common institutional problem by relating research to extension in the National Manioc Program.

Extension projects in Columbia (N° 5140203), Thailand (N° 4930280), Uganda (N° 6170012), and El Salvador (N° 5190179) discuss and/or evaluate small farmer organization and participation as key to extension efforts. Small farmer participation is built into the Zaire Cassava Outreach project to introduce new cassava varieties and to gauge acceptability of improved cassava varieties.

The critical differentiation of the Zaire cassava outreach project from other research and extension projects is the serious disease and pest problems the Zairian small farmer faces in cassava production. There the problem is not one of changing agricultural practices as it is of providing proven disease resistant varieties and developing various insect control approaches appropriate to the small Zairian farmers economic and physical environment.

11. Other Donors

IITA/Ibadan has provided limited training, commodity and consultant assistance on a grant basis. Through a contractual arrangement with IITA, the GOZ supports IITA's involvement in PRONAM. This involvement, which began in 1974, is expected to cost \$ 1,753,000 through 1982. The Gouvernement of Belgium supported cassava research much earlier, but to our knowledge is no longer doing so.

B. PROJECT DESCRIPTION

1. Goal

The goal to which this project will contribute is the increased level, availability and the nutritional quality of food production for the low income majority in Zaire. This project's contribution to increased production, availability and improved nutritional quality of the most important subsistence crop in Zaire, cassava, will be of direct, considerable importance to both the rural and urban poor who are the majority in Zaire.

a) Measure of Goal Achievement

Since cassava is the most extensively cultivated and consumed crop, changes in the cassava complex would have a significant impact on the total food situation in Zaire. Retarding and eventually reducing cassava crop losses due to disease and insect damage through PRONAM regional activities will be a means of assessing the achievement of the project goal. PRONAM's research training and agronomic/outreach activities should have a sufficient impact on increasing cassava production, improving traditional cassava processing procedures, and improving the nutritional quality of cassava to permit these changes to be used as indicators that the project's anticipated contribution to the goal has been realized.

b) Means of Verification

The annual agriculture statistics generated by the GOZ Department of Agriculture's Bureau d'Etudes (supported by the USAID Agricultural Economics Project 660-052) will provide a means of verification. The substantive interaction between PRONAM and other agricultural institutions such as INERA and agricultural projects such as the USAID supported North Shaba Maize Production Project (which is doing research on intercropping) will be another means of benchmarking achievement.

c) Assumptions

It is assumed that the GOZ will maintain or initiate appropriate research policies that will encourage more resources to be allocated towards research that affects the small farmer level. The GOZ must allocate sufficient funds for the development of the agricultural research sub-sector. It is also assumed that increasing levels of resources from the donor community will be committed to agriculture in order to accomplish this goal.

2. Project Purpose

The purpose of this project is to develop the institutional capability of PRONAM to (1) conduct adaptive and applied research on cassava; and (2) to make new cassava technology available for distribution to subsistence farmers in Zaire.

PRONAM was created only 4 years ago. USAID assistance proposed herein will enable PRONAM to expand the research activities initiated by the IITA/PRONAM agreement, which are presently centered in M'Vuazi, Bas-Zaire. This expansion will be into the other major cassava producing areas. IITA will be the project implementing agent because of their unique experience in African cassava research.

For PRONAM to have a lasting impact on cassava, it must be strengthened and equipped to accomplish this task independently of outside assistance. PRONAM will develop the capability to carry out adaptive and applied research in the major cassava areas. The research approach to be used will involve a participatory approach where farmers will be directly involved in the process of testing and selecting cassava varieties on their farms. New cassava technology is to be made available to rural farmers and public and private organizations with extension capabilities through regional PRONAM agronomy/outreach activities as well as a nationally oriented research/extension training program at the PRONAM headquarters in M'Vuazi. New cassava technology is considered as new to Zaire but not necessarily new in other parts of the world.

a) End of Project Status

At the end of four years, PRONAM will have the following capabilities:

1. PRONAM will on a continuous basis, identify high yielding, disease and insect resistant cassava varieties. Newly developed farming cultural practices that should lead to better yields will also be specified so that farmers will receive a "production package" of improved varieties and new or improved production technology. Research is a dynamic process where promising alternatives are syphoned off to be tested and applied on regional and area specific basis. In this fashion, a gradual increase in Zaire's cassava production by means of higher yielding, sturdier varieties will be possible. The vegetative destruction and crop loss caused by three cassava diseases and two insect pests will receive priority attention by this project.

2. On a regional basis, PRONAM will multiply promising cassava varieties and establish a system for the distribution of these varieties in the area. This outreach activity will insure that the farmers have access to these improved cassava varieties and agronomic practices.

3. PRONAM will be capable of serving a front-line role in the identification and control of economically significant disease and insect problems of the cassava crop. This is an extremely important factor in preventing the type of crisis that Zaire is presently facing. It takes a knowledgeable, well organized and well equipped institution to identify and address new threats to cassava production.

4. PRONAM will have identified an improved quality of cassava product in terms of consumer acceptance, nutritional value and processing characteristics. This will have to be measured primarily on a regional basis where the substations are located.

5. The PRONAM M'Vuazi station will train intermediate level research workers and extension supervisors who will then be capable of (a) plant screening; (b) plant multiplication and distribution; (c) conducting farm level trials and (d) training extension agents in the same above mentioned areas.

This outreach activity is a key to making proven new cassava technology available for distribution to rural farmers. Intermediate level research workers and extension supervisors from PRONAM and other government agencies, as well as other interested institutions and organizations from any part of Zaire with extension capabilities will be given the opportunity to learn the basics of cassava technology and will be made aware of the latest results of cassava research. These individuals are expected to return to their normal environment and educate others as well as train them in the same techniques they learned.

b) Means of Verification

The external project evaluation (PAR) will provide the basis for verifying the achievement of the project purpose and evaluating the end-of-project-status. GOZ/DOA reports, PRONAM reports, and reports from other institutions, especially those who were involved in PRONAM's training program will supplement the PAR.

c) Assumptions

The achievement of the project purpose will depend upon a few external factors.

- The GOZ must faithfully continue its financial obligations under the present IITA/PRONAM agreement so as not to jeopardize the research activities of the four IITA scientists now at M'Vuazi. It is essential that PRONAM receive sufficient budgetary and local currency allocations from the Government to support the expansion of its activities.
- It is assumed that adequate numbers of trained Zairians will remain within PRONAM to insure that the organization has a competent staff to achieve its objectives and fulfill its responsibilities independently of outside foreign assistance.
- Agricultural extension in Zaire is quite inadequate at this time. Since this project will make a marginal contribution to improving the overall extension services, it is assumed that there will be complementary improvement

in the present DOA or RD agriculture extension system. It is also assumed that there will be enough extension activity carried out by other institutions, progressive groups, and agricultural projects to take over where PRONAM leaves off. Such institutions include INERA, IRS and private voluntary organizations including the many church and missionary groups.

- It is assumed that farmers will be sufficiently interested in receiving improved varieties and new technologies that they will actively seek them out themselves. This is an important assumption and one that will be key to the success of this project in reaching large numbers of farmers. There is every reason to believe that this will happen based on the importance of cassava in Zaire. The experiences to date at the M'Vuazi station give every indication that farmers are indeed eager to participate in variety selection and to take advantage of research results. To facilitate this process, improved cassava varieties and newly developed technologies will be adapted to local environments and farming systems.
- Finally, it is assumed that qualified expatriate personnel can be recruited on a timely basis so as not to seriously delay project implementation or impair the chances of success.

3. Outputs

In order to accomplish its objectives, several project outputs are envisioned as follows:

a) The INERA M'Vuazi station will be established as PRONAM's national center for cassava research and training. The M'Vuazi station has actually been part of the larger INERA research station complex. PRONAM was installed at the M'Vuazi station when it was created in 1974. With the addition of regional substations, the M'Vuazi station will be the national headquarters for PRONAM and the center of PRONAM research and training activities. This project will lead to intensification of research and adds local training as a new activity.

To prepare PRONAM to function independently of outside assistance, six Zairians will be trained at the Ph.D. level. The expatriate scientists presently at M'Vuazi will eventually be phased out and Zairian professionals will take over in their place.

b) Five PRONAM substations will be established at four INERA stations and at one other location in the most important cassava producing areas. They will be: (1) Kimpese, Bas-Zaire; (2) Gandajika, East Kasai; (3) Mulungu, Kivu; (4) Boketa, Equateur or Yangambi, Haut-Zaire; and (5) Kiyaka, Bandundu. The major

research on cassava will be performed at M'Vuazi. Promising materials and practices developed there will be sent to these substations. The substations will conduct local variety adaptation tests, with small farmers in their fields. Next, these varieties and different farming practices will be screened using farmer participation. Then the substations will extend these proven varieties and acceptable farming practices to some farmers and extension agents. Equally important, such a system will enable a reverse flow of information from farmers through the substations to M'Vuazi on the constraints and problems as the farmers perceive them. Each substation will be managed initially by an expatriate with a strong agronomic/extension background.

To staff these substations at the professional and paraprofessional level, the project has built in a paraprofessional and advanced degree training program. A total of 20 Zairians will be trained at the Master's degree level in the U.S. and 32 Zairians will receive paraprofessional training at IITA/Ibadan.

c) A training center will be established at PRONAM's M'Vuazi station. The center will have a classroom and boarding facilities with the capacity to board 24 people at one time. Approximately 40 research technicians and extension supervisors per year are expected to receive technical training in cassava research, production technology and extension techniques.

d) An improved physical plant services capability at M'Vuazi and substations which can maintain and repair station and farm machinery as well as PRONAM vehicles.

e) Improved information on the economics of cassava production, processing and marketing is envisioned.

f) To overcome the serious communications problems in Zaire, a radio communications network will be established between all the six PRONAM stations. This radio system will be integrated into the larger Department of Agriculture radio network.

g) Assumptions: It is assumed that there will be sufficient numbers of qualified candidates available for the various training programs. This would have to include candidates from within PRONAM for all levels of training as well as candidates from elsewhere for the M'Vuazi training center. It is also assumed that there will be adequate institutional, administrative and logistical cooperation and coordination between PRONAM and INERA in support of PRONAM's expansion. It is assumed that the equipment and supplies can arrive on site on a timely basis.

4. Inputs

A. USAID CONTRIBUTION

1.	Technical Assistance.....		₡ 2,323,000
	a. Five (5) extension agronomists 228mm...	1,045,000	
	b. One (1) training officer, 36mm.....	165,000	
	c. One (1) physical plant services off.48mm	220,000	
	d. International Travel.....	27,000	
	e. Consultants.....	28,000	
	f. Support costs for seven (7) expatriates (including vehicles).....	146,500	
	g. Administration.....		
	1. One (1) Project Coordinator, 48mm....	220,000	
	2. Support Costs.....	18,500	
	3. Supplies and expenses.....	13,000	
	h. Agricultural economics and extension studies	140,000	
	i. Contingency funding for 3 IITA scientists.....	300,000	
2.	Training.....		536,000
	a. University degree training (MS & PhD)..	440,000	
	b. Paraprofessional training at IITA.....	96,000	
3.	M'Vuazi training center equipment & supplies		60,000
4.	Research equipment and supplies.....		155,000
	a. M'Vuazi station.....	72,000	
	b. Regional stations.....	83,000	
5.	Physical plant services support.....		62,000
	a. M'Vuazi station PPS equipment.....	25,000	
	b. Regional stations PPS equipment.....	37,000	
6.	Vehicle fleet and spare parts.....		191,000
	a. M'Vuazi station (scientists & general).	52,000	
	b. Substations.....	132,000	
	c. Training center.....	9,000	
7.	Radio communications equipment.....		53,000
8.	Other Costs.....		118,000
9.	IITA Overhead (18%).....		629,500
10.	Inflation.....		372,500
	TOTAL.....		₡ 4,500,000

B. GOZ CONTRIBUTION

1. Technical Assistance Support (Local travel, POL, local furnishings, Ag.Econ.Studies Support).....		Z	559,000
2. Station Vehicles (cost & POL).....			150,000
a. Yamaha motorcycles - M'Vuazi.....	20,000		
b. Yamaha motorcycles - Substations.....	130,000		
3. Training Support.....			133,000
a. Advanced degree training (travel).....	30,500		
b. Paraprofessional training.....	10,500		
c. In-residence training.....	92,000		
4. Construction & Equiping M'Vuazi Training Center.....			308,500
5. Research & PPS Supplies.....			155,500
6. Station Rehabilitation.....			395,000
7. PRONAM Staff Salaries.....			1,965,000
8. PRONAM Operating Costs.....			287,500
9. Other Costs.....			33,500
10. Inflation.....			11,064,000
TOTAL.....		Z	15,087,000

C. IITA CONTRIBUTION

IITA is providing a biological control entomologist specialist at their own expense.

C. DETAILED PROJECT DESCRIPTION

The project envisions five major activities: crop research, outreach, training, machinery maintenance and agricultural economics studies.

1. Crop Research and Outreach

a) Crop research objectives

The research objectives of the project are to improve cassava for stable growth characteristics and high yield of both tuber and leaf with good consumer acceptance. This will be accomplished through breeding varieties that are resistant to major diseases and insects and by identifying improved cultural and management practices applicable at the farm level. The research objectives in more detail are:

- (i) High yield of both tuber and leaf in terms of dry matter per unit of land and time.
- (ii) Plant resistance to and control of the major economically important diseases and insects.
- (iii) High quality of cassava in terms of consumer acceptance, low HCN, high leaf protein content and quality, and refinement of processing.
- (iv) Improved plant characteristics - good conformation and root characteristics.
- (v) Wide adaptation of cassava to many different environments within similar ecological zones.

b) Crop research priorities

IITA/PRONAM has identified the source of resistance to cassava bacterial blight disease (CBB), cassava mosaic disease (CMD) and anthracnose disease. Cassava lines with multiple resistance to these diseases and with high yield potential have been selected by IITA/PRONAM scientists. However, the level of resistance of cassava lines to anthracnose is not satisfactory. Therefore, emphasis will be given to screening and breeding cassava materials for resistance to anthracnose as well as continuing efforts to improve cassava resistance to CBB and CMD.

biological, distribution and population dynamics of the mealybug insect have been investigated. Methods of controlling the insect will now be investigated: breeding cassava for resistance to the insect; cultural control and biological control of the insect. Chemical control is uneconomical; and since cassava leaves are often used as a vegetable, contamination of the leaves also rules chemicals out. The level of cassava resistance to the

mealybug is not very high at the present time. Therefore, the search for a source of resistance will be continued. Mulching of cassava appears to decrease the occurrence of the mealybug due to higher soil moisture. Thus, research on cultural control methods will be continued. The highest priority for mealybug control will be given to the biological approach, as biological control appears to be the most promising approach to controlling the cassava mealybug. An IITA/PRONAM entomologist has begun to investigate the biology of the cassava mealybug and the distribution of cassava mealybugs in Zaire. Some predators of the general category of mealybugs in Zaire have been identified: two COCCINELLIDS (Coleoptera), one CECIDOMIID (Diptera) and one LYCAENID (Lepidoptera) who live in association with the insect. However, these predators are associated with large populations of general mealybugs and have little effect on cassava mealybug. Thus, there is a need to identify natural enemies of the cassava mealybug in Latin America which can be introduced in Zaire with low or zero negative externalities to the environment.

There are obvious differences among cassava families in their resistance to the other pest, the green cassava mite. Thus, it may be possible to breed cassava varieties that are resistant to this insect. Many different germplasms of cassava will be screened for resistance to the insect in the Kivu region where the insect is now a significant problem. PRONAM should be well prepared to tackle this insect problem before it reaches the major cassava producing regions of Bas-Zaire, Bandundu and the Kasais.

Testing of promising cassava lines will be conducted at several locations within different ecological regions as a high priority during the course of the project. It is essential to test cassava lines for wide adaptation for future multiplication and farm level distribution of promising varieties. Extensive farm level testing of the most promising cassava lines will permit farmer participation and feedback in selecting the varieties. This should concurrently build their interest in new cassava technology.

c) Crop research strategies

To achieve the crop research objectives, the program has adopted an interdisciplinary team approach with an agronomist, a general entomologist, a biological control entomologist, a plant breeder and a plant pathologist. The entomologists screen cassava breeding materials for resistance to insects in collaboration with the plant breeder. Together they develop methods of insect control in cooperation with the agronomist. The pathologist screens breeding materials for resistance to diseases in cooperation with the plant breeder and they develop control methods of diseases in collaboration with the agronomist. The plant breeder develops plant population sources, and selects desirable types in cooperation with the pathologist, entomologist and agronomist. The agronomist develops cultural control methods of diseases and

insects in cooperation with the entomologists and pathologist. The agronomist then synthesizes a cultural system incorporating the production technologies developed by all the scientists of the program. The package of technology developed in terms of improved varieties and improved cultural and management methods, will be tested in different ecological zones by agronomists working at various substations. This activity is described in the following section (d).

All the crop research activities will be carried out jointly between IITA/PRONAM scientists and their Zairian counterparts. IITA/PRONAM scientists will lead the sub-program activities. Necessary consultative technical support to PRONAM will be provided by IITA's Root and Tuber Improvement Program. The Root and Tuber Improvement Program at IITA has eight scientists: an agronomist, plant breeders (2), an entomologist, a pathologist, a biochemist, a food technologist, a tissue culture/physiologist and a production agronomist. Scientists of the same discipline in PRONAM and IITA in Zaire will interact closely with each other.

The crop research conducted at M'Vuazi is by and large a GOZ/IITA project activity which is separately funded under the IITA/PRONAM agreement of 1974.

d) Outreach

So far, most of PRONAM's cassava research and screening work has been done in the Bas-Zaire and Bandundu Regions. In order to test over a wider area those promising lines already identified and those new lines, cultural practices and packages of technology emanating from the cassava research center at M'Vuazi, PRONAM plans to establish regional research/outreach substations at existing INERA stations located in the major cassava producing areas. Specifically, cassava research/outreach substations are planned for Kimpese (Bas-Zaire region), Kiyaka (Bandundu region), Gandajika (Kasai Oriental region), Mulungu (Kivu region), and Boketa (Equateur region) or Yangambi (Haut-Zaire region) Table 1.

Expatriate agronomists with extension experience will be stationed at each of the five outreach substations and will pursue the following objectives:

TABLE 1

CENTRAL AND REGIONAL STATIONS AND THEIR ACTIVITIES

STATION	REGION	ECOLOGY	REGIONAL SPECIFIC PROBLEMS AND ACTIVITY
<u>CENTRAL STATION</u>			
M'Vuazi	Bas-Zaire	Savannah	Objective research, primary screening, recombination, multiplication of breeders sticks CBB, CMD, AD, MB
<u>REGIONAL STATION</u>			
Kimpese	Bas-Zaire	Savannah	Testing of breeding materials. Multiplication and distribution of improved varieties, farm level testing and extension. CBB, CMD, AD, MB
Kiyaka	Bandundu	Savannah/ Forest	Same as above
Gandajika	Kasai	Savannah/ Forest	Same as above CBB, CMD, AD
Mulungu	Kivu	Low Moun- tainecus	Same as above CBB, CMD, GCM
Boketa or	Equateur	High Rain- fall Forest	Same as above CBB, CMD, AD
Yangambi	Haut-Zaire		

CBB stands for Cassava Bacterial Blight disease

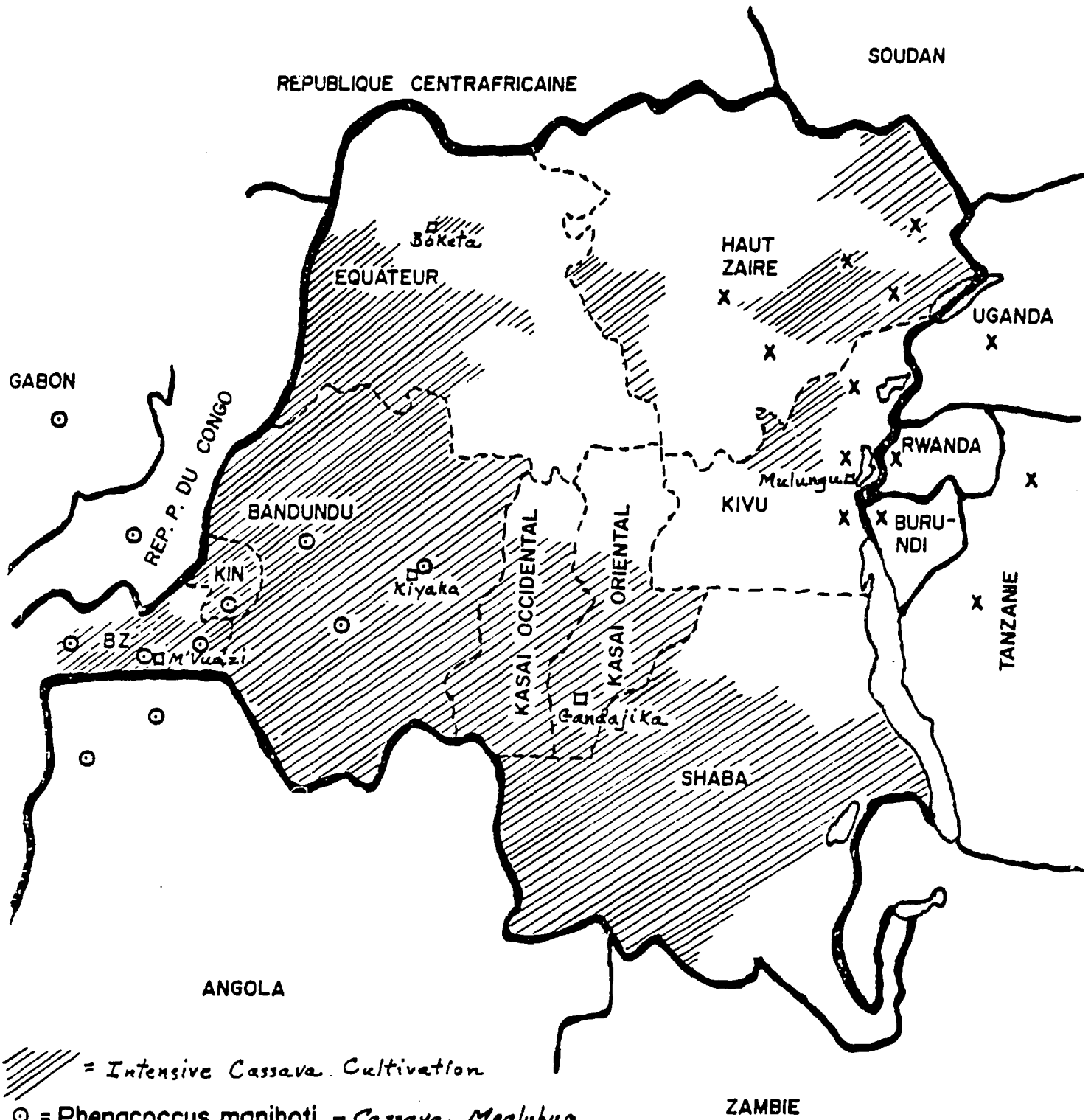
AD stands for Anthracnose disease

CMD stands for Cassava Mosaic Disease

MB stands for Mealybug

GCM stands for Green Cassava Mite

FIGURE 1
DISTRIBUTION OF PHENACOCUS MANIHOTI AND
MONONYCHELLUS TANAJQA IN ZAIRE



// = Intensive Cassava Cultivation
 ○ = Phenacoccus manihoti - Cassava Mealybug
 x = Mononychellus tanajqa - Spider Mite

- (i) Screen promising lines of cassava for insect disease resistance and other desirable characteristics. Selection on a regional bases minimizes the problems of adoption, quality acceptance, multiplication and distribuiton.
 - (ii) Test selected lines and cultural practices on farmers fields. This will enable local farmers to participate in the selection of improved materials and practices and to feedback to the researchers their reactions.
 - (iii) Multiply improved planting material using rapid multiplication techniques successfully employed in Nigeria and distribute the material to those involved in extension and local farmers.
 - (iv) Train extension workers and other interested parties including farmers in improved cassava production techniques.
- e) Annual activities to achieve research and outreach objectives

PRONAM's activities will be: objective research at the M'Vuazi center and testing of research results at the five regional stations. PRONAM will adopt an interdisciplinary team approach to effectively achieve its common objective: There will be an interaction of research, adoption/extension, agronomy, plant breeding, entomology I (host plant resistance), entomology II (biological control) and pathology.

YEAR 1

BREEDING

- 1) Collect local germplasm and evaluate them at each substation
- 2) Introduce germplasm in seed form from IITA and other sources and screen them for desirable agronomic characters at the central station and 5 regional stations.
- 3) Make recombinations between promising introduced cassava lines and the best local varieties.
- 4) Raise about 100,000 seedlings in M'Vuazi from the hybrid seeds of previous year.
- 5) Screen seedlings for resistance to diseases and insects and for plant characteristics.
- 6) Conduct preliminary yield trials in M'Vuazi for lines 3,000.

- 7) Conduct advanced yield trials at substations for promising 50 lines from the preliminary field trials of the previous year.
- 8) Conduct uniform yield trials for the 25 most promising lines from the advanced yield trials of the previous year at the 5 regional stations in cooperation with regional agronomists.

PLANT PATHOLOGY

- 1) Screen 100,000 seedlings and 2,000 lines from preliminary field trials, 50 lines of advanced field trials and 25 lines of uniform field trials for resistance to disease.
- 2) Make a survey of anthracnose disease distribution.
- 3) Study the etiology of anthracnose disease.
- 4) Survey and study root rot diseases.
- 5) Study the effect that the time of planting has on the expression of CBB, CMD, and anthracnose disease and on yield of both tuber and leaf as affected by the diseases.
- 6) Study the effect of mulch in the expression of CBB.
- 7) Study the synergetic effect of CNN, CMD and anthracnose disease upon cassava yield and quality.
- 8) Study the effect of soil types, soil moisture and soil fertility on the expression of CBB, CMD, and anthracnose disease.
- 9) Develop methods of screening cassava for resistance to anthracnose disease.
- 10) Conduct a study of yield loss due to anthracnose disease.

ENTOMOLOGY I (HOST PLANT RESISTANCE)

- 1) Screen 100,000 seedlings, 2,000 lines for preliminary yield trials, 50 lines for advanced yield trials and 25 lines for uniform yield trials for resistance to insects at Kimpese and Mulungu.
- 2) Study the biology of the green cassava mite at the Mulungu station.
- 3) Study the population dynamics of the mealybug.
- 4) Study the effect of planting time on mealybug incidence and yield of both tuber and leaf as affected by mealybug infestation.

- 5) Survey the extent of the spread of the green cassava mite.
- 6) Study the effect of mulching on the severity of mealybug damage.
- 7) Study the effect of soil types, soil moisture, soil fertility on the incidence of mealybug damage.
- 8) Study yield loss due to mealybug and green cassava mite infestation.

ENTOMOLOGY II (BIOLOGICAL CONTROL)

- 1) Survey and identify the natural enemy complex (parasite/predator) of the mealybug under the local environment where it is a pest (especially in Brazil and other parts of Latin America).
- 2) Survey and identify natural enemies of the green cassava mite (low priority) in Brazil and other parts of Latin America.

AGRONOMY

- 1) Develop cultural control methods for mealybug and CBB.
- 2) Study relationship between soil fertility and moisture levels on the incidence of diseases and insects and their severity.
- 3) Study the economics of leaf vegetable harvesting from cassava and disease severity and tuber yields.
- 4) Multiply rapidly the improved cassava varieties and conduct cultural evaluations studies for improved cassava varieties.
- 5) Identify limiting factors in cassava production from the cultural and management points of view.
- 6) Study how to improve the existing cultural practices of cassava.
- 7) Synthesize a cultural system incorporating the production technologies.
- 8) Study how to maintain and improve soil fertility through green manuring, mulching, and intercropping/rotation with legumes.

REGIONAL STATIONS

- 1) At each station, multiply rapidly the 50 most promising lines which are produced by PRONAM in the previous four years.
- 2) Collect local cassava germplasm at each regional station.
- 3) Evaluate the local cassava germplasm at each regional station.

- 4) Raise about 20,000 seedlings annually from the improved seeds supplied by PRONAM and IITA at each regional station.
- 5) Screen the seedlings for resistance to diseases and insects at each regional station.
- 6) Conduct uniform yield trials for the 25 best lines from PRONAM center.

YEAR 2

BREEDING

Continue all the sequences of breeding activities of Year 1.

- 1) Study the genetic mechanism of resistances to green cassava mite, if such resistance has been found.

PATHOLOGY

Continue all the pathology activities of Year 1.

ENTOMOLOGY I (HOST PLANT RESISTANCE)

Continue all the entomology activities of Year 1.

ENTOMOLOGY II (MEALYBUG BIOLOGICAL CONTROL)

- 1) Determine the efficiency of control of mealybug by the identified natural enemies (if any).
- 2) Assess the natural enemies for effective control of mealybugs and the breeding (cultivating) capability of the natural enemies.

AGRONOMY

Continue the agronomic activities of Year 1.

REGIONAL STATIONS

Continue the activities of Year 1.

- 1) Distribute planting materials of the most promising lines to selected farmers in each region.
- 2) Conduct farm level testing for the best lines at several different locations within each region.
- 3) Conduct preliminary yield trials for about 500 selected seedlings.

YEAR 3BREEDING

Continue the sequence of breeding activities of Year 2.

PATHOLOGY

Continue the pathology activities of Year 2.

- 1) Production of disease free planting material by tissue culture.

ENTOMOLOGY I (HOST PLANT RESISTANCE)

Continue the entomology activities of Year 2.

- 1) Study mechanism of resistance to green cassava mite and cassava mealybug (if a resistance exists).

ENTOMOLOGY II (MEALYBUG BIOLOGICAL CONTROL)

- 1) Introduce the successful natural enemies to the mealybug (if any).
- 2) Pre- and post release assessment of natural enemies that have been introduced after successful rearing and culturing of these natural enemies of the mealybug.
- 3) Application of biological control on a large scale in the areas where mealybug is serious.

AGRONOMY

Continue agronomic activities of Year 2.

REGIONAL STATIONS

Continue the activities of Year 2.

- 1) Conduct advanced yield trials for about 50 lines which are selected through preliminary yield trials at each regional station.

YEAR 4BREEDING

Continue breeding activities of Year 3.

- 1) Study the genetic mechanism of resistance to anthracnose disease.

PATHOLOGY

Discontinue activities 2, 3, 4, 5, 6, 7, 8, 9, 10 of Year 1.

- 1) Study mechanism of resistance to anthracnose disease.
- 2) Study whether or not different areas of anthracnose disease exist. Race differentiation of anthracnose disease.
- 3) Develop methods of screening cassava for root rot.

ENTOMOLOGY I (HOST PLANT RESISTANCE)

Discontinue activities 2, 3, 4, 5, 6, 7, 8 of Year 1.

- 1) Continue study on mechanism of resistance to various insects.

ENTOMOLOGY II (BIOLOGICAL CONTROL)

Continue biological control activities of Year 3.

- 1) Divert research effort from mealybug to green cassava mite.

AGRONOMY

Discontinue the activities 2, 3, 4, 5 of Year 1.

- 1) Concentrate more on synthesizing a cultural system that incorporates the production technologies.

REGIONAL STATIONS

Continue the activities of Year 3.

- 1) Conduct uniform yield trials for the 25 most promising lines selected through advanced yield trials. Conduct the trials at many different sections within each region.

2. Training Activities

The objective of the project's training activities is to develop a cadre of Zairians to take responsibility for all aspects of PRONAM at the earliest possible date. Achieving this goal will require paraprofessional and advanced degree training of Zairians outside of Zaire and the development of a technical training capability within the country.

a) External paraprofessional and advanced degree training

In order to Zairianize PRONAM, paraprofessional and advanced degree training presently unavailable in Zaire would be required. Specifically to carry out PRONAM's research, training and outreach activities, the project would seek to train 20 M.Sc's. and from these, 6 Ph.D's as follows:

	<u>M.Sc Level</u>	<u>Ph.D. Level</u>
Plant breeding.....	3	2
Agronomy.....	6	2
Entomology.....	2	1
Pathology.....	2	1
Agricultural Economics.	1	-
Food Technology.....	1	-
Agricultural Education.	1	-
	<hr/>	<hr/>
	16	6
	=====	=====

The project would also endeavor to provide at IITA 5 months of paraprofessional training in cassava research and production technology to 8 Zairians per year over the project's four year period. This paraprofessional training will cover the following areas:

- 1) Soils and environments of root and tuber crop production and their effective management;
- 2) Morphology, growth stages and plant development in relation to improved cultural practices;
- 3) Production and rapid multiplication techniques;
- 4) Improved agronomic practices for land preparation, fertilization, weed control and plant spacing for growing high-yielding varieties under optimal conditions for maximum yield;
- 5) Low-cost intermediate technology farm implements for land preparation, planting, weeding, fertilizing, crop protection and harvesting;
- 6) Post-harvest technology, including nutritional and cooking considerations;
- 7) The economics of root and tuber crop production and marketing;
- 8) Crop protection, pests and diseases;
- 9) Root and tuber crops as components of a farming system

- under tropical conditions, problems and possibilities;
- 10) Communications techniques and extension methodology;
 - 11) Machinery repair and maintenance; and
 - 12) Management and operation of a physical plant services unit.

Procedurally, candidates for paraprofessional training will be jointly selected by IITA/PRONAM and INERA and advanced degree candidates will be jointly selected from those who have completed paraprofessional training at IITA. Every effort will be made to place M.Sc. candidates at the University of Ibadan so that the focus of their studies and research will be on tropical African agricultural problems. Thesis research would be jointly designed and supervised by University of Ibadan, IITA and PRONAM scientists and would be undertaken either in Nigeria or in Zaire. It is envisioned that those Zairians selected for Ph.D. studies from among the successful M.Sc. students would be sent to a U.S. university for course work and undertake their thesis research on a cassava research problem either at IITA or in Zaire. Admission for Ph.D. candidates would thus be sought at appropriate U.S. universities which would permit thesis research to be undertaken either in Nigeria or Zaire under the supervision of IITA or PRONAM scientists. Provision would be made to have a Ph.D. student's major professor visit Nigeria or Zaire as appropriate to ensure the research is on track. Successful Ph.D. candidates would be expected to replace the expatriate PRONAM research scientists in the fields of plant breeding, agronomy, entomology and pathology.

It is expected that an M.Sc. program would require two years to complete and a Ph.D. program an additional two and one half years. A schedule of paraprofessional and advance degree training is shown in Table 2.

b) Development of technical training capability within Zaire

To make a national impact on cassava production in a country the size of Zaire will require a large number of personnel trained in the role of cassava in local farming systems, the identification of local cassava production problems such as diseases, insects, soil deficiencies, etc., the latest techniques for improved cassava production and the effective extension of these techniques to Zairian farmers. In order to satisfy these training requirements, the project proposes to establish a cassava technical training facility and program at PRONAM's M'Vuazi headquarters.

TABLE 2

PROPOSED SCHEDULE FOR PROFESSIONAL TRAINING

AREA	1978	1979	1980	1981	1982	1983
Plant Breeding	M.Sc.	M.Sc.	M.Sc. M.Sc.			Ph.D. Ph.D.
Agronomy		M.Sc. M.Sc.	M.Sc. M.Sc.	M.Sc. M.Sc. M.Sc.		Ph.D. Ph.D.
Entomology		M.Sc.	M.Sc. M.Sc.			Ph.D.
Pathology		M.Sc.	M.Sc. M.Sc.			Ph.D.
Agricultural Economics			M.Sc.			
Food Technology			M.Sc.			
Agricultural Education			M.Sc.			

The facility will be capable of accomodating 20 technical trainees and 4 advanced degree candidates undertaking thesis research at M'Vuazi.

It is planned to have two 10 week technical training coursed each year. These courses would be designed for mid-level extension personnel, research technicians and others of the A₁ or A₂ level with interests in cassava production such as individuals from church groups, the Peace Corps, commercial organizations, etc. The emphasis would be on "training of trainers" in the hopes that participants upon returning to their respective areas could train extension workers, farmer groups and other interested parties. In addition to dormitory rooms, the facility will require a kitchen and dining area, laundry services, offices, a classroom, library/reading room and some recreation facilities.

In order to provide overall direction while the facilities and program are being established, the project proposes to employ an expatriate training officer. INERA will appoint a deputy training officer who, after a period of on-the-job experience and upon completion of a Master's degree in agricultural education, will take over the expatriate training officer's position. In addition to the deputy training officer, INERA will provide the following personnel to support the training officer:

1 Field Trainer. This individual assists in course preparation and delivery and assists the trainees design, execute and evaluate field trials.

5 Field Laborers. These are permanently assigned to the training program to assist trainees establish and maintain field trials and to take care of the training plots between courses.

1 Head Cook.

4 Assistant Cook/Stewards.

2 Custodians.

2 Laundry persons.

1 Clerk/Typist.

3. Machinery Maintenance Activities

A problem which has consistently hampered PRONAM's past research efforts has been the lack of a vehicle maintenance and repair capability at M'Vuazi. Although there are excellent garage facilities at M'Vuazi (repair bays, store rooms, etc.) there are virtually no tools and shop equipment and the Zairian

staff lack proper training in equipment maintenance and repair and in garage management. As proper maintenance and repair of vehicles, farm machinery and station power generation, water supply, and other equipment is vital to the success of the project, it is proposed that an experienced physical plant officer be employed by the project for a four year period and that sufficient funds be made available to purchase the tools and equipment required to enable the M'Vuazi station to provide full repair and maintenance services to PRONAM and the M'Vuazi station. A major part of the physical plant services officer's duties will be to provide on-the-job training to the Zairian garage staff on proper maintenance and repair procedures as well as proper methods of garage management. Provision has been made within the project's paraprofessional training category to train up to four Zairians at IITA in the operation and management of farm machinery and garage management.

D. AGRICULTURAL ECONOMICS STUDIES

Reliable economic information regarding constraints to cassava production, processing, and marketing (transport, distribution, prices) is necessary for GOZ policy makers, development planners and PRONAM to formulate strategies and set priorities for research, training and extension activities. An economic survey will be carried out by IITA and PRONAM agricultural economists to gather this information. This economic research activity will contribute to the professional training and field expertise of the PRONAM economist as well as the rest of the PRONAM staff thereby insuring that future research on cassava reflects economic realities. One individual is going to be trained to the Master's Degree level to help staff PRONAM in the area of economic analysis.

The methods and technologies applied to cassava production, processing and marketing in Zaire are diverse. In Zaire, cassava is presently used only for human consumption. There may be choices available related to systems of production, processing, marketing and use of cassava. To properly make these choices, technical, economic, social and political implications must be better understood. To develop improved cassava production systems, the economic gains from technology must be considered along with the distribution of these gains. Economic realities will help guide PRONAM research on improved technologies. A continuous capacity to obtain and assess such data is necessary so that government policy makers and development planners and farmers can make appropriate investment decisions about cassava production.

A three phase plan for incorporating an agricultural economics capability within PRONAM has been designed. At this time, the chief architect of this plan, IITA's senior agricultural economist, is on the verge of taking a new position in Asia. Thus it is possible that the general plan discussed below will change somewhat.

Although IITA staff will take the leading role in carrying out the economic studies, they will receive assistance from the DOA Division of Statistics in survey design.

The DOA Division of Statistics is currently receiving USAID assistance in data collection analysis through the Agricultural Economics Project (660-052). The IITA economist and PRONAM staff will fully define the data requirements and will develop the research methodology jointly with the Statistics Division. Data collection activities will also be tied to the data collection activities that will take place as part of the research program. In that respect, there will be cooperation and interaction between research and the economic studies activity for the benefit of both. It is important to emphasize

as well that the economic studies proposed in this project will be closely linked with other (particularly in marketing) agricultural studies that are expected to be initiated in the DOA. This is particularly true of the pricing/marketing study on cassava, maize and rice which is scheduled to begin about the same time.

A brief description follows of the original three phase plan to be applied to the major cassava producing areas of Bas-Zaire, Bandundu and the Kasais:

1. PHASE I will be a macro oriented baseline study which will identify regional production links, develop information on the extent of disease and insect infestations, survey production technologies and produce base data on regional varieties in processing and marketing channels. This study will incorporate primary and secondary data from the major cassava production areas of Zaire: Bas-Zaire, Bandundu and both Kasai Regions. The major source of primary data will be the research statistics developed by the PRONAM staff and the data developed through the use of the area frame sample which has been developed by the DOA Division of Statistics. Data analysis will be the responsibility of the IITA and PRONAM technicians although they will be assisted by the DOA technicians who will develop specifications for the data which will be collected using the area frame sample. This study is expected to take about a year to complete. This baseline study will also serve as a base for determining the scope of phase II studies which will provide more in-depth micro information.

2. PHASE II will involve three in-depth investigations of cassava over a two years period.

a) Farm level production systems will be investigated. The role of cassava within farming systems would be defined together with a view to solving production problems. Cassava production models will be outlined. Data will be collected so that the effect can be measured on cassava production systems of varying such factors as the technical, biological, economic, and managerial relationships which exist between cassava and other crops grown by farmers. The effects of environment (disease, insects, soil types, seasonal patterns, etc.) will be closely analysed. These studies will be done as a cooperative effort among the disciplines of economics, agronomy, entomology, and soil science. Although PRONAM does not have a resident soil scientist, INERA which is now receiving assistance from USAID in this area (USAID INERA Support Project 660-064) will be able to fulfill this need. Results from this part of the Phase II study will be an initial effort: to identify the most important problem areas in cassava production which should have future priority in biological research; identify any needed changes in institutions and marketing systems; identify and rank constraints which impede the adoption of improved cassava

technology; identify technology which may have high adoption rate; estimate the benefits of new technology in terms of both increased output and income distribution among farmers; help identify the target groups for an expanded extension effort; enable planners to predict resources and prices (credit, planning material) required for new technology to be adopted by farmers; and help estimate future demands for cassava products.

b) Cassava processing systems will be studied. Certain fundamental questions concerning cassava in the traditional context of Zaire should be answered. As is pointed out in the socio-economics analysis, the labor requirement in processing cassava (often a woman's job) can account for up to a half of the total energy to produce a final consumable or saleable product. If it were technically possible to increase farm level production, would the traditional processing system have the capacity to absorb and process the increased output? Would bottlenecks lie within the transporting of roots to processing sites, the root cleaning and soaking steps, the grating or handling of roots, fermenting or drying products (e.g. energy supply?), or possibly the storing of processed cassava? If constraints in processing do present themselves as serious limitations to the availability of increased production, they must be identified and quantitatively understood before solutions through research can be formulated. Here again there has to be multidisciplinary cooperation among scientists and economists.

c) Cassava marketing systems will be the third part of the Phase II study. The impact that increased cassava production may have on the transportation infrastructure, prices, market channels, etc. is to receive considerable attention. The issue of the relationship between producer prices, marketing margins and consumer prices in Zaire is a hot issue. This will have to be thoroughly evaluated so that government policy makers can make informed decisions regarding this issue. Demand analysis may be carried out. For staple crop like cassava that plays such a vital role in the food system of Zaire, it is imperative that the future demand for cassava be analyzed, especially in terms of the elasticity of demand.

3. PHASE III At this stage, policy and planning come into focus. The social and economic costs of the distribution of the benefits from alternative policies must be presented to policy makers. To facilitate the making of appropriate technical, economic and social decisions that will lead to socially beneficial and politically acceptable policies and plans, the micro and macro-economic studies of Phases I & II will have to be synthesized into concrete proposals of action for the future. The information generated from these studies is expected to be so synthesized into proposals by PRONAM in conjunction

with Zairian scholars. It is then up to development planners and policymakers in PRONAM and the rest of government to formulate appropriate plans to stimulate cassava production for the future.

TABLE 3

INTERNATIONAL STAFF AND THEIR RESPONSIBILITIES

STAFF	LOCATION	RESPONSIBILITY
<u>ADMINISTRATION</u>		
1 IITA Administration Officer (1)	Kinshasa	Overall coordination
<u>RESEARCH</u>		
1 Technical Coordinator/Agronomist (2) (PRONAM interim Director)	M'Vuazi	Coordination of research, Improving cultural methods.
1 Entomologist (2)	"	Host plant resistance
1 Entomologist (3)	"	Biological control
1 Plant Breeder (2)	"	Variety control improvement
1 Plant Pathologist (2)	"	Disease resistance
<u>OUTREACH</u>		
1 Agronomist (1)	M'Vuazi, Bas-Zaire	Testing, multiplication, distribution and farm level testing
1 Agronomist (1)	Kiyaka, Bas-Zaire	"
1 Agronomist (1);	Gandajika, Kasai Oriental	"
1 Agronomist (1)	Mulungu, Kivu	"
1 Agronomist (1)	Boketa, Equateur or Yangambi, Haut-Zaire	"
<u>TRAINING</u>		
1 Training Officer (1)	M'Vuazi	Planning and execution of technical training programs, coordination of training with Zaire
<u>MAINTENANCE</u>		
1 Physical Plant Services Officer (1)	M'Vuazi	Maintenance, repair of PRONAM machinery and vehicles

- (1) USAID supported
(2) GOZ supported
(3) IITA supported

See Annex for job descriptions.

TABLE 4

ZAIRIAN STAFF AND THEIR RESPONSIBILITIES

<u>STAFF</u>	<u>LOCATION</u>	<u>RESPONSIBILITY</u>
<u>ADMINISTRATION</u>		
1 Administrative Assistant	Kinshasa	Administrative support
1 Clerk/Typist	"	"
1 Deputy Physical Plant Services Officer	M'Vuazi	Support service
2 Mechanics	"	"
2 Mechanic assistants	"	"
3 Drivers	"	"
1 Driver	Kinshasa	"
3 General Services Technicians	M'Vuazi	"
<u>RESEARCH</u>		
1 Deputy coordinator (Future PRONAM Director)	M'Vuazi	Research/Research Admin.
2 Deputy Agronomists	"	Research
2 Deputy Breeders	"	"
2 Deputy Entomologists	"	"
2 Deputy Pathologists	"	"
15 Technicians	"	Assistant researchers
50 Laborers	"	Field work
2 Clerk/Typists	"	Support service
<u>TRAINING</u>		
1 Deputy Training Officer	M'Vuazi	Training
1 Trainer	"	"
1 Head Cook	"	Support service
6 Asst. Cook/Steward Custodians	"	"
10 Laborers	"	Field work
<u>OUTREACH</u>		
5 Substation Agronomists	5 Regional Stations	Testing, multiplication, Distribution, Farm level testing
25 Technicians	"	Assist extension agronomist
100 Laborers	"	Field work
5 Clerk/Typists	"	Support service

TABLE 4 (CONTINUED)
 ZAIRIAN STAFF AND THEIR RESPONSIBILITIES

STAFF	LOCATION	RESPONSIBILITY
<u>OUTREACH</u> (continued)		
5 Driver/mechanics	5 Regional Stations	Support service
5 Drivers	"	"
5 General service technicians	"	"
5 Physical plant service officers	"	"

III. PROJECT ANALYSIS

A. TECHNICAL ANALYSIS

1. Research and extension methodology being proposed in this project are suitable and feasible for Zaire. National manioc programs have been established in other nations with similar conditions, e.g. Nigeria, Brazil. The suggested implementing agency IITA, has preeminent experience in backstopping such cassava at the small farmer level will be accomplished in the same way as currently practiced in Zaire (vegetative cuttings). The investigation of natural predators of the cassava mealybug, and probable impostation of such natural predators will be preceded by careful synergetic analysis of the total impact of the presence of the new predator in Zaire.

2. Inputs (construction and rehabilitation of research/outreach facilities and of housing; implementation of technical training programs in the U.S., Nigeria, and in Zaire; establishment of a physical plant services and logistics system; establishment of a radio communications system; and provision of expatriate technical services) are judged to be reasonably priced, based on intensive on-site evaluations by an AID engineer at the M'Vuazi and Kiyaka (Bandundu) stations. Based upon prior visits to the Gandajika, Mulungu, Boketa, and Yangambi stations by AID personnel or PRONAM and reports of GOZ technicians, it is assumed that required remodelling and construction work will be similar in nature and expense to that expected at M'Vuazi and Kiyaka. Should that assumption prove untrue, necessary cost increases would be addressed as a project revision. Supplemental information is contained in Annex B .

3. The project is deemed technically sound; and, based on analysis by an AID engineer and the Design Team, the project meets requirements of FAA Section 611 (a) and (b).

B. FINANCIAL ANALYSIS AND PLAN

1. It is difficult to demonstrate financial rate of return/viability with respect to project participants or beneficiaries in any agricultural research or extension project, especially in LDC's. No such estimates will be made in this project.

2. Recurrent operating and maintenance costs of PRONAM are assured, during the project life, from counterpart funds. Efforts are underway to increase PRONAM's regular budget allocations and it is expected this will be sufficiently accomplished by 1981.

3. The total investment costs of all GOZ and USAID contributions to PRONAM and the Cassava Outreach Project

(GOZ contribution began in 1974) will exceed \$25 million by 1982. The GOZ is financing over 82% of this which includes both local currency and foreign exchange. The total project cost is over \$23 million, exclusive of the IITA/GOZ agreement. Almost 95% of the total GOZ contribution of \$20.6 million during the life of this project is in local currency (dollar equivalent). Of this, about \$19 million will be from counterpart funds for project costs other than PRONAM salaries and operational costs. GOZ foreign exchange costs will total about \$1.7 million from 1974-1982 which is to support the IITA/GOZ PRONAM agreement. Of this total, approximately \$1 million will be expended during the life of this project. The greatest portion of GOZ costs is for PRONAM salaries and operational costs.

The USAID is helping to finance the expansion of PRONAM research and outreach activities as well as the necessary investment costs in training Zairians to carry on these PRONAM operations after outside assistance from the USAID and IITA is completed in four years. Over 50% of the total USAID contribution of \$4.5 million will be for technical assistance. This technical assistance includes eight (8) permanently assigned expatriate technical advisors and TDY consultants. The other two major categories of USAID's contribution are training funds and the necessary vehicles, research and physical plant services equipment to support a national PRONAM program. Equipment and vehicular costs are considered quite minimal considering the difficult logistical and commodity procurement problems in Zaire.

This page has been intentionally left blank.

TABLE 1
SUMMARY COST ESTIMATES AND
FINANCIAL PLAN (000)

	AID FX	GOZ LC ¹⁾	TOTAL
Technical Assistance..	\$ 1,923.0	\$ 667.5	\$ 2,590.5
Vehicles, Equipment and Supplies.....	521.0	351.0	872.0
Training.....	536.0	166.0	702.0
Staff.....	-	1,914.5	1,914.5
Station Rehabilitation or Construction.....	-	872.0	872.0
Operating Costs.....	-	286.0	286.0
Other Costs.....	113.0	40.0	153.0
IITA Overhead ²⁾	556.5	-	556.5
Inflation ³⁾	128.5	1,035.0	1,163.5
TOTAL.....	<u>\$ 3,778.0</u>	<u>\$ 5,332.0</u>	<u>\$ 9,110.0</u>

1) Conversion of Table 2: Z 1 = \$ 1.25

2) 18%

3) FX = 6%; LC = 40%

NOTE: GOZ Counterpart Funds = \$ 2,450.0

TABLE 1-A

USAID Total Contribution.....	= \$ 3,778,000
1) GOZ Contribution in Foreign Exchange through 1978.....	= \$ 721,900
1) GOZ Contribution in Foreign Exchange from CY 79 - CY 82=	\$ 1,031,600
GOZ Contribution in Local Currency (\$ equivalent).....	= \$ 5,332,000
TOTAL.....	= <u>\$10,863,500</u>

1) To finance the existing IITA/GOZ cassava research agreement

TABLE 2

COSTING OF PROJECT INPUTS/PROJECT ACTIVITY CENTERS (000)

	ADMINI- STRATION	M'VUAZI CENTRAL STATION	TRAINING	SUBSTATIONS OUTREACH	AG. ECON STUDIES	COMMUNI- CATIONS	TOTAL
<u>AID</u>							
Technical Assistance.....	§ 251.5	§ . . . 5	§ 180.5	§ 1,122.5	§140.0	§ -	§ 2,323.0
Vehicles, Equipment and Supplies.....	-	149.0	69.0	250.0	-	53.0	521.0
Training Funds.....	-	-	536.0	-	-	-	536.0
Other Costs ¹⁾²⁾	9.5	.0	30.0	52.0	1.5	2.0	118.0
IITA Overhead ¹⁾	47.0	.5	146.5	256.0	25.5	10.0	629.5
Inflation ¹⁾0	.5	.0		23.0	40.0	372.5
SUB TOTAL.....	§ 330.0	§1,083.5	§ 1,029.5	§ 1,798.0	§190.0	§ 69.0	§ 4,500.0
<u>GOZ</u>							
°Technical Assistance.....	Z 82.0	Z 253.0	Z 20.0	Z 142.0	Z 62.0	-	Z 559.0
°Vehicles, Equipment and Supplies.....	-	80.0	7.5	220.0	-	-	307.5
°Training Support.....	-	-	173.0	-	-	-	173.0
Staff.....	14.0	792.0	80.0	1079.0	-	-	1,965.0
°Station Rehabilitation or Construction.....	-	355.0	302.5	40.0	-	-	697.5
Operating Costs.....	-	167.0	-	120.0	-	-	287.0
°Other Costs.....	1.0	14.0	5.0	13.0	0.5	-	33.5
Inflation ¹⁾	313.	4491.5	1696.5	4363.0	200.0	-	11,064.0
SUB TOTAL.....	Z 410.0	Z 6,153.0	Z 2,284.5	Z 5,977.0	Z 262.5	-	Z 15,087.0

1) Allocated; 2) Includes approximately § 8,000 for Evaluation; °Counterpart Funds

TABLE 3

YEARLY COST ESTIMATES
AND FINANCIAL PLAN (000)

OUTPUT ACTIVITIES	FISCAL YEAR										TOTAL	
	78		79		80		81		82		AID-\$	GOZ-Z
	AID-\$	GOZ-Z	AID-\$	GOZ-Z	AID-\$	GOZ-Z	AID-\$	GOZ-Z	AID-\$	GOZ-Z	AID-\$	GOZ-Z
ADMINISTRATION												
Technical Assistance	110.0				55.0		55.0				200.0	
T.A. Support.....	18.5	30.0		30.0		5.0		5.0			18.5	70.0
Supplies & Expenses	5.0										5.0	
Staff Salaries.....		10.0		4.0								14.0
International & Local Travel.....	2.0	3.0	2.0	3.0	2.0	3.0	2.0	3.0			8.0	12.0
SUB TOTAL....	\$135.5	Z 43.0	\$ 2.0	Z37.0	\$ 57.0	Z 80.0	\$ 57.0	Z 8.0			\$ 251.0	Z 96.0
MUHAZI CENTRAL STATION												
2												
Technical Assistance	110.0				90.0		20.0		300.0		520.0	
T.A. Support.....	53.5	25.0		25.0		25.0		25.0		25.0	53.5	125.0
Consultant.....	8.0		20.0								28.0	
PRONAM Staff.....		127.0		133.0		140.0		196.0		196.0		792.0
International & Local Travel.....	15.0	32.0	12.0	32.0		32.0		32.0		32.0	27.0	128.0
Station Vehicles.....	52.0	14.0		2.0		2.0		2.0			52.0	20.0
Station Rehabilitation		355.0										355.0
Operating Costs.....		33.5		33.5		33.5		33.5		33.5		167.5
Research Equipment & Supplies.....	50.0	10.0	22.0	5.0		5.0		5.0		5.0	72.0	30.0
PPS Equipment & Supplies.....	20.0	10.0	5.0	5.0		5.0		5.0		5.0	25.0	30.0
SUB TOTAL	\$308.5	Z606.5	\$ 59.0	Z235.5	\$ 90.0	Z242.5	\$ 20.0	Z298.0	\$300.0	Z264.5	\$ 997.5	Z1647.5

TABLE 3 CONTINUED

	78		79		80		81		82		TOTAL	
	AID-\$	GOZ-Z	AID-\$	GOZ-Z	AID-\$	GOZ-Z	AID-\$	GOZ-Z	AID-\$	GOZ-Z	AID-\$	GOZ-Z
TRAINING												
Technical Assistance (M'Vuazi).....			55.0		55.0		55.0				165.0	
T.A. Support.....	8.0	5.0	7.5	5.0		5.0		5.0			15.5	20.0
Advanced Degree Training.....	60.0		144.0	20.0	100.0	8.0	136.0	2.5			400.0	30.5
Paraprofessional Training.....	24.0		72.0	3.5		3.5		3.5			96.0	10.5
In-Residence Training M'Vuazi Training Center (construction, vehicle).....	9.0	302.5		16.0		36.0		40.0		40.0		132.0
PRONAM Staff.....				20.0		20.0		20.0		20.0	9.0	302.5
Equipment & Supplies (Training Center)....	60.0	2.0		1.0		1.5		1.5		1.5	60.0	7.5
SUB TOTAL	\$161.0	Z 309.5	\$286.0	Z 65.5	\$155.0	Z 74.0	\$191.0	Z 72.5		Z 61.5	\$785.5	Z 583.0
SUBSTATION OUTREACH 2)												
Technical Assistance	225.0		270.0		355.0		195.0				1045.0	
T.A. Support 1/....	70.0	40.0	7.5	30.0		20.0		20.0			77.5	110.0
Local Travel.....		8.0		8.0		8.0		8.0				32.0
PRONAM Staff.....		206.5		217.5		220.0		217.5		217.5		1079.0
Station Vehicles....	130.0	52.0		26.0		26.0		26.0			130.0	130.0
Research Equipment & Supplies.....	75.0	20.0	8.0	15.0		10.0		10.0		10.0	83.0	65.0
PPS Equipment & Supplies	32.0	5.0	5.0	5.0		5.0		5.0		5.0	37.0	30.0
Rehabilitation.....		40.0										40.0
Operating Costs.....		20.0		25.0		25.0		25.0		25.0		115.0
SUB TOTAL	\$532.0	Z 391.5	\$290.0	Z 326.5	\$355.0	Z 314.0	\$195.0	Z 311.5		Z 257.5	\$1372.5	Z 1610.5

TABLE 3 CONTINUED

	78		79		80		81		82		TOTAL	
	AID-\$	GOZ-Z	AID-\$	GOZ-Z	AID-\$	GOZ-Z	AID-\$	GOZ-Z	AID-\$	GOZ-Z	AID-\$	GOZ-Z
AGRICULTURAL ECONOMICS STUDIES.....	15.0	10.0	25.0	15.0		17.0		20.0			40.0	62.0
RADIO COMMUNICATIONS..	53.0										53.0	
OTHER COSTS..... ^{1/}	66.0	8.0	25.0	8.0	10.0	8.0	12.0	8.0	5.0	1.5	118.0	33.5
TOTAL DIRECT	\$1271.0	Z1368.5	\$680.0	Z687.5	\$667.0	Z663.5	\$575.0	Z718.5	\$305.0	Z585.0	\$3498.0	Z4023.0
11TA OVERHEAD (18%)..	229.0		122.0		120.0		103.5		55.0		629.5	
SUB TOTAL...	\$1500.0	Z1368.5	\$802.0	Z687.5	\$787.0	Z663.5	\$678.5	Z718.5	\$360.0	Z585.0	\$4127.5	Z4023.0
INFLATION (FX-6%, LC-40%)..... Compounded			48.0	550.0	97.0	1486.0	130.7	287.5	97.5	5556.0	372.5	11064.0
TOTAL COSTS	\$1500.0	Z1368.5	\$850.0	Z1237.5	\$884.0	Z2149.5	\$808.5	Z1006.0	\$457.5	Z6141.0	\$4500.0	Z15087.0
COUNTERPART FUNDS		Z 972.5		Z 458.0		Z729.0		Z 621.5		Z1082.0		Z 2890.5

^{1/} T.A. Support includes vehicles, house furnishings, and POL

^{2/} Includes station PPS

TABLE 4

GOZ/IITA BUDGET (000)

	Expended Inception thru 31 Dec.77	1978	1979	1980	1981	1982	TOTALS
Salaries, allowances..	293.5	191.7 ^o	180.0	180.0	180.0	180.0	1,205.2
Consultation Visits...	11.4	5.0	5.0	5.0	5.0	-	31.4
Supplies, Expenses.....	21.5	15.0	15.0	15.0	15.0	15.0	96.5
Training.....	12.2	12.0	-	-	-	-	24.2
Equipment.....	38.7	10.0	20.0	20.0	20.0	20.0	128.7
Overhead Recovery.....	67.9	43.0	39.6	39.6	38.7	38.7	267.5
TOTAL.....	<u>445.2</u>	<u>276.7</u>	<u>259.6</u>	<u>259.6</u>	<u>258.7</u>	<u>253.7</u>	<u>1,753.5</u>

^oThe Salary and allowances figure for 1978 includes provision for an extension/agronomist until such time as he can be supported by USAID.

C. SOCIO-ECONOMIC ANALYSIS

1. Cassava Production

a) Extent of cassava cultivation

In this vast country of about 2.35 million square kilometers, cassava is grown on approximately 1.7 million hectares, or 50% of all cultivated land. The importance of cassava is illustrated by the fact that roughly two-thirds of all cultivated land in the region of Bas-Zaire is used to grow cassava. Its dominance is further demonstrated by the fact that at least a third of the cultivated land in every region is sown in cassava.

Bandundu has always produced by far the most cassava, while Kivu is the second largest producer. Bandundu has been producing over 15% of the nation's total cassava production (which was about 12 million tons in 1976). But as far as the total amount of land under cassava cultivation, Kivu has devoted the most to cassava. On the basis of yield, Bandundu and Bas-Zaire have considerably better yields than the other regions. It is interesting to note that although the national average yield of cassava in Zaire is 9 ton/Ha, the scientists at M'Vuazi have seen yields as high as 60 tons/Ha (under ideal conditions) and they believe the average farmer could get 30 ton/Ha. In terms of per capita production, the regional order is Bandundu, Bas-Zaire and the Kasais.

It is hard to deny the fact that cassava is a widely accepted, extremely important crop in Zaire. Zairians are heavy consumers of cassava roots as well as the relatively nutritious leaves. Over time, more and more land is being devoted to cassava. Increasing demand for cassava due to a rise in population and increasing losses due to diseases and insect infestation have resulted in more intensive cassava cultivation. Since only about 1% of the land area in Zaire is cultivated, increased cropping of cassava is not necessarily a threat to other crops in terms of land availability.

Cassava has not always been the most important staple crop in Zaire. Maize was introduced into Zaire before cassava and it easily established itself as an important staple crop. When cassava was brought to Zaire by the Portugese, it adapted well in the rain forest zone to which it was ideally suited. Cassava spread rapidly and completely through the forested Congo basin. Although cassava is grown also in the savannah areas, maize remains more popular. Cassava's predominance over maize on a national basis has apparently been rather recent (maybe during the 1950s). Cassava has been at least a co-dominant crop in most areas for some time. The slow advance of cassava may be related to its propagation method (by cuttings) and the slow adoption of the "cassava complex", which includes a complicated processing technique to remove the hydrocyanic acid (HCN) content.

The hardiness of the cassava plant (especially in poor and marginal soils), the ease of storing tubers in the ground for long periods of time, as well as the high caloric content of cassava have led to its position as the principal staple crop in Zaire. Another important reason for the increased popularity of cassava is that it can be harvested at the end of the dry season when the threat of famine is greatest.

b) The technology of cassava production and use

To fully grasp the socio-cultural aspects of this project, it is important to briefly examine the traditional context in which the project will exist. Producing cassava does not require a lot of inputs. It is the processing system for cassava that is quite complicated, time consuming and labor intensive. The following discussion is an illustrative picture of a diversified reality among Zaire's many different ethnic groups.

1. Land preparation

Except in rather rare cases, land is prepared for cassava production by traditional methods. Grass is first burned in heaps. The resultant ash product is mixed with the soil (locally termed "mafuku") and formed into mounds to be left until the start of the rainy season. After about the first two or three showers, the mounds are joined by ridging the intervening spaces to form a continuous ridge. Alternatively, mounds may be left and cassava planted directly. Where ridging is practiced, cassava, whose stems (25-30 cm long) are used as propagators, is planted throughout the ridge. The mounds are usually considered more fertile and may be used to grow maize, beans, gourds and tomatoes as intercrops. Cassava may also be grown in rotation with rice, peanuts and millet.

2. Harvesting

Cassava tubers are harvested after anywhere from 6-18 months. Tubers can be harvested all year round. The fact that tubers can be stored unharvested until the end of the dry season when the threat of famine is the greatest is a tremendous advantage of this crop. Cassava leaves can be plucked at almost anytime. A study completed during 1976 by an agronomist at the M'Vuazi station showed that harvesting cassava leaves at regular monthly intervals can result in 6 to 8 times more revenue than harvesting roots alone. Although more frequent harvesting of leaves depressed root yields, total revenue does increase.

3. The processing and utilization of cassava

Observations of cassava processing indicate high labor inputs. The table that compares the labor input for planting, harvesting and processing between staple foods (Table 4 Annex D). reveals that half the total labor input for cassava is utilized

in processing cassava. Figure 1 in Annex D is a schematic illustration of the many stages that may be involved in cassava preparation. Cassava leaves in Zaire are used as a green vegetable to make a dish such as the popular "pondu". Cassava roots are prepared in a variety of forms usually to make "chikwanges" and "fufu". It is the preparation of the roots (including the important step in removing the HCN) that is complicated and requires so much effort.

After harvesting, 4-5 days are required before wet cossettes may be prepared from the cassava root. This process requires some 4 or 5 separate steps of variable duration. The preparation of "fufu" requires drying and milling or pounding with a mortar and pestle. Although milling may not require much human effort, people often lose a lot of time just getting to and from a mill as well as waiting in lines.

The preparation of "chikwange" is also a complicated process. Making "ndika" or "ntinga" involves as many as 10 additional steps after wet cossettes are made with intermittent work spread out over anywhere from 9-14 days. For "nsesa" it takes six stages (lasting from 7-21 days) subsequent to the preparation of wet cossettes. When the time spent in marketing a finished product is counted, considerable amount of time and labor is involved with cassava. Obviously, any improvements in cassava varieties with lower HCN levels as well as discoveries of labor saving processing techniques would have a significant beneficial impact in Zaire.

4. Marketing

The fact that unprocessed cassava roots are rather perishable after they are harvested seems to severely limit long distant transport of the root. Trade in cassava products is as variable as the many products produced. GOZ Department of Agriculture statistics indicate that only about 5-6 percent of total cassava production moves through other than localized village markets. But Bas-Zaire provides about 80% of Kinshasa's needs. Kinshasa is undoubtedly the biggest single cassava market.

Tubers are sold in many forms. Sales may also be negotiated for the standing crop. Freshly dug roots may be marketed or they may be sold as wet or dry "cossettes", or in the form of "fufu" or "chikwange". Such sales may occur within or between villages. Cassava as cossettes or chikwange may be sold to dealers. Some cassava leaves reach the market but the main value of these would be assessed within the framework of a subsistence economy rather than a commercial economy. Accessibility either in the form of proximity to market centers or stable roadways influences trade. There can be a market price differential between villages in production areas and between these areas and urban centers like Kinshasa. Whether these

differentials reflect the true economic cost of transport or whether dealers have an undue advantage over the growers and processors can only be answered by a thorough economic survey. This will be studied in the Agricultural Economics component of this project.

c) Factors influencing cassava production

Certain economic factors have influenced the distribution and increased importance of cassava in Zaire. To avoid many problems associated with standard economic analysis with crop yield figures in Zaire, a comparative analysis between crops based on production labor requirements can be revealing.

Labor requirements in crop production weigh heavily in a farmer's decision making process, while nutritional value is of greater consideration to government policy makers. Despite the rather bad reputation of root crops in general as compared to grain crops, the significance of cassava production in Zaire must be evaluated in terms of the reality of subsistence agriculture in this country.

1. Relative crop yields based on food calories

A study done in the early 1950s showed that cassava has the highest caloric yield/hectare among maize, rice, yams, millet and sorghum, sweet potatoes and plantains in Zaire. This was based on a computed "index of caloric yield" and "production relative" in Table 2 in Annex D .

Although yield estimates may have been subject to a wide margin of error, the index of caloric yield/ha (column C in Table 2 of Annex D), shows cassava to have almost four times as much calories/ha as maize. A crude indication of the relative importance of food calories to a farmer reveals that cassava produces roughly six times more than maize. These relationships apparently have not changed much over time. Table 3 with more current data reveals that cassava has maintained this superiority in caloric yield through 1970-74. This is not to say that the competitive advantage of cassava because of its high caloric yield is not offset by other factors. For instance, cassava has a long growth period, anywhere from 6-24 months. A study done on the labor requirements for maize, rice, cassava and plantains in the forest region of Zaire indicates the relative low cost of growing cassava. That is, on a yield/ha or calories per hectare basis. It is the extensive processing requirements of cassava roots that accounts for well over half of the total labor requirement for cassava. See Table 4 in Annex D .

Some researchers studying staple crops several years ago in West and Central Africa (including Zaire) estimated the costliness of producing staple foods. Their analysis ranked them on a per area, per weight and per calorie basis. On a per pound

and per thousand calories basis, cassava and plantains were the cheapest to produce. The results of analysis on relative crop yields based on food calories helps shed light on the socio-economic reasons for the selection of cassava as the basic staple crop in Zaire.

2. Cassava consumption factors

a. Consumer preference and consumption of cassava

It is sometimes difficult to generalize about consumer preference, but in tropical Africa the overwhelming dependence on starchy foods in the diet of the people has been well established. The preference for cassava as a subsistence crop in Zaire can be determined according to the cultivation pattern of the crop. In the mid-1950s, 20 of Zaire's 22 administrative districts demonstrated a preference for a root crop as the dominant or co-dominant crop. To a large extent root crop meant cassava. Today, as was shown earlier, this pattern is very much the same where on the average, 50 percent of all cultivated land is in cassava. As one travels east from Bas-Zaire to Shaba, the preference for a combination of cassava and maize flour to make "fufu" (a popular Zairian dish) shifts from roughly a 100% use of cassava, to an 80:20 mixture and to a 60:40 mixture. Cassava leaves are considered the preferred vegetable in Zaire and substantial quantities are consumed. The placement of PRONAM stations in the most important cassava production zones will enable them to conduct more accurate consumer taste tests in the selection of improved cassava varieties.

Unfortunately, there are no food demand profiles for the major cities of Zaire. The largest urban center to be fed is Kinshasa where the majority of the people prefer cassava. This is primarily because of its proximity to the major cassava producing regions of Bas-Zaire and Bandundu from whence most people came. Thus, one can see the economic and political significance of cassava production in these regions. Again, the famine relief aspect of cassava plays a vital role in the preference for cassava among the poorest of the poor in Zaire.

b. Relative prices among foods

Cassava has always been a relatively cheap food to buy, especially if it is based on calories. This plant is well suited to most of Zaire, which accounts for it being relatively less costly to produce than most other crops. Evidence from several years ago ranked maize and cassava roots as the least costly (momentarily) per thousand calories among staple food crops. On a per pound basis, cassava was least costly. Although this evidence relied on highly arbitrary and uncertain price data, relative prices did set such a pattern. This pattern still holds

to be generally true today. In the Equator region, plantain has until recently been the dominant staple crop. But the relative price shift between plantain and cassava has made cassava cheaper in recent years. In Kinshasa, the food price survey conducted by the U.S. Embassy shows that cassava is one of the cheapest foods available. Over the past few years there has been rampant inflation of food prices in the city. But cassava has shown one of the lowest rates of inflation among a market basket of foods. It is quite likely though, that the price of cassava products may double or triple very soon in Kinshasa because of low yields due to heavy mealybug infestation in Bas-Zaïre and Bandundu. It is the poorest urban dwellers who have been affected the most by food price increases since it is not uncommon for them to spend up to 75% of their income on food, of which cassava is the staple.

3. Nutritional considerations

One of the chief concerns about cassava roots is that it is a poor source of protein and essential nutrients. Among the general Zaïrian population it is unlikely that the nutritive quality of cassava is a major factor in their selection of such a food. But the nutritive quality of foods should indeed be an important consideration in formulating plans for the development of the agricultural sector.

The utility of cassava as a relatively cheap source of energy has been demonstrated. This has been undoubtedly the most important consideration in the selection of cassava as a subsistence crop in Zaïre. What is of great importance though is the good nutritive quality of the cassava leaf that is interestingly enough, the most popular vegetable in the country. Compared to other sources of protein now available in Zaïre, cassava leaves compare favorably. See Tables 5 & 6 in Annex D. Cassava leaves are also an excellent source of other important minerals such as vitamins C and A. Cassava leaves are a major source of protein in Zaïre for the majority of the people. This is an extremely important nutritional and cultural factor concerning this project.

Therefore, the nutritional value of the entire cassava plant has to be taken into account when cassava is compared to other foods. In that respect, cassava roots and leaves combined are an important source of nutrition under the present conditions in Zaïre. In the long run though, a more diversified agricultural production system is essential.

4. Future food requirements

The future demand for food will depend on a host of factors of which the population growth rate, the shifting pattern between rural and urban populations, income levels and consumer consumption preferences are the most significant. The 1970 GOZ

census estimated the total population of Zaire to be 21.6 million. In 1980, the population may be 28.5 million as a result of about a 2.9% growth rate. By 1985, the population is expected to be 50 percent higher than in 1970. If consumption patterns do not change, the demand for cassava could increase by the same amount.

Feeding the major cities in Zaire poses the most serious food problem. Kinshasa's population is estimated by some authorities to be over 3 million this year (1978) and to be 3.68 million by 1980. The rural-urban migration which accounts for the majority of this urban expansion (approximately 8% of the estimated 11% population growth rate) has reached alarming proportions. This trend (although not as rapid as in Kinshasa) is a reality for every major city in Zaire. The national urban/rural ratio is expected to shift drastically from the 30/70 ratio in 1970 to possibly 36/64 by 1980. Thus, the pressure to feed urban centers will definitely intensify rather than dissipate.

The apparent food consumption survey of Kinshasa for 1969-70 shows that the consumption of cassava roots is significant among the low and middle income groups. The income elasticity of demand for cassava tuber products appears to decline sharply as incomes rise. But these surveys indicate that for cassava leaves, which are much more nutritious than the roots, consumption does not decline as rapidly when incomes rise. It is the low and middle income people in Kinshasa who depend the most on cassava products and their incomes will probably have to rise before there will be a large scale shift in the consumption pattern of this group away from cassava. Per capita urban incomes in Zaire are not expected to increase very much in the near future. A significant rise in incomes is not likely to occur among the rural population in the near future. Thus, the demand for cassava in both the urban and rural areas is likely to remain strong for some time.

Cassava is often called a poor man's food, and since it is the poor who depend heavily on cassava, research on cassava is a reasonable effort to directly assist the poor majority in Zaire. Since this dependence on and preference for cassava is not likely to change in the near future there is an urgency in finding solutions to the current problems for the cassava crop. The array of foods that are the principal sources of energy for Zairians is not a diverse group of foods. Consequently changes in cassava production will have a direct impact on the nutritional intake of partially everyone in Zaire.

5. Beneficiaries

Each one of the four PRONAM stations will be located in a major cassava production area. Since this project relies heavily on farmer participatory research, those farmers who

are closest to each station will be the first to benefit from this project. Based on the experiences at the PRONAM M'Vuazi station, farmers have been very eager to participate in the trial and selection of cassava varieties. The scientists at this station have also witnessed a tremendous interest expressed by other farmers in new varieties that are higher yielding as well as resistant to the major destroyers of the cassava crop. This station has been besieged with requests for new varieties. The research done by PRONAM will, by intentional design be oriented towards the development of cassava varieties and cultural practices that are compatible with the traditional farming system in each station's locale.

Improved cassava varieties will be widely accepted by farmers. As the farmers closest to the PRONAM stations adopt new varieties, other farmers will come to the stations and to those nearby farmers to get these varieties for themselves. Since this is not a situation of presenting a new crop with a radically new technology, wide spread dissipation of improved cassava varieties is expected to be quite rapid. The importance of cassava in the lives of these people has been demonstrated earlier. Not only is it a question of warding off a disastrous food crisis caused by tremendous shortfalls in cassava production due to disease and insect damage, it is also a question of improving the poor majority's nutritional intake. This will be the result of developing higher yielding more nutritious cassava varieties. An improvement in the processing characteristics of cassava tubers will also be of noteworthy value to the people. Substantial amounts of labor and time are now spent in eliminating the lethal poison in cassava tubers.

In terms of the number of people affected by this project, it could eventually be close to 80% of the population if one includes producers as well as consumers of cassava. Farmers grow cassava in every region and cassava is today consumed as a staple food everywhere in Zaire. For example, a recent survey (1976/77) done by GOZDA Bureau d'Etudes with the assistance of the Agricultural Economics Project (USAID Project N° 660-052) shows that 93.6% of the population in the region of Bandundu is involved in agriculture. Of the twenty-five different crops listed as principal crops cultivated, 96% of the traditional farms and 97% of the modern farms considered cassava as the primary crop. As was pointed out earlier, no region allocates less than a third of its cultivated land to cassava. The distribution of most benefits from the research of PRONAM will be available to the majority of Zairian producers and consumers within 3-10 years.

The GOZ's overall research capabilities will be enhanced by the improved capacity of PRONAM to conduct research related to cassava. Those organizations who send people to the M'Vuazi training center will benefit from the cassava extension/technology training program. Another important contribution of this project will be the educational training offered to some 20 Zairians who

receive Masters degrees and PhD's and approximately 32 who will receive paraprofessional training. The training is considered a significant contribution of this project from which individuals, institutions and the country will benefit. The extension training activities of PRONAM are the means of providing a mechanism for transferring research results to the rural farmers. The educational training should provide PRONAM with the trained man-power to continue appropriate research and outreach activities independently.

In short, although this is basically an institution building project, the intended beneficiaries are indeed the poorest of the poor in Zaire. It will be a matter of time before reaching all subsistant farmers. The subsistence farmers and the urban poor have been the hardest hit by cassava crop failure due to extensive disease and insect damage. This situation if unattended will only get worse. The importance of cassava and the need to improve cassava in Zaire cannot be questioned. Regional PRONAM stations with research/outreach activities will enable PRONAM to reach farmers on a national basis. The project is directly addressing the needs of the majority of the population. There should be no social impediments to its success. No changes should be required in the beneficiaries' values, social organization and motivations in order for them to utilize any project activity. Therefore, on a social basis, the project has more than a reasonable chance of success.

6. The role of women

Within the major cassava producing areas, women are the farmers on the traditional small farms. This might very well be said of the entire small farm subsector of agriculture in Zaire. Women have, except in rare cases, exclusive control of the processing and marketing of cassava. In the production phase of cassava, men will usually do the heavy land clearing work in the forest areas. Other than that, women do practically everything else to produce, harvest, process, and market cassava.

Since women are the ones who do practically all the producing, processing and marketing of cassava, they are the ones who will be intimately involved in the farmer feedback process of the farmer participatory research activities in this project. Consequently, women will have a key role to play in determining the direction of research in this project. Any new developments in production technology, processing techniques, marketing strategies and policies will involve and impact upon women.

Currently, no women are employed by PRONAM in the higher technical areas of research. This is primarily because of the general lack of educational opportunities for women in Zaire. This situation is changing over time. In 1973, there were 159 women enrolled at the National University which represented about

4% of the total student population. During the 1975-76 school year there were about 2,700 female students enrolled (10% of the total enrollment) of whom 9 were enrolled in agronomic studies. This can be compared to 1963 when there was only one woman attending the University.

The role that women should play in the transfer of technology will be examined by the rural sociologist who will be stationed at the INERA Mulungu station under the USAID supported INERA Support Project (660-064). The forthcoming recommendations will apply to the extension training and outreach activities of the project.

7. Measuring the Project's economic value

Economic evaluation of agricultural research productivity has always been a difficult task. There is no universal agreement on the proper analytical approach to be employed. There have been some cost-benefit type studies done on agricultural research productivity that have indicated annual rates of return that are quite high compared to conventional development projects. According to some analysts, if certain deficiencies in the counting of benefits in these agricultural research projects are corrected, the estimated returns would be more comparable to conventional development projects. Others argue that the benefits from research are often conservatively stated and that indirect effects are not fully captured by existing data in the analysis. The critical factor in the economic analysis of research regardless of the methodology used is the accurate estimation of the change in production attributable to research. This estimation is considered the most difficult step in any effort to measure research productivity.

In Zaire recent accurate agricultural data has been practically nonexistent. Therefore, it is not possible at this time to measure expected change in cassava production as a result of this project.

For the type of outputs envisioned for this project, there are no other reasonable alternative of achieving them that can be accurately measured. Probably the best way to evaluate this project is the way one participant in the 1975 Conference on Resource Allocation and Productivity in National and International Agricultural Research expressed the evaluation of research productivity: "investment in agricultural research in developing countries should be supported not on the basis of the high rate of return that has been estimated but simply because agricultural research has been an important factor leading to increase in agricultural productivity."

This project is an investment in building PRONAM into a nationally effective cassava research and outreach institution. The nutritional, economic and political importance of cassava

in Zaire is unquestionably paramount in the lives of most Zairian people. If the present ongoing research on cassava in M'Vuazi is not expanded nationwide through this project, there is the strong possibility that there will be severe shortfalls in cassava production. The statistical magnitude of crop failure and production shortfall due to disease and heavy insect infestation has not been measured and is difficult to measure at this time. But if two plant diseases and the mealybug can each cause anywhere from 50-100% reduction in tuber and leaf yield, over 25% of Zaire's cassava production from Bas-Zaire and Bandundu is now in serious jeopardy. The region that has been most seriously affected is Bas-Zaire which provides roughly 80% of Kinshasa's cassava needs. Cassava root products and leaves are the principle foods for the majority of the estimated three million Kinshasa residents. Cassava is an 18 month crop (average production cycle), and there is a long lag between production loss and the resultant market affect. The full affect of production short fall from Bas-Zaire has not been felt yet in Kinshasa. Up until recently, cassava has had one of the slowest price inflations in Kinshasa. When cassava prices do rise as a result of decreased supplies, it will have a devastating affect on millions of people in Kinshasa. Most of these people are in the low and middle income groups who can least afford a price rise in the product that is for most, the only staple in their diet.

For the country as a whole, cassava is a subsistence crop that has been the last alternative to other crops for a variety of reasons mentioned earlier. The people cannot afford to loose the crop that has played such an important risk aversion role in their lives. An investment in expanding PRONAM's research and outreach capabilities is seen as the only way to address the current threat to Zaire's cassava crop. The project is certainly a reasonable means of insuring an indigenous capability of carrying out these same activities for one of Zaire's most important agricultural crops.

IV. IMPLEMENTATION PLAN AND EVALUATION

A. ADMINISTRATIVE ARRANGEMENTS

1. Recipient:

The GOZ organization that is the recipient of assistance from this project is PRONAM which is part of the INERA institution within the Department of Agriculture (DOA). The DOA is considered the GOZ executing agency. Program documents will be negotiated, reviewed and signed by the DOA Secretary of State and/or the Commissioner of State for Agriculture. Within the DOA, the principal administrative unit will be PRONAM, through the office of the Technical Coordinator (Director). The Technical Coordinator will establish the technical direction of the project and PRONAM. He will receive guidance from the Leader of the IITA Root and Tuber Improvement Program in Ibadan, Nigeria. The Technical Coordinator will be responsible only to the Scientific Director within the INERA organization, with an informational responsibility to the INERA Bas-Zaire Sector Director. The Scientific Director is in turn responsible to the DOA Secretary of State. See the organizational chart in Annex E.

The Project Administrative Officer located in Kinshasa will be responsible to the IITA Administration and he must coordinate his activities with the Technical Coordinator in M'Vuazi. Annex E details this person's responsibilities.

Each PRONAM substation will operate autonomously from INERA in each location. But the extension/agronomist who manages each PRONAM substation must cooperate with the INERA Sector Director of the area and inform him of PRONAM activities. The substation manager is directly responsible to the Technical Coordinator at M'Vuazi.

The PPS at M'Vuazi and the substations is under the direct control of the PRONAM Technical Coordinator and the Station Managers. But the INERA Sector Director in each region will have indirect access to the PPS. It must be emphasized that every effort will be made to insure cooperation between INERA and PRONAM at each station.

The project proposal and undertakings described within this project paper have been reviewed with the Department of Agriculture, INERA, PRONAM, and IITA. They are all in agreement with the findings.

2. USAID:

The USAID Food and Agriculture Officer or his delegate will be the USAID Project Liaison Officer. He will assist the

USAID Director in program or policy discussions and negotiations concerning this project.

3. IITA:

IITA is to be the project contractor implementing agent because of their unique expertise in African cassava research and because they are already carrying out a cassava research agreement with the GOZ. This project depends upon this IITA/GOZ agreement. The International Center for Tropical Agriculture (CIAT) is the only other institution known to do research on cassava in the tropics. However, CIAT's primary focus is on the lowland tropics of Western Hemisphere. More specifically, they concentrate on six commodities (which does include cassava) that are important to the rural and urban poor living in this region. Therefore, IITA is seen as the most appropriate implementing agent. A host-country contract of the Cost Reimbursement without fee Contract type is proposed. The total estimated dollar cost of this contract is to be financed by USAID. The contract will be administered by the GOZ/DOA.

The general responsibilities of the contractor will include recruitment and support of technical advisors, most commodity procurement, administration of the entire training program, and overall project management. The IITA Project Administrative Officer with the support of the IITA Administration has project administration responsibilities.

4. GOZ Budget for project operations:

PRONAM receives its own budget through the DOA from the Department of Finance. A special account will be established at a local bank, as a depository for Counterpart Funds and Regular Budget Funds for the execution of this project. The Counterpart Funds will be allocated by the Department of Plan. Disbursements from this fund will be authorized by the joint signature of the IITA Project Administrative Officer and the DOA Secretary of State or their representatives, as designated in writing.

B. EVALUATION PLAN

Three categories of evaluation will be performed during the life of the project:

- On-going (formative) evaluation.
- Annual evaluations at the end of the first and third year.
- An in-depth mid-project evaluation.
- End of project evaluation.

1. On-going (formative) Evaluation.

The project is designed to develop the institutional capability of PRONAM to conduct adaptive and applied research on cassava which will in turn result in the identification of improved technical packages acceptable to small farmers. The project is going to be located in five areas greatly dispersed geographically. It will therefore be important that minimum basic data be obtained from each area concerning its operations from both the administrative and technical point of view. This will permit the project managers to diagnose problems as they arise and to formulate solutions on an on-going basis.

Thus, the project will develop data collection and analysis procedures which will permit the project staff and others to monitor project implementation and the achievement of project objectives in terms of:

Financial, commodity, training and technical assistance inputs and their allocation to the various substations.

The results of these inputs will be measured in terms of research results (improved varieties and practices identified and accepted), personnel trained at each substation, and the inter-relationship which exists between the participant small farmers and project personnel in terms of their implications for the acceptability of research packages developed under the project for small farmers.

The key assumption or other possible changed conditions or data revisions which may imply increased risk with respect to successful project implementation.

2. Annual Evaluations

Annual evaluations that are scheduled for the end of the first and third years will be carried out by AID. The purpose of these evaluations will be to reexamine project strategy and to assess actual performance against planned performance as

presented in the logical framework. Based on the results of these evaluations corrective action will be identified and taken. These actions will be reflected in annual work plans to be prepared by the staff at PRONAM and approved by AID, DOA and IITA.

3. The in-depth mid-project evaluation

The in-depth mid-project evaluation will be conducted at the end of year two and will be the most extensive evaluation. It will be undertaken by a combined team representing AID, IITA, PRONAM, and the Department of Agriculture and will at AID's discretion involve an outside consultant. Based on the results of this major evaluation, adjustments will be made as necessary and agreed upon by AID and the GOZ in the basic design of the project including strategy, approach, implementation and financing.

The project management will play an important role in carrying out this evaluation as well as the annual evaluations. Beginning one month before the evaluation, the project will: (1) organize data and analysis produced for the previous evaluations and for this mid-term evaluation into a format that will facilitate use by the evaluation team; and (2) attempt to foresee special information needs of the evaluation team, and collect this information for its use. This special information might be internal to the project and/or project areas, but may also include periodic or special reports of the GOZ, U.S. Government, or other donor organizations.

When the evaluation team arrives, it will assess its tasks and organize any additional special studies and surveys to be undertaken in collaboration with the project management.

As in the annual evaluations, the first task of the evaluation team will be to assess actual performance against planned performance. It will also be necessary to refer to the PP for supplemental information regarding the project's original intent (the Log Frame represents only a summary of that intent).

The next task (these tasks are not necessarily sequential and probably will overlap) will be a reassessment of the project's environment. It is here that the major issues will appear and the information necessary to discern causality for performance achievement (or lack thereof) will be obtained. The team should use the Log Frame assumptions for guidelines as there will be issues not foreseeable by the project design team. An assessment should be made regarding each assumption and each new issue as to how in their current state they will affect the project. A determination will then be made of which corrective action must be undertaken to achieve those objectives.

The evaluation team will reassess the project hypotheses (i.e., Is the project purpose still the most appropriate and

effective means to achieve the project purpose? Are the inputs still the most appropriate, effective, and efficient means to produce the outputs?) The evaluation team will present its findings, conclusions and recommendations to the DOA and AID for decisions regarding changes in the project objectives and/or strategy. After approval, the changes will be built into an updated Logical Framework for the project.

The evaluation can be divided into the following functions:

1. Descriptive: Level of performance and state of environment;
2. Diagnostic: Why objectives were or were not achieved as planned;
3. Prognostic: What achievement can be expected with or without changing strategy (level and type of inputs);
4. Prescriptive: What changes should be made.

Evaluation

An important decision will have to be made at this time as to whether PRONAM will be able to adequately continue its research activities at M'Vuazi during an approximate one year gap between the departing IITA scientists in 1982 and the returning Ph.D candidates. During this period of time, there will be only one Ph.D in PRONAM who is presently the Deputy Director. A key question is whether the staff trained to the Masters Degree level will have adequate skills to manage PRONAM's operations until the Ph.D trained scientists can return. If the IITA scientists leave in December 1982 when the existing IITA/GOZ agreement expires, there will be no overlap between these experienced scientists and the newly trained Zairian staff who are to replace them. These two issues will have to be assessed during this evaluation. There is contingency funding in the project to finance 3 IITA scientists for up to two years if it is determined that there is a need for overlap of the IITA scientists and their replacements.

4. End of Project Evaluation

This evaluation will be undertaken over a period of six weeks. U.S.-based Ph.D research specialists (preferably persons who have been involved in setting up the information system for the project) will arrive with the evaluation team and remain two weeks after conclusion of the evaluation. These last two weeks will be spent readjusting the information system to reflect changes in the project design.

The final end of project evaluation, will be oriented to summing up project achievement. It will assess causality and analyze the replicability of the project strategy and operations in terms of their utility for future projects.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project: ANNEX A-1
From FY 78 to FY 81
Total U.S. Funding \$ 3,778,000
Date Prepared: May 15, 1978

Project Title & Number: CASSAVA OUTREACH (077)

PAGE

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>PROGRAM OR SECTOR GOAL: THE BROADER OBJECTIVE TO WHICH THIS PROJECT CONTRIBUTES:</p> <p>Increase the level, availability and nutritional quality of food production for the low income majority in Zaire.</p>	<p>MEASURES OF GOAL ACHIEVEMENT</p> <ol style="list-style-type: none"> 1. Retardation and reduction of cassava crop loss due to disease and insect damage. 2. Increase in cassava production and marketing. 3. Identification of improved quality of cassava product. 	<ol style="list-style-type: none"> 1. Annual GOZ agriculture statistics. 2. Results of economic studies done by Production Economics Studies component of this project. 	<p>ASSUMPTIONS FOR ACHIEVING GOAL TARGETS:</p> <ol style="list-style-type: none"> 1. That the GOZ will maintain or initiate appropriate research policies that will be an incentive to increased agric. research. 2. That the GOZ will allocate sufficient funds for agric. research development. 3. That increased levels of resources from the donor community will be committed to agriculture.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

AID 1020-72 (7-71)
SUPPLEMENT I

Life of Project: A-2
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

Project Title & Number: CASSAVA OUTREACH (077)

PAGE:

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Project Purpose:</p> <p>To develop the institutional capability of PRONAM to:</p> <ol style="list-style-type: none"> 1. Conduct adaptive and applied research on cassava; and 2. Make new cassava technology available for distribution to rural farmers in Zaire. 	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <ol style="list-style-type: none"> 1. PRONAM will continuously identify high yielding, disease and insect resistant cassava varieties, and identify improved cultural practices. 2. On a regional basis PRONAM will multiply improved plant material and establish a system for distributing this material. 3. PRONAM will have identified an improved quality of cassava product in terms of consumer acceptance, nutritional value and processing characteristics. 4. PRONAM will be capable of a front-line role in the identification and control of economically significant cassava diseases and insect problems. 5. PRONAM M'Vuazi will train intermediate level research workers and extension supervisors who will be capable of doing: <ol style="list-style-type: none"> A) Plant screening; B) Plant multiplication and distribution; C) Farm level trials; and D) Train extension agents in the above areas. 	<ol style="list-style-type: none"> 1. External Evaluation (PAR). 2. GOZ/DOA reports and reports from institutions who take part in the M'Vuazi and regional station training program. 	<p>Assumptions for achieving purpose:</p> <ol style="list-style-type: none"> 1. That the GOZ continues its financial support of the IITA/PRONAM agreement. 2. That the GOZ increase its budgetary support of PRONAM to support expansion, and will commit the required LC to accomplish this project. 3. That sufficient numbers of the PRONAM staff trained will remain in PRONAM. 4. That the present GOZ agricultural extension system will improve over time and the extension activity of other organizations and projects will improve and/or expand. 5. That farmers themselves will actively seek new cassava technology. 6. That appropriate expatriate personnel can be recruited on a timely basis.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project: A-3
From FY _____ to FY _____
Total U.S. Funding _____
Date Prepared: _____

Project Title & Number: CASSAVA OUTREACH (077)

PAGE

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>OUTPUTS</p> <ol style="list-style-type: none"> 1. Establishment of the INERA M'Vuazi station as the national center for PRONAM cassava research. 2. Establishment and staffing of regional PRONAM stations. 3. Establishment of a training center at PRONAM M'Vuazi center. 4. Completion of agricultural economics studies and the incorporation of this capability in PRONAM. 5. Radio communications network established between all PRONAM stations. 6. An improved physical plant services will be developed at all PRONAM stations. 	<p>MAGNITUDE OF OUTPUTS</p> <ol style="list-style-type: none"> 1. Additional entomologist; 12 m.yr. of degree related research; intensified cassava research; development of regional technological packages. 2. Four stations at INERA's Kiyaka, Gandajika, Mulungu and Boketa stations; plus Kimpes; 16 persons trained at Ph.D. level; 32 persons given ST training at IITA/Ibadan. 3. One training center with classroom and dormitory block with 24 persons capacity; 40 people/yr. trained. 4. Three phased agricultural economic study of cassava. 5. Six radio communications installations at 4 PRONAM stations, Kimpes and Kinshasa. 	<ol style="list-style-type: none"> 1. On-site inspections. 2. PRONAM agricultural economics reports on cassava. 3. PRONAM M'Vuazi training records. 4. INERA and PRONAM records. 	<p>Assumptions for achieving purpose:</p> <ol style="list-style-type: none"> 1. That sufficient numbers of qualified candidates can be found for training; both among the PRONAM staff for advanced training and for the M'Vuazi training center. 2. That equipment and building material arrive on a timely basis.

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

Life of Project: A-4
From FY _____ to FY _____
Total U. S. Funding _____
Date Prepared: _____

Project Title & Number: CASSAVA OUTREACH (077)

PAGE

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
INPUTS:	IMPLEMENTATION TARGET		ASSUMPTION FOR PROVIDING
<u>USAID</u>	(TYPE/QUALITY):		INPUTS:
1. Technical Assistance a. 5 extension agronomists b. 1 training officer c. 1 physical plant services of d. International travel e. Consultants f. T.A. Support costs g. Administration	1. TOTAL: \$ 1,923,000		
2. Training	2. University degrees and paraprofessional * \$ 536,000		
3. Training Center Equipment and Supplies	3. \$ 60,000		
4. Research equipment & Supplies	4. \$ 155,000		
5. Physical plant services support.	5. \$ 62,000		
6. Vehicle fleet and spare parts	6. \$ 191,000		
7. Agricultural economics Studies	7. \$ 40,000		
8. Radio communications equipment.	8. \$ 53,000		
<u>GOZ</u>			
1. PRONAM operational and staff support.	1. Approximately \$ 2,200,500		
2. PRONAM expansion support	2. Approximately \$ 1,930,000		
3. Training support	3. Approximately \$ 166,000		
4. Support of the 1974 IITA/GOZ Agreement.	4. Approximately \$ 1,031,600 in foreign exchange		

SUPPLEMENTAL INFORMATION
-----TECHNICAL ANALYSIS-----

A. M'VUAZI STATION

The increase in staff and training activities at this central station calls for an expansion and improvement in the facilities.

1. BUILDINGS:

The present housing facilities in M'Vuazi are:

- 20 Homes for staff members of INERA and PRONAM
- 111 Homes for 116 employees and their families.

The 111 homes are distributed over three separate camps located within the limits of M'Vuazi. In total, 650 persons live at the Station. The 20 homes which are to be used by INERA and PRONAM staff members, and by expatriate advisors and their counterparts, are structurally in good condition and suitable for occupancy, except for the water and power supply.

According to the PP Design Team the following additional structures are needed for the PRONAM Project:

- a. Two 3-bedroom homes (150 m² each)
Two 2-bedroom homes (120 m² each)
- b. A training center

2. WATER SUPPLY:

The 20 existing homes use rain from the roofs as their water supply, which is collected in underground cisterns. The water is pumped daily by hand into attic tanks from where it is tapped for cooking, washing, bathing and for sanitary facilities. This water is not potable and must be boiled and filtered prior to consumption. During the dry season the cisterns go dry and must be replenished with water delivered by truck. This water is pumped from an open ditch that has its intake in a nearby stream. Water from the same source is piped to the Main Building where the offices and laboratories are located and is also piped to water points in the camps. There is a need for a new water supply system that would supply the 24 homes and the Training Center (about 150 occupants in total).

A water supply for the 150 persons would require about 150 X 225 liter (60 gallons) or 34 m³ per day. Considering electrical power outages, a 34 m³ water tower would be desirable.

The tank should be built on the high point of the station which is located between the executive homes.

Ideally, the water should be taken from a drilled well near the tank, but the cost of drilling such a well appears to be excessive. The alternative is pumping the water from the well which was hand dug in the flood plane of a nearby small stream. It has water throughout the dry season. This hand dug well would have to be lined and built up 80 cm above the terrain to avoid the entering of surface water. This well must be enclosed on top leaving an access hole which is to be covered with a removable lid.

If water treatment for potable water would be considered, it would be advisable that two water systems be placed leading from the water tower to the staff-homes and training center. A water treatment installation could be installed near the tower and connected to one of the two systems. However, this would require additional funds, hard-to-get chemicals, and careful control, once in operation.

3. POWER SUPPLY:

The nearest point which receives electricity from the power company is the palm oil factory at Kolo about 9 km from M'Vuazi. However, the connection between Kolo and the High tension line, about 15 km away, has reached its capacity. REGIDESO, the government entity for power and water supply was contracte to install new cables to Kolo and M'Vuazi. The poles have been placed, the wire is available, but other equipment such as transformers must be imported. According to the latest information no foreign currency has been made available for this purpose. The contract was signed two years ago and costs have escalated considerably during this time. There is some doubt that the contractor will complete the work even though REGIDESO has assured INERA that the work will be done.

Up to now power has been supplied by two "electrogen groups". These power sources frequently go out and the entire station is without electricity, hampering laboratory work and causing discomfort to many.

Recently IITA secured a generator for PRONAM from U.S. Government surplus. But it is 60 cycles instead of the required 50 cycles. In order to have it conform with the other installations, it is being converted. PRONAM expects to have it in operation soon.

For the time being this arrangement will be satisfactory. However, funds should be made available for replacing some of the 25 year old wiring in homes as advised by the power company.

It would be also advisable to install a small standby generator in the main building in order to avoid interruptions

in the laboratory during power outings. IITA has donated to the project a 10.5 KVA 50 cycle diesel generating set. This phase generator can use the same wiring in the building but can not operate simultaneously with other generators. On October 20, 1977 an electrical contractor, INGA, made a cost estimate for repairing or replacing faulty or missing gauges in the panel of the existing power station, installing an instrument panel in the garage and replacing 6600 m of wiring throughout the station. However, not all this work is essential but this project should budget for electrical repairs.

4. TRANSPORTATION:

M'Vuazi is an isolated station approximately 200 Km south of Kinshasa and can be reached by car from Kinshasa over 170 Km of paved road and 30 Km of rough gravel surface.

This project will need additional vehicles for transportation. This will put an extra load on the poorly equipped garage. Projected vehicles for M'Vuazi:

- Two 3 1/2 ton trucks.
- Two Blazers,
- Two pickups
- Two tractors

Since these roads have been badly neglected, about 5 Km of gravel road needs repairs. The Director of INERA in M'Vuazi has agreed to have his workers clean out and regrade the side ditches to reestablish proper drainage.

The location of the Training Center would require improving 500 m of roadway. Side ditches must be dug and a 4 m wide road should be covered with gravel which is available in a nearby pit. No other excavation or fill will be necessary.

The stockroom of the garage should be enlarged by about 15 m². Proper control over spare parts must be established. The Deputy PPS Officer will have this responsibility. The garage is in a great need of tools. Annex lists the tools supplied by this project.

B. KIYAKA SUBSTATION

This is the INERA substation which is about 75 Km (4 hours drive) from Kikwit. PRONAM's activity will be almost the entire operation of INERA at this locality. The station consists of:

- one office building
- one garage
- one infirmary
- one power house (part of the garage)

- one pump house
- one water tower
- 8 homes for staff members
- 70 homes in worker camps
- one meteorological station

Kiyaka was built in 1947. Its elevation is 730 m and has an average rainfall of 1600 mm. Of the 75 Km of dirt road (no gravel), 68 Km is being maintained by Office National des Routes while the last 7 Km is the responsibility of INERA. A ferry crosses a tributary of the Kwilu river close to Kiyaka.

1. BUILDINGS

The main building appears to be in good condition except for missing door knobs, outlets, light fixtures and some broken window panes.

The homes for staff members are of various sizes. They are attractive structures, basically in good condition. Some electrical repairs seem to be necessary and some missing hardware such as door locks, bolts and faucets should be installed. The other structures appear to be in good condition but all are in need of some routine maintenance.

There is a swimming pool that could be rehabilitated and a tennis court that could be used if it would be fenced in. No new construction will be necessary.

2. POWER SUPPLY

Power is being supplied by a 50 KVA G.E. generator with diesel engine. There is no fuel tank; oil barrels are directly hooked up to the fuel line. The oil is not delivered by a fuel truck but is hauled in barrels. There appears to be no problem with this system, unless there is a shortage of barrels.

Some sections of the wiring throughout the station will probably need replacing. Funds should be reserved for this purpose.

3. WATER SUPPLY

Water is pumped from the Kikundu River into a 16 m³ water tower. The 1957 pump is worn out, but INERA has ordered a replacement. The capacity of the tower is adequate for supplying the station.

4. TRANSPORTATION

PRONAM will need some off-road type vehicles. Logistical support is vital for PRONAM regional operations. The garage will be able to handle the additional vehicles, but will need

spare parts and new tools.

The road maintenance must be done by pick and shovel. During wet periods the roads are very slippery due to a lack of gravel. Mud tread tires are useful.

C. RESEARCH STATION EQUIPMENT AND SUPPLIES

Other than PPS equipment, these stations need lab, field and office equipment and supplies. The M'Vuazi station needs the most since the major research will be done there. A detailed breakdown of the essential items is found in Annex C.

The project plans to purchase a mini-computer such as the Altair 8800, complete with video, disc drive and cassette bulk data storage facilities for the M'Vuazi center. The computer would be primarily controlled by the Physical Plant Services Officer who would use it for handling vehicle fleet operations monitoring such as stock control, fuel consumption rates, purchasing requirements and cost forecasting. It will also be used by research scientists for research analysis and the analysis of economic survey data. The administrative office would use it for personnel records and accounting procedures.

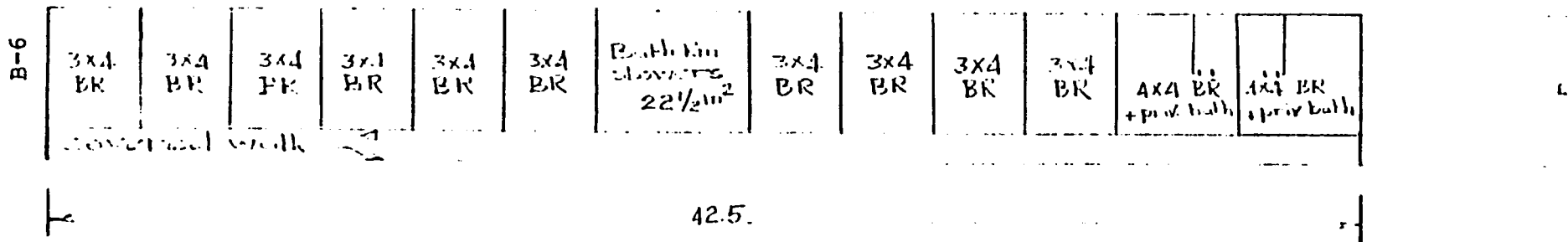
D. RADIO COMMUNICATION SYSTEM

Direct, immediate communications is vital for the operation of any nationwide program in Zaire. PRONAM presently does not have any immediate communications system, not even between M'Vuazi and Kinshasa. All the proposed substations (except Kimpesi) are remotely located from M'Vuazi. Radio communications is the only acceptable reliable alternative means of contact in Zaire at this time. Thus, a radio system will be installed so that there will be direct communications between M'Vuazi, Kinshasa and all four substations. The PRONAM system will be physically and administratively integrated into the larger Department of Agriculture radio network that is being established as a result of the many GOZ/USAID agricultural projects. All radios will be 100 Watt High Frequency single sideband radios with selective call option. Since there will be a radio installed at the Mulungu INERA station, through the USAID/GOZ INERA Support Project (660-064), no additional radio will be necessary at this location. Portable gasoline-powered electric generators will also be procured for the stations that need this type of backup power. There are three stations in particular where the normal electrical power source is not dependable, especially considering emergency precautions.

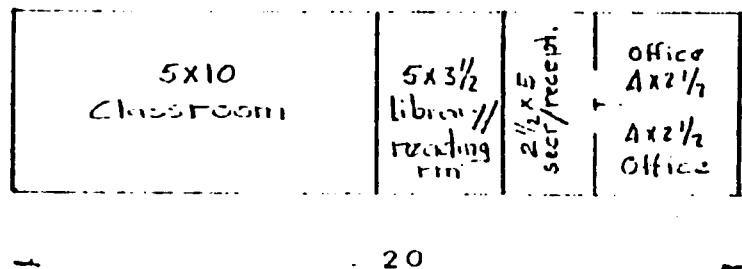
M'VUAZI TRAINING CENTER

BEST COPY AVAILABLE

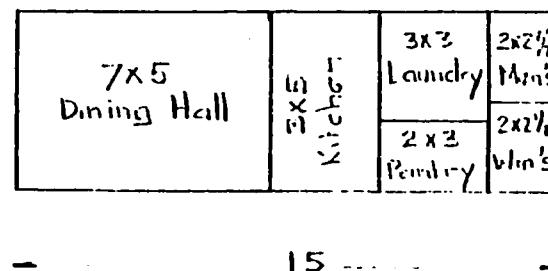
Building A



Building B



Building C



Approx. Areas:

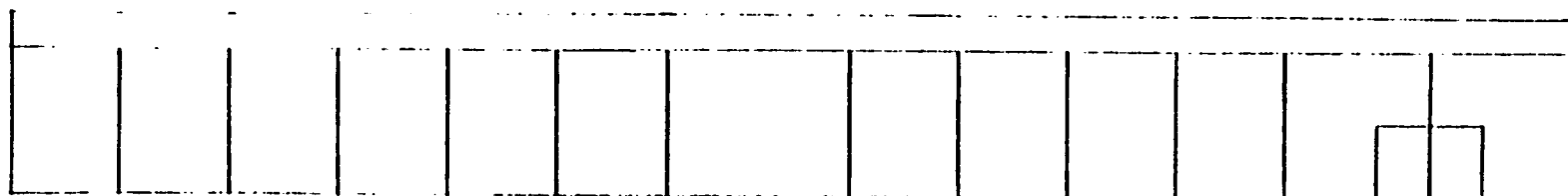
Bldg A + D $42.5 \times 5 \times 2 = 425$

Bldg B $20 \times 5 = 100$

Bldg C $15 \times 5 = 75$

Total 600

Building D (Similar to Bldg A)



No scale.

All dimensions
given in meters.

Dimensions include wall thickness.

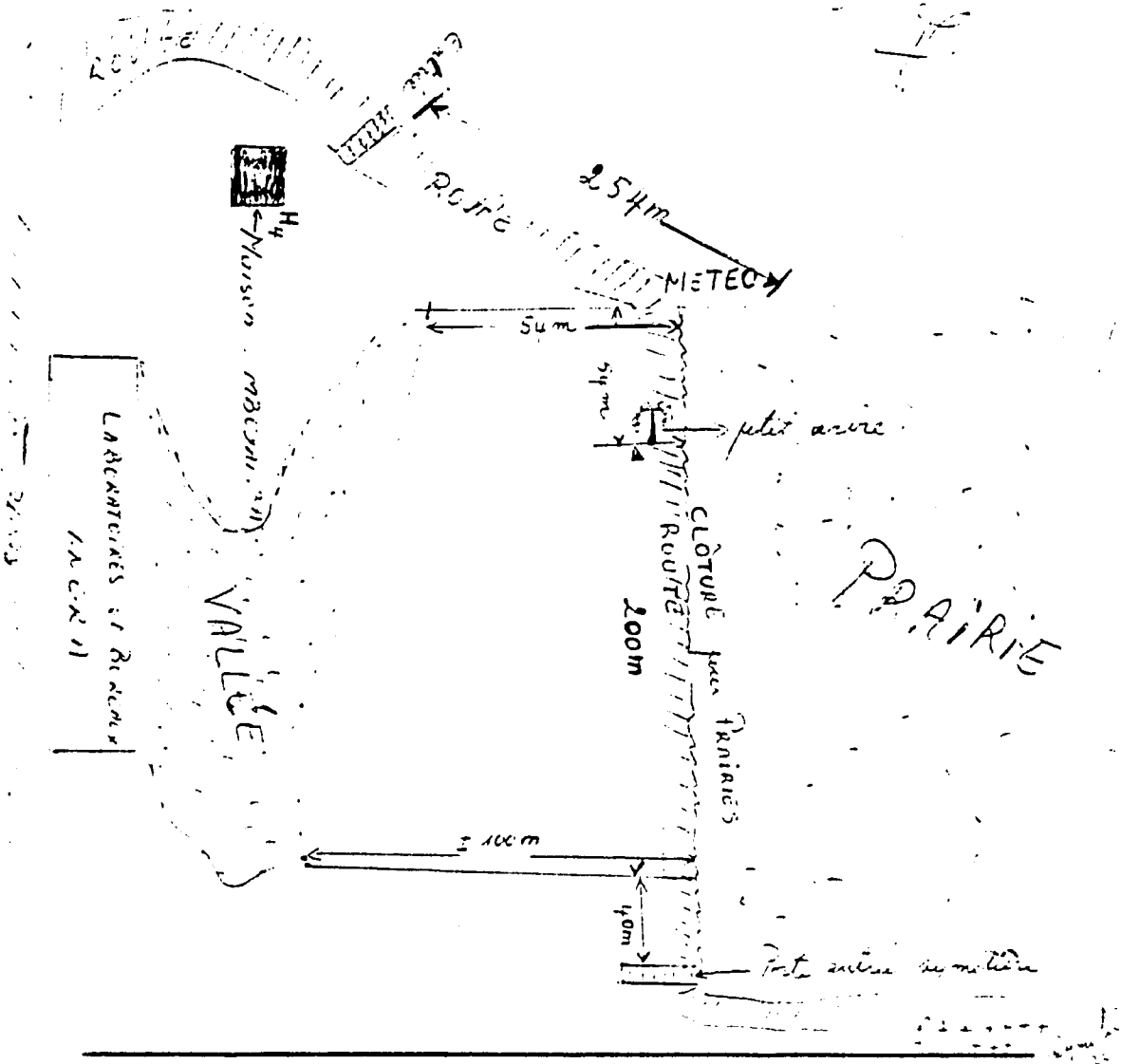


IITA - ZAIRE PROGRAMME NATIONAL MANIOC

PRONAM B. P. 11835 KINSHASA 1 ZAIRE

INERA - M'VUAZI, GARE MUEKE BAS ZAIRE

• On peut construire sur le terrain avec des arbres



SIEGE PRINCIPAL: INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE P.M.B. 5320, OYO ROAD, IBADAN, NIGERIA

N.B. En cas de nécessité ces données peut être avancées le 10 m de plus ou de moins.

LAB EQUIPMENT LIST AND ESTIMATED COSTM'VUAZI CENTRAL STATION

<u>EQUIPMENT</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>TOTAL PRICE</u>
Walk in drying oven.....	1	\$10,000	\$10,000
Lab refrigerator.....	1	1,100	1,100
Isolation chamber.....	1	400	400
Kjeldahl (for quality lab).....	1	4,000	4,000
Spectrophotometer.....	1	3,000	3,000
Cooking oven (for quality lab)..	1	500	500
Vegetable Shreder (for quality lab).....	1	1,500	1,500
Balance.....	4	100	400
Water-bath incubator shaker.....	1	1,000	1,000
Binocular microscope.....	2	500	1,000
TOTAL.....			\$22,900

FIVE SUBSTATIONS

<u>EQUIPMENT</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>TOTAL PRICE</u>
Oven.....	5	\$ 500	\$ 2,500
Vegetable shreder.....	5	1,500	7,500
Balance.....	10	100	1,000
TOTAL.....			\$11,000

FIELD EQUIPMENT LIST AND ESTIMATED COSTM'VUAZI CENTRAL STATION

<u>EQUIPMENT</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>TOTAL PRICE</u>
Disc plough.....	4	§ 1,500	§ 6,000
Disc Harrow.....	2	2,000	4,000
Ridger.....	2	1,500	3,000
Trailer (tipping type).....	1	2,000	2,000
Rotary brush cutter.....	1	1,500	1,500
TOTAL.....			§18,500

FIVE SUBSTATIONS

<u>EQUIPMENT</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>TOTAL PRICE</u>
Disc plough.....	10	§ 1,500	§15,000
Disc Harrow.....	5	2,000	10,000
Ridger.....	5	1,500	7,500
Trailor.....	5	2,000	10,000
Brush cutter.....	5	1,500	7,500
TOTAL.....			§50,000

TABLE 1 PERCENT OF CULTIVATED AREA OCCUPIED BY CASSAVA IN ZAIRE

REGION

1. BAS ZAIRE	65.7
2. BANDUNDU	51.7
3. SHABA	48.5
4. KIVU	46.5
5. KASAI OCCIDENTAL	42.7
6. KASAI ORIENTAL	37.5
7. HAUT ZAIRE	33.4
8. EQUATEUR	33.4
AVERAGE	45.4

STATISTIQUE AGRICOLE 1970-74

DEPARTEMENT DE L'AGRICULTURE MAY 77

TABLE 2 APPROXIMATION OF STAPLE FOOD CROP YIELDS, CALORIE VALUES, AND INDEX OF CALORIE

YIELD PER HECTARE, ZAIRE °

D-2	Crop	(a) Approximate yield ^a (Metric tons per hectare)	(b) Calories per 100 gram	(c) Index of caloric yield per hectare	(d) Area rela- tive	(e) Production relative (caloric base)
	Cassava.....	11.54	109	100	100	100
	Millet and sorghum ^b25	345	6.9	14	1
	Maize.....	.87	360	24.5	60	15
	Rice.....	1.04	359	29.6	28	8
	Yams	4.43	88	30.9	9	3
	Cocoyams					
	Sweet potatoes.....	6.09	97	46.9	10	5
	Plantains.....	9.24	75	55.1	34	19

° Computed from 1952 data in Bel., Min. Col., L'Agriculture au Congo Belge et au Rwanda-Urundi de 1948 à 1952 (1954), tables following p. 155.

^a European productions has been included in calculating yields but does not exceed 2 per cent of total production for any of these crops.

^b Includes other small grains.

TABLE 3 APPROXIMATION OF STAPLE FOOD CROP YIELDS, CALORIE VALUES, AND INDEX OF CALORIE YIELD PER HECTARE.

D-3

	(a) Approximate yield (Metric tons per hectare)	(b) Calories per 100 gram	(c) Index of caloric yield per hectare	(d) Area rela- tive	(e) Production relative (caloric base)
Cassava.....	6.85	109	100	100	100
Maize.....	.72	360	35	40	14
Rice (Paddy).....	.76	359	37	16	6
Sweet Potatoes					
Yams	5.73	93	71	5	4
Millet and sorghum.	.80	345	37	4	1

Source: Statistiques Agricoles, Annuaire Retrospectif 1970-1974, GOZ Department of Agriculture, 1977.

TABLE 4 ESTIMATED LABOR REQUIREMENTS FOR STAPLE FOOD CROPS, FOREST ZONE, ZAIRE°
(In man-days per hectare except as noted)

	Maize (as initial crop)		Maize (following manioc regrowth)		Rice		Manioc		Plantain	
	A ^a	B ^b	A ^a	B ^b	A ^a	B ^b	A ^a	B ^b	A ^a	B ^b
Preparation of the field ^c ...	25	16	25	16	25	16	25	16	25	16
Weeding after the harvest of maize.....					4	4	4	4	4	4
Weeding after the regrowth of manioc.....			40	40					10	10
Planting (including prepar- ation of stem cuttings for manioc.....	20	20	20	20	30	30	35	35	15	15
Weeding.....	10	10	20	20	6	6	6	6	6	6
Harvest.....	24	24	24	24	40	40	50	50	20	20
SUBTOTAL (FIELD OPERATIONS).	(79)	(70)	(129)	(120)	(105)	(96)	(120)	(111)	(80)	(71)
Transporting the crop.....	8	16	16	16	4	4	40	40	d	d
Building supports for drying	8	16	16	16						
Husking.....	3	6	6	6						
Grinding and storage (sack- ing for rice).....	20	40	40	40	23	23				
Winnowing.....	2	4	4	4	30	30				
Sacking.....	2	4	4	4						
Peeling.....							50	50		
Soaking and drying.....							100	100		
TOTAL MAN-DAYS PER HECTARE..	122	156	215	206	162	153	310	301	80	71
YIELD PER HECTARE IN TONS...	(1)	(1)	(2)	(2)	(1)	(1)	(10)	(10)	(4)	(4)
TOTAL MAN-DAYS PER TON.....	122	78	107	103	162	153	31	30	20	18

°Data from G. Geortay, "Données de base pour la gestion de paysannats de cultures vivrières en région équatoriale forestière," Bull, inf. de l'INEAC (Belg., Min. Col.), August 1956, pp.227-29.

^aA columns refer to production following forest.

^bB columns refer to production following secondary bush (sur recru).

^cTotal time for preparing field for cultivation divided equally between the five cultures shown here and peanuts.

^dIncluded in time required for harvesting.

TABLE 5 A COMPARISON OF THE NUTRITIVE VALUE OF CASSAVA .VERSE OTHER STAPLE FOODS
(Per 100 grams)

D-5

	Cassava Root	Cassava Leaf	Cassava Flour	Maize Flour	Yams	Plantains	Tropical Spinach Leaf
Calories.....	109-168	53	338-352	363	80-105	75-127	44
Protein in g...	.7-1.0	7	1.5	8.4	2.1-2.4	.8	4
Vitamin A in IU	0	10,000	traces	300	traces	0-600	13,000
Vitamin B ₁ in mg	.02	.14	(0)	.18	.08	.04	.15
Vitamin B ₂ in mg	.1	.26	(0)	.08	.03	.03	.25
Niacin in mg	.6	1.5	(1.0)	(0.6)	.4	.4	.85
Vitamin C in mg	30	3000	0	(0)	9	11	100

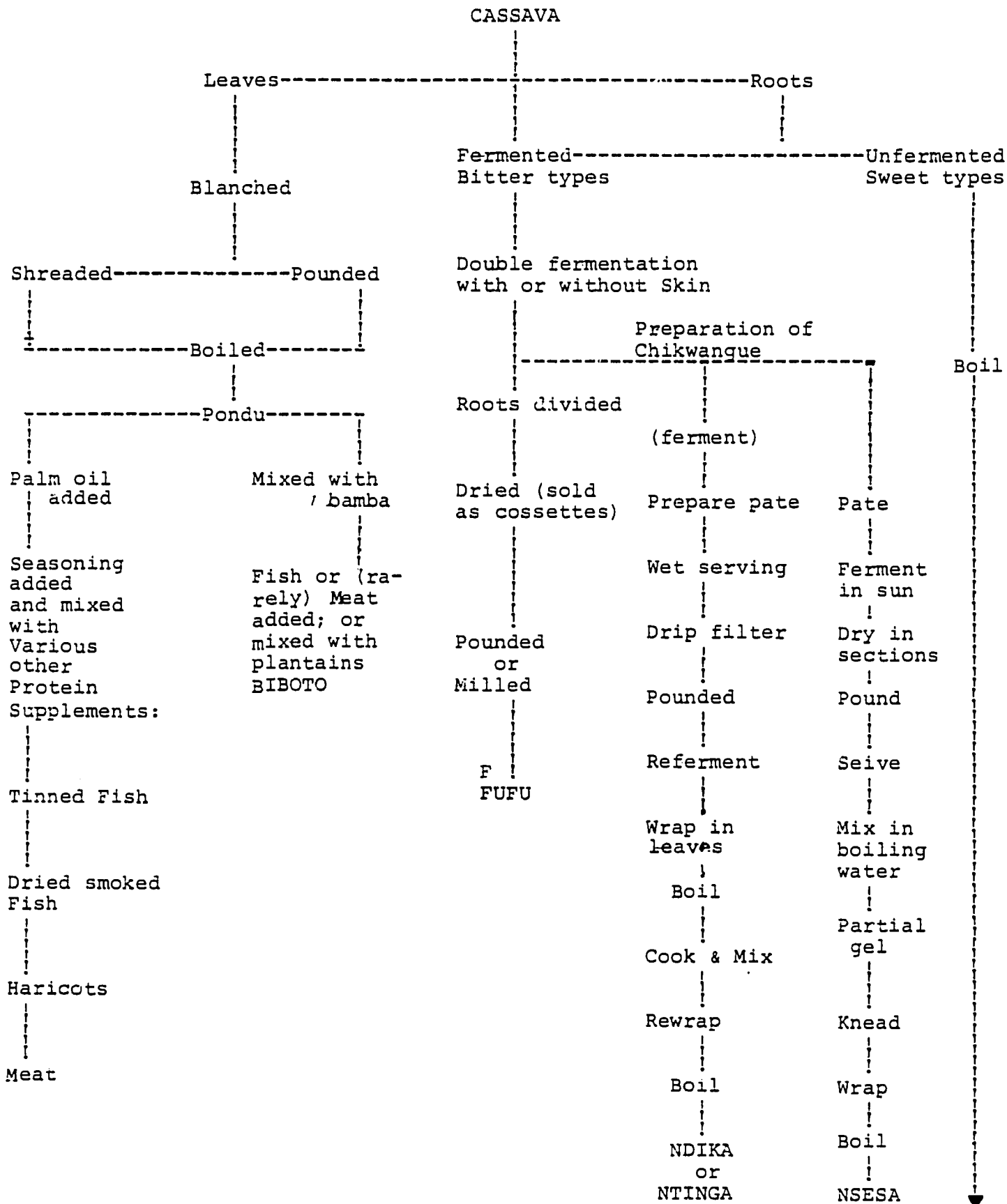
Sources: FAO, Food Composition Tables - Minerals & Vitamins - for International Use, 1954;
Tables de composition alimentaires pour la République Démocratique du Congo, V.A. Degroote
Figures in parentheses are imputed values.

TABLE 6

NUTRITIONAL VALUES OF ROOTS AND TUBERS

No.	ROOT	AV. PROXIMATE COMPOSITION OF DRY MATTER							MINERALS mg/100g			VITAMINS mg/100g					CALORIES/100g.
		Dry matter	Cr. Protein	Ts. Protein	Fat	Sugar	Carbohydr.	Ash (S.F.)	Calcium	Phosphorus	Iron	Carotene Vit. A	Vit. C	Niacin	Thioflavin	Miscin	
1	CASSAVA	28.50	2.50	2.58	0.46	0.43	94.12	2.29	10.00	35.00	0.50	7.0	3.5	0.04	0.02	0.6	391
2	YAM (D.r.)	24.10	4.42	3.75	0.34	1.45	90.11	2.51									331
	YAM (D.s.)	26.17	7.26	6.68	0.58	2.29	84.71	4.99	10.40	41.20	0.62	8.8	2.0	0.09	0.03	0.47	373
	YAM (D.c.)	16.10	5.44	4.95	0.17	0.77	90.60	2.57									306
3	SWEET POTATO	28.77	5.24	3.81	0.46	0.14	91.49	2.60	16.60	31.00	0.83	0.01	26.2	0.13	0.02	0.55	391
4	COCOYAM - XS	21.92	5.87	4.93	0.59	1.24	88.46	3.64	6.00	360.0	0.70	0.05	10	0.05	0.08		383
	COCOYAM-CE	27.77	7.59	6.30	0.37	1.63	85.69	2.69	24.00	53.0	0.72	1.20	14	0.03	0.03	0.83	376

Fig 1 SCHEMATIC REPRESENTATION OF THE STAGES IN CASSAVA PREPARATION



CASSAVA STATISTICS1. PRODUCTION FIGURES (1000 tons)

	1970	1971	1972	1973	1974	1975	1976(P)
BAS-ZAIRE	1000.3	991.4	1037.3	1082.2	1126.5	1170.5	1205.5
BANDUNDU	1725.4	1671.6	1710.1	1794.3	1900.2	1960.5	2015.9
EQUATEUR	1024.3	1040.8	1056.6	1108.2	1130.7	1185.7	1214.3
HAUT-ZAIRE	1191.1	1203.5	1224.2	1271.7	1305.0	1318.0	1334.0
KASAI OCC.	1329.6	1301.2	1348.1	1395.1	1471.8	1530.6	1580.7
KASAI OR.	1049.7	1069.3	1100.1	1133.9	1174.0	1215.0	1247.6
KIVU	1678.7	1745.6	1761.2	1818.4	1856.8	1932.8	1970.6
SHABA	1346.8	1305.6	1347.2	1411.1	1481.6	1531.0	1561.0
TOTAL	10345.9	10329.0	10584.8	11014.9	11447.3	11844.1	12129.6

2. LAND UNDER CULTIVATION (1000 hectares)

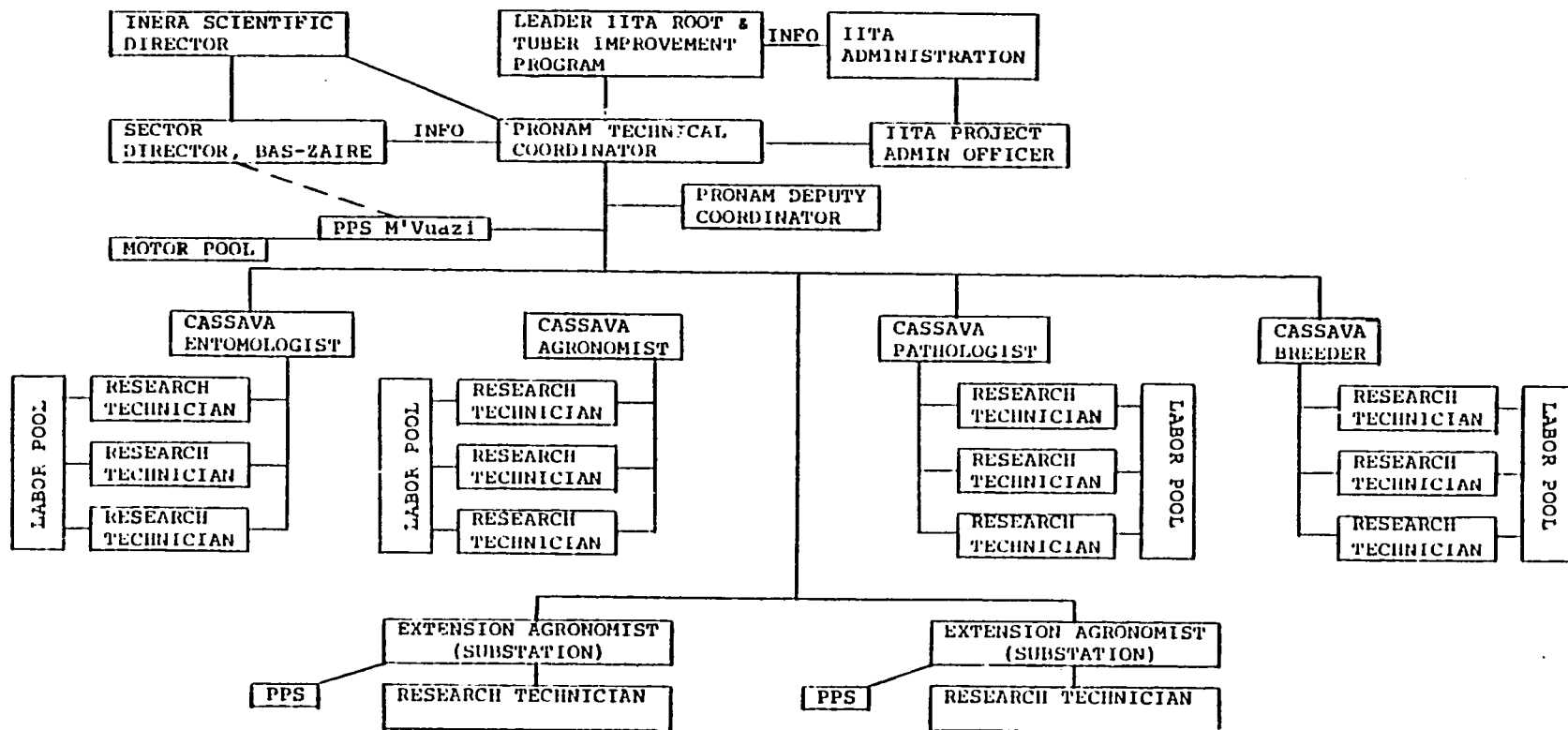
	1970	1971	1972	1973	1974	1975	1976(P)
BAS-ZAIRE	138.9	143.3	147.3	151.1	155.6	161.6	166.4
BANDUNDU	238.3	241.9	248.5	255.6	262.2	269.4	277.3
EQUATEUR	154.0	157.7	162.3	166.9	171.3	174.7	178.3
HAUT-ZAIRE	174.1	178.5	183.6	186.2	189.7	189.0	192.0
KASAI OCC.	188.6	192.2	196.8	201.6	207.0	211.7	216.6
KASAI OR.	149.4	153.1	157.9	160.9	164.2	169.8	173.9
KIVU	249.1	256.3	263.3	268.2	275.9	283.5	291.5
SHABA	200.8	204.0	211.5	216.1	221.8	228.5	233.4

3. YIELD (ton/hectare)

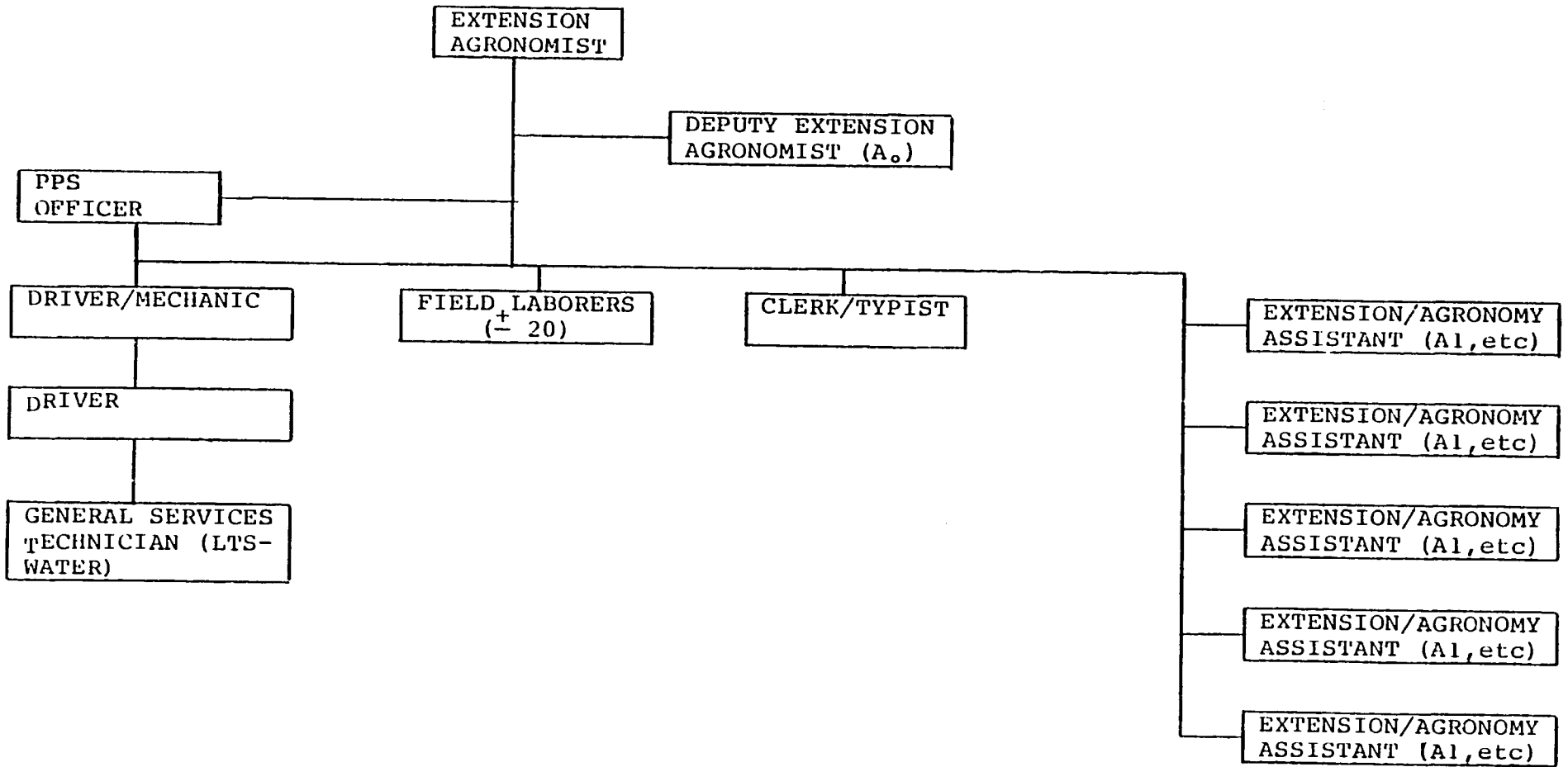
	1970	1971	1972	1973	1974	1975	1976 (P)
BAS-ZAIRE	7.20	6.92	7.04	7.16	7.24	7.24	7.24
BANDUNDU	7.24	6.91	6.88	7.02	7.25	7.28	7.27
EQUATEUR	6.65	6.60	6.51	6.60	6.60	6.79	6.81
HAUT-ZAIRE	6.84	6.74	6.67	6.83	6.88	6.97	6.95
KASAI OCC.	7.05	6.77	6.85	6.92	7.11	7.23	7.30
KASAI OR.	7.03	6.98	6.97	7.05	7.15	7.16	7.17
KIVU	6.74	6.81	6.69	6.78	6.73	6.82	6.76
SHABA	6.71	6.40	6.37	6.53	6.68	6.70	6.69

NOTES: (P) projection

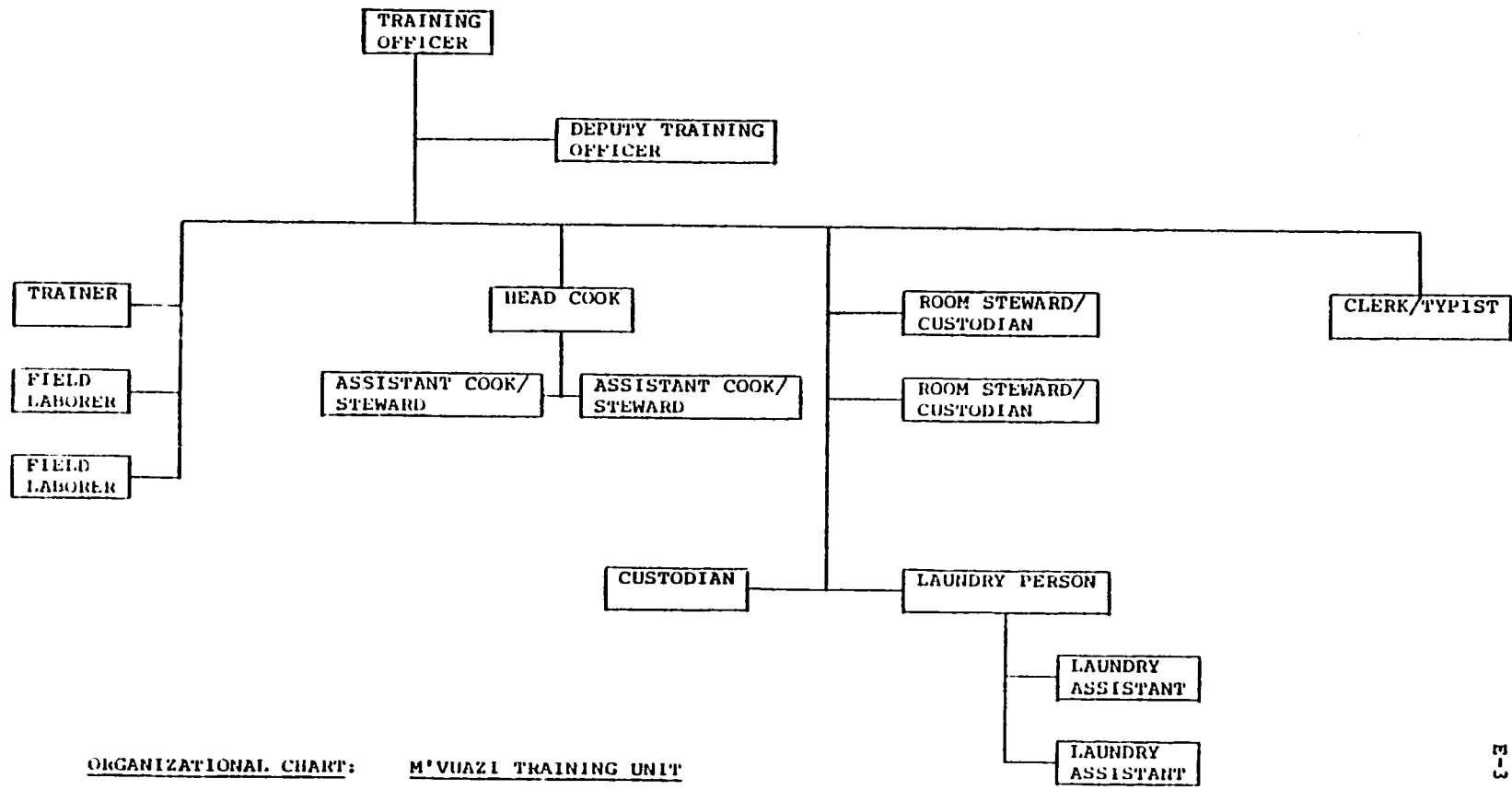
Source: GOZDA, Annuaire des Statistiques Agricoles
1970-1974, 1975-1976



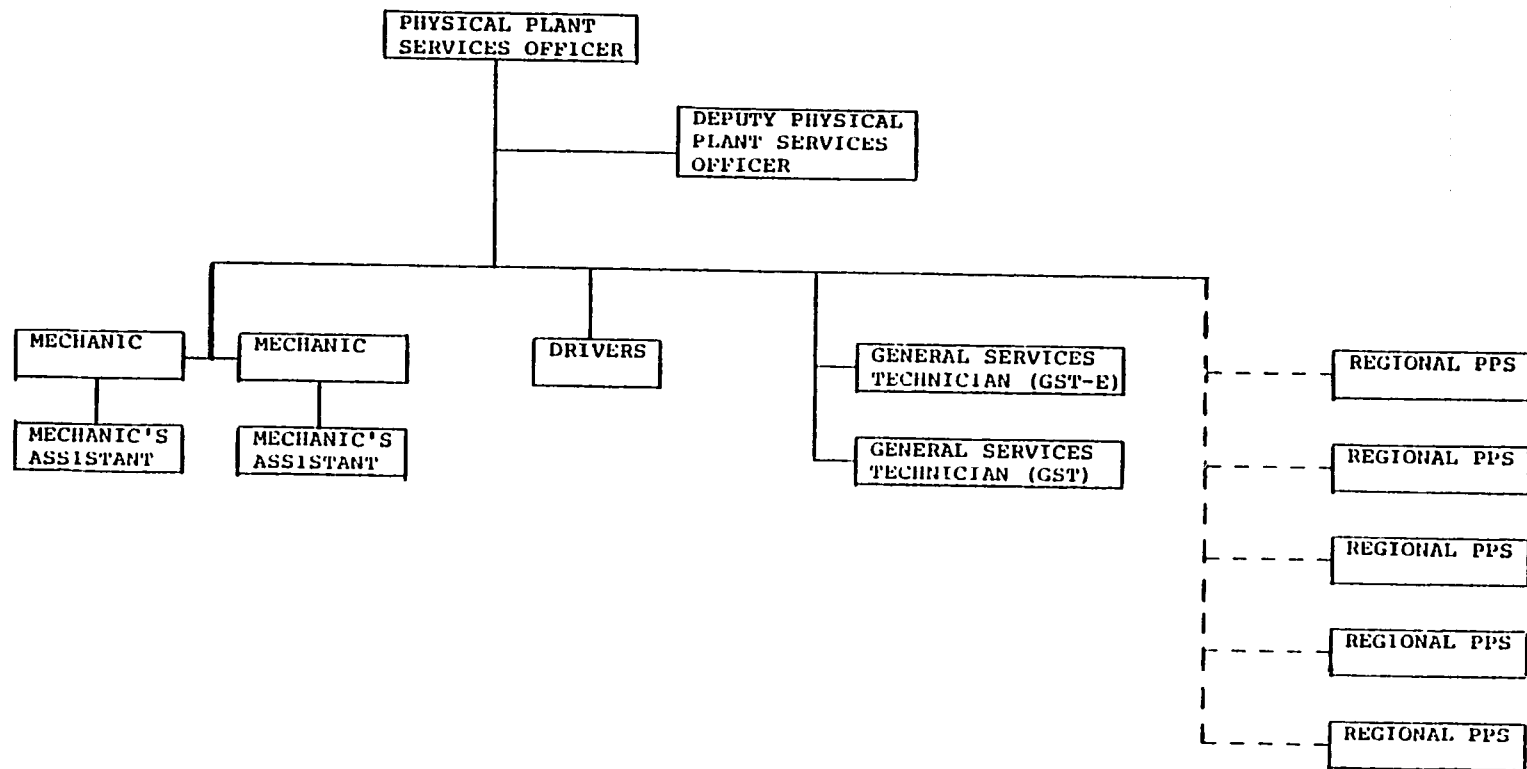
ORGANIZATIONAL CHART: PRONAM - RESEARCH



ORGANIZATIONAL CHART: REGIONAL CENTERS



ORGANIZATIONAL CHART: M'VUAZI TRAINING UNIT



ORGANIZATIONAL CHART: PHYSICAL PLANT SERVICES

JOB DESCRIPTIONSAGRONOMIST/RESEARCH TEAM LEADER (TECHNICAL COORDINATOR)

Ph.D. in agronomy with strong background in soil science and crop physiology. Good field experience in the tropics for more than four years and experience in research administration for more than two years. Experience with cassava or other root crops is desirable but not essential. French language ability is desirable. His duties and responsibilities are as follows:

1. Identify cultural limiting factors in cassava production in Zaire.
2. Conduct research leading to improved cultural methods of cassava to obtain higher economic yields of cassava, both root and leaf.
3. Develop cultural control methods to off-set major economically significant diseases and insects.
4. Incorporate research findings of the plant breeder, entomologist and pathologist, into improved cultural practices.
5. Cooperate and interact closely with Zairian counterpart agronomist.
6. Cooperate with IITA core program agronomist for agronomical research.
7. Participate in the training of extension workers, M.S., Ph.D. candidates, and post doctoral fellows.
8. Lead and coordinate research activities of IITA/PRONAM scientists and their Zairian counterparts.
9. Administer and manage the M'Vuazi PRONAM center, including being responsible for the formulation of budgets, accounts, station reports, farm operation, equipment, supplies, and personnel matters.
10. Assist the Director of PRONAM in operation of the M'Vuazi PRONAM center in terms of research, training and support service.
11. Coordinate agronomical activities of regional stations.
12. Report the results of research and training at M'Vuazi PRONAM center to the Delegeue General of INERA and Assistant Director of IITA's Root and Tuber Improvement Program via the Director of PRONAM.

PLANT BREEDER

Ph.D. in plant breeding. Experience in plant breeding in the tropics for more than two years. Experience in cassava or other root crops breeding is desirable but not essential. French language ability is desirable. His duties and responsibilities are:

1. Collect and evaluate cassava germplasm within Zaire.
2. Carry out recombination and selection of cassava breeding material.
3. Conduct yield trials in different geographical locations.
4. Screen breeding material for resistance to major diseases and insects in cooperation with plant pathologist and entomologist.
5. Evaluate cassava breeding material for consumer acceptance quality, low cyanide content, high leaf protein.
6. Cooperate and interact closely with a Zairian counterpart plant breeder.
7. Cooperate with IITA core program cassava breeder.
8. Participate in training extension workers, M.S., Ph.D. candidates and post doctoral fellows.
9. Coordinate cassava breeding activities at regional stations.

ENTOMOLOGIST - HOST PLANT RESISTANCE SPECIALIST

Ph.D. in entomology with good background and experience in host plant resistance. Experience in the field for more than two years. French language ability is desirable. His duties and responsibilities are:

1. Screen cassava breeding lines for resistance to major insects in collaboration with plant breeder.
2. Develop economical and easily adoptable control methods of major insect pests in collaboration with agronomist.
3. Cooperate and interact closely with a Zairian counterpart entomologist for host plant resistance.
4. Cooperate with IITA core program entomologist.
5. Participate in the training of extension workers, M.S., Ph.D. candidates and post doctoral fellows.

6. Coordinate screening of cassava breeding lines for resistance to major insect pests at the regional stations.

ENTOMOLOGIST - BIOLOGICAL CONTROL SPECIALIST

Ph.D. in entomology with a strong background and experience in biological control for more than two years. French language ability is desirable. His duties and responsibilities are:

1. Identify natural enemies of cassava mealybug (Phenacoccus manihoti) for biological control of the cassava mealybug.
2. Travel to Brazil and any other areas as necessary to identify promising natural enemies of the cassava mealybug.
3. Laboratory assessment of natural enemies for control of mealybug and culturing of natural enemies.
4. Conduct preliminary field trials of biological control of the cassava mealybug.
5. Expand and apply the successful biological control methods to major cassava growing areas to control cassava mealybug.
6. Cooperate with the Biological Control Division of the University of California at Riverside and with Commonwealth Institute of Biological Control.
7. Cooperate with IITA core program entomologist.
8. Participate in the training of extension workers, M.S., Ph.D. candidates and post doctoral fellows.
9. Coordinate biological control activities at regional stations.
10. Cooperate closely with a Zairian counterpart biological control entomologist.
11. Seek possibility of controlling green cassava mite (Mononychellus tanajoa)

PLANT PATHOLOGIST

Ph.D. in plant pathology with good background in both fungal and bacterial diseases. Field experience in the tropics for more than two years. French language ability is desirable. His duties and responsibilities are:

1. Screen cassava breeding lines for resistance to major diseases in collaboration with the plant breeder.

2. Develop economical and easily adaptable control methods of major diseases in collaboration with the agronomist.
3. Cooperate and interact closely with a Zairian counterpart plant pathologist.
4. Cooperate with IITA core program entomologist.
5. Participate in the training of extension workers, M.S., Ph.D. candidates and post doctoral fellows.
6. Coordinate screening of cassava breeding lines for resistance to major diseases at the regional stations.
7. Identify unknown or unidentified cassava disease problems.

EXTENSION AGRONOMIST

M.S. or equivalent in plant science or agricultural education. Experience in agricultural production and extension in the tropics for more than two years. He must be good in written and spoken French as well as English. Mechanical skills would be an advantage. Experience with cassava or other root crops is desirable but not essential. His duties and responsibilities are:

1. Collect and evaluate local cassava germplasm in the assigned specific region.
2. Evaluate cassava breeding lines for yield, resistance to disease and insects, and consumer acceptance in the assigned region in cooperation with breeders.
3. Conduct multi-location yield trials.
4. Multiply rapidly the most promising cassava lines for distribution to farmers.
5. Distribute the multiplied planting materials to farmers.
6. Conduct farm level testing.
7. Identify and control the major economically significant diseases and insects of cassava.
8. Organize and coordinate short-term training courses in cassava production and extension for extension agents.
9. Identify suitable candidates for intermediate level training.
10. Administer and manage the assigned regional office

including formulation of budgets, accounts, reports, equipment and supplies, and personnel matters.

TRAINING OFFICER

The training officer will have overall responsibility for all aspects of training including:

1. Planning of training courses in conjunction with the scientific staff.
2. Organizing of courses, including elaboration of behavioral objectives, training schedules, field preparation, procurement of supplies and preparation of training materials.
3. Day-to-day coordination of training courses.
4. Overseeing of Zairian personnel and field laborers assigned to training.
5. Teaching of such subject matter areas as communications techniques, extension methodologies and training coordination.
6. Assistance with training courses organized at regional centers.
7. Budget formulation for training and accounts.
8. Relations with donors, employers of applicants and resource persons among others.
9. Planning, organization and coordination in conjunction with scientific staff of seminars, workshops and conferences.

Qualifications:

1. Ag. education, vocational education or teaching background.
2. Experience in tropical Africa.
3. Agricultural graduate of at least M.Sc. degree level.

Must have a good command of spoken and written French.

DEPUTY TRAINING OFFICER

The Deputy Training Officer, a Zairian, will perform such duties as assigned by the Training Officer. His role is to assist the Training Officer in all aspects of training in preparation of eventually assuming the responsibility of Training Officer.

Qualifications:

M.Sc or equivalent in agricultural education, agricultural extension of vocational education. Strong background in agronomy. The ability to read and to converse in English will be an advantage.

TRAINER (2)

Trainers for crop production technology and extension courses assist the course coordinator as assigned with all aspects related to the preparation for the course, the course's day-to-day operations and the post-course compiling of data relating to performance and the results of applied research trials managed by the participants. Trainers may be assigned to the M'Vuazi center for one course or on a permanent basis.

Qualifications:

Ingenieur Agronome and a result of "Distinction" or "High Distinction" in the IITA Root Crops Course. Freedom from communicable diseases and parasites.

FIELD LABORERS (2)

Field laborers are assigned to Training on a permanent basis to assist Training personnel with operations on Training field plots that cannot be assured by course participants. Field laborers care for Training plots between courses and are otherwise assigned according to labor requirements.

Qualifications:

Must be able to communicate in French

Must be familiar with field operations of cassava

Freedom from communicable diseases and parasites

HEAD COOK

The Head Cook will be responsible for the on time preparation of three meals a day for up to 50 people with an average number not exceeding 30 during training courses. Menus may include both local, national and international dishes. The Head Cook will supervise the activities of two Assistant Cook/Stewards and will assure the cleanliness of dining hall, kitchen

and pantry, of all appliances, dishes, flatware, glasses and cooking utensils as well as the cleanliness of food and drink served. The Head Cook will be responsible for submitting to the Training Officer requests for purchase of needed commodities and for accounting for those used.

Qualifications

Professional competency

Must be capable of communication in French

Freedom from communicable diseases and parasites

ASSISTANT COOK/STEWARD (2)

Assistant Cook/Stewards assist the Head Cook in this person's functions, as assigned. Assistant Cook/Stewards may be required to assume the functions of the Head Cook for short periods.

Qualifications

Professional competency

Ability to communicate in French

Freedom from communicable diseases and parasites.

ROOM STEWARD/CUSTODIAN

Room Steward/Custodian will be responsible for maintaining the cleanliness of the dormitory buildings including bedrooms, verandas and sanitary blicks, for assuring distribution of soap, linens and sanitary supplies to training program participants and for collecting participant laundry.

Qualifications:

Professional competency

Freedom from communicable diseases and parasites.

CUSTODIAN

The custodian will have responsibility for maintaining the cleanliness of Building B (Classroom, library, reading room, offices and veranda) and of the sanitary facilities in Building C.

In addition, the Custodian will prepare rooms for various activities, as assigned.

Qualifications:

Professional competency

Freedom from communicable diseases and parasites

LAUNDRYPERSON

The laundryperson will be responsible for the washing and pressing of all laundry generated by the activities of the Training Program, including dish towels, table cloths, bed linens, towels, window curtains, participant laundry and uniforms. In addition, he will be responsible for the cleanliness and orderliness of the laundry and laundry-selected facilities and appliances.

Qualifications

Professional competency

Freedom from communicable diseases and parasites.

LAUNDRY ASSISTANT (2)

Laundry Assistants may be temporary personnel. They assist the Laundryperson with his duties, as assigned.

Qualifications:

Professional competency

Freedom from communicable diseases and parasites.

CLERK/TYPIST

The Clerk/Typist will be responsible, as assigned, by the Training Officer or his Deputy, for typing of letters, manuscripts and stencils, for the operation of a mimeograph machine for the preparation of training materials, for filing and for the general operation of the Training Office.

Qualifications:

Professional competency

Freedom from communicable diseases and parasites.

Fluent in spoken and written French

Ability to converse in English and to understand letters written in this language.

IITA PROJECT ADMINISTRATIVE OFFICER

The person to be appointed IITA Project Administrative Officer will be based in Kinshasa and his duties and responsibilities shall include but not be limited to:

1. Providing administrative support to IITA staff based in Zaire. This includes providing the benefits and allowances IITA staff are entitled under IITA's Professional Personnel Policies.
2. Commodity procurement including clearing of goods entering Zaire and shipment to final destination.
3. Management of project imprest funds and rendering of appropriate accounts to IITA.
4. Liaison between IITA, Zairian agencies, USAID and other international organizations.
5. Development of training plans for overseas training, placement of students and handling of trainee travel arrangements.
6. Preparation of progress, financial, procurement and other project reports.

PHYSICAL PLANT SERVICES

PHYSICAL PLANT SERVICES OFFICER (PPSO)

The physical plant services officer will reside at M'Vuazi and will be concerned with the continued safe operation of all project equipment. His responsibilities will be:

1. Organize and supervise the maintenance staff at M'Vuazi and the regional centers.
2. Train a deputy PPSO.
3. Recommend the hiring and firing of personnel in his staff.
4. Assure adequate supplies of spare parts and fuels to maintain the project program.

QUALIFICATIONS:

1. B.S. Degree in Mechanical Engineering or Mechanical Engineering Technology.
2. Ability to communicate well in French and English.
3. Experience working in West Africa.
4. Supervisory experience - running automotive repair shop.

DEPUTY PHYSICAL PLANT SERVICES OFFICER

The deputy PPSO will reside at M'Vuazi and will fulfill such duties and responsibilities as are given to him by the PPSO.

He would normally be expected to:

1. Help the PPSO in screening and training maintenance personnel.
2. Work with the PPSO and the mechanics in carrying on the daily repair activities on the maintenance center.
3. Assist the PPSO in controlling the vehicle fleet and stock of spare parts.

QUALIFICATIONS:

1. 12 years of training through high school, "Scientific Option".
2. A minimum of 2 years of University level training in Mechanical Engineering, Industrial Engineering, or

- other technologically oriented degree.
3. Ability to communicate well in French and English.
 4. Recommendation of PPSO.

MECHANICS

Two mechanics will reside at M'Vuazi. Their responsibilities will include:

1. Carrying on the daily maintenance work at the maintenance center.
2. Accompanying the PPSO when major repairs are required at Regional Centers.
3. Repairing vehicles broken down away from any project center.

QUALIFICATIONS:

1. 12 years training through high school, "Scientific Option" plus or including two years specialized training in automotive and diesel mechanics at a recommended training center.
2. Ability to communicate well in French.
3. Recommendation of the PPSO.

DRIVER-MECHANIC

Each Regional Center will have one Driver-Mechanic who will be responsible to:

1. Supervise all the maintenance activities at the Regional Center.
2. Safely operate one or more vehicles assigned to him.
3. Supervise and aid the other chauffeurs at the Center and to report to the PPSO in any difficulties concerning them.
4. Report to the PPSO when major repairs are required at the Center that demand assistance from the maintenance Center.

QUALIFICATIONS

1. 12 years training through high school, "Scientific Option" plus or including two years specialized training in automotive and diesel mechanics at a recommended training center.
2. The ability to communicate well in French.
3. Recommendation of the PPSO.

DRIVERS

Each "pool" vehicle will have one driver assigned it. That driver only will operate that vehicle and thus be answerable for all questions arising about the care and operation of the vehicle. He will be expected to:

1. Safely operate his vehicle(s) on all roads at all locations.
2. Properly care for his vehicle(s) to the extent of minor repairs.

QUALIFICATIONS

1. The ability to communicate well in French.
2. Recommendation of the PPSO on the basis of a driving examination which includes areas of minor repairs.

MECHANIC'S ASSISTANT

Each mechanic will be assigned one or more mechanic's assistant(s) depending upon the volume of work being received at the maintenance center. They will help the mechanics carry on the daily repairs activities at the maintenance center.

QUALIFICATIONS

1. 10 years of schooling.
2. Recommendation by the PPSO.

GENERAL SERVICES TECHNICIAN - ELECTRICAL (GST-E)

The GST-E will reside at M'Vuazi and will be responsible for:

1. The operation of the diesel electric generating plant.
2. The repair of the current distribution circuits.
3. Repair of simple electrical fixtures.

QUALIFICATIONS

1. 12 years training through high school, "Scientific Option".
2. Two years experience working with an electrician.
3. The ability to communicate well in French.
4. Recommendation of the PPSO.

GENERAL SERVICES TECHNICIAN (GST)

The General Services Technician will reside at M'Vuazi and will:

1. maintain the operation of the water distribution system.
2. complete such minor repairs in carpentry, masonry, and plumbing as to facilitate the smooth operation of the project program.

QUALIFICATIONS

1. The ability to communicate well in French.
2. Recommendation of the PPSO.

GENERAL SERVICES TECHNICIAN - ELECTRICAL AND WATER (GST-EW)

The GST-EW will reside one to each Regional Center. They will be responsible for:

1. The proper operation of the electrical generating plant.
2. The proper operation of the water distribution system.

QUALIFICATIONS

1. The ability to communicate well in French.
2. At least ten years of schooling.
3. Recommendation of the PPSO.

INITIAL ENVIRONMENTAL EXAMINATION

Project Country: Zaire

Project Title: Zaire Manioc Outreach Project, 660-0077

Funding: FY(s) 1978-1982 \$ 4,500,000

Period of Project: five years

IEE Prepared by: IITA/Ibadan and USAID Zaire

Environmental Action Recommended: Negative Determination

Concurrence:



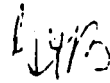
Norman L. Sweet, Director, USAID/Zaire

Date:

9/10/78

Assistant Administrator Decision:

APPROVED



DISAPPROVED

DATE

9/13/78

INITIAL ENVIRONMENTAL EXAMINATION

Project Locations: M'Vuazi, Bas-Zaire Region; Kiyaka, Bandundu Region; Gandajika, East Kasai Region; Mulungu, Kivu Region; Boketa, Equateur Region.

Project Title: Cassava Outreach (660-077)

Funding: FY 1978-FY 1982

Life of Project: 5 Years

IEE Prepared by: IITA/Ibadon and USAID/Zaire date: March, 1978

Action Recommended: Negative Determination

Discussion Of Major Project Relationships Relevant to Negative DeterminationA. Summary of Proposed Project

This project seeks to extend to the major cassava (manioc) growing areas of Zaire the effects of the Programme National Manioc (PRONAM), created in 1974 by a memorandum of agreement between the Government of Zaire and the International Institute of Tropical Agriculture (IITA). Screening and testing activities leading to the development of high yielding varieties of cassava that incorporate disease and insect pest resistance were initiated at the INERA station of M'Vuazi, Bas-Zaire. The achievements realized by this work suggest the importance of creating regional bases at which cassava may be tested under the environmental and climatic conditions of these regions. Of particular importance is the multiplication for extension of large quantities of disease and pest-free planting materials on a regional basis.

Regional testing and multiplication activities would be based at four existing INERA stations. Training in cassava production technology and extension for research workers and extension supervisors from all regions of Zaire would be offered at the M'Vuazi station.

B. Identification and Evaluation of Possible Environmental Impacts1. Resource linkage:

The technology introduced by the project would be through the introduction of improved planting materials and management practices for an existing staple food crop. Pesticides would not be used. Fertilizers, if available and economically within reach for the farmer, may be recommended. No changes in land use patterns, population density or redistribution would be anticipated. Irrigation would not be a factor except for rapid multiplication of improved planting materials.

2. Physical Aspects:

The opening of new land to cultivation is not a factor in the present proposal. Soils currently utilized for cassava production would be those to be utilized for the introduction of improved planting materials. Although the introduction of diseases or insect pests is a possibility, the probability would be

- 2 -

minimal by the nature of the project's objectives and the precautions already effected by PRONAM scientists. The regional stations that form a part of the present project proposal have been recommended in part as a means of obviating the danger of spreading over larger areas diseases and insect pests already present in certain regions. Since cassava field stubble is not normally burnt, problems associated with air pollution would not be present.

3. Socio-cultural Aspects:

The possibility of creating deleterious effects through the introduction of improved planting materials of a locally used species of crop plant is minimal, especially when the improved materials do not require purchasable inputs, such as pesticides and fertilizers, for some measure of improved yield. The package of recommended cultural practices that will be extended to the farmers with the improved planting materials may be adopted wholly or in part, depending on the level of management each farmer exercises. The project is not based on purchasable inputs of any sort (neither mechanization nor chemicals). The project would require no land reform nor change in land tenure arrangements.

The project would affect only the indigenous populations of Zaire by increasing the food supply and improving nutritional levels through increased yield of cassava leaves and tubers. Spin-off or transfer effects that may be expected include such factors as increased awareness on the part of the farmer regarding improved planting materials, plant disease and insect pest control and the effect of varying levels of management on crop yield. None of the above effects are seen to be deleterious nor are any imposed upon any farmer or other member of a local population.

4. Altering Natural Defenses:

The cassava crop in Zaire has been under attack for some time by several diseases and insect pests. Included among these are Cassava Mosaic Disease (CMD) which is transmitted by white flies, Cassava Bacterial Blight (CBB), anthracnose, the green cassava mite and the cassava mealybug. It is the latter, the cassava mealybug, only recently identified by Ms. Matite-Fereero as Phenacoccus Manihoti (Pseudococcidae), that has reached the most serious epidemic level. Cassava is a major food crop in Zaire, providing the major calorific diet for two-thirds of the population. If the mealybug were to spread unchecked throughout Zaire, there might be an extensive food crisis of enormous proportions among the poorest people, who depend heavily on cassava as their principal source of food.

To address this serious problem, an International Workshop on the Cassava Mealybug, co-sponsored by the International Institute of Tropical Agriculture (IITA) and the Government of Zaire Department of Agriculture's National Manioc Program (PRONAM), was held at the M'Vuazi Research Station, one of the stations of the National Agricultural Research and Studies Institute (INERA), in Bas-Zaire from June 26 to June 29, 1977.

a. Control of the Mealybug: Four different approaches have been suggested to control the insect

1. Cultural methods control;
2. Chemical control;

- 3 -

3. Breeding for resistance; and
4. Biological control.

It is believed that biological control and breeding for resistance are the best long-term solutions. Changes in cultural methods and chemical control together appear to be appropriate as short-term solutions.

1. Cultural Methods and Chemical Control: An adjustment in farmer cultural practices has been suggested as a promising short-term way of retarding the effect and spread of mealybug attack. Such control changes include: (1) planting early to give plants a "head-start"; (2) soil moisture conservation and other practices to improve plant growth; (3) growing cover crops at appropriate times; and (4) weeding cassava fields within the first six weeks of planting. The patchy distribution of cassava fields, the cost of insecticides, and the use of cassava leaves as food make chemical control inappropriate as a major method of long-term control. Preliminary studies, however, have shown that dipping cassava cuttings in an appropriate insecticide reduces the chances of initial infestation from cuttings. It has been suggested that a network of treatment centers be established. This should help reduce the spread of the mealybug.

2. Breeding for Resistance: This may be the best means of control (mainly because it is the cheapest in the long run) but it takes time. Efforts have begun in Zaire to screen over 2,000 cassava families from both INERA and IITA cassava varieties. Since the mealybug has been held in check in South America, a cassava variety resistant to the insect may exist there. Thus, the spectrum of cassava germplasm will be expanded to include samples from South America according to experts in this field.

3. Biological Control: At this time, bio-control is considered the most promising method of containing and eventually controlling the cassava mealybug. Here in Zaire the proposal is to introduce natural enemies of the pest into the ecosystem where neither the pest nor the introduced species have previously existed. It is claimed that the mealybug has expanded so rapidly in Africa primarily because this is an incipient invasion and the ecosystem has not yet been able to accommodate the pest, nor bring about control by a balance of nature.

Biological control of other species of mealybug has proven to be successful in other parts of the world. Investigations of the applicability of this method here in Zaire will include the introduction of a parasite, a predator, or the two in combination. Previous experience with other mealybug pest problems has shown that predators such as the Lady Beetle, cryptolaemus montrouzieri, and the wasp, neodusmetia sanguani, are especially effective in reducing high density populations. Parasitoids in general are considered better at finding and destroying host at a low host insect population density.

Biological control has the advantage over other methods in that: (1) once achieved, it is permanent; (2) it is specific; and (3) it is maintained without any need for recurrent input by the farmer. Thus, this method is ideally suited for developing countries where one finds a predominant peasant agriculture and subsistence food crop. A disadvantage of this method is that

- 4 -

success cannot be guaranteed in advance and may take some time to achieve. The scientists at the Workshop did not express (much) fear of creating another pest problem with the introduction of a foreign insect or parasite. There are several hundred successful historical cases reported around the world of bio-control of mealybugs and therefore there is little reservation felt among scientists in applying this technique here in Zaire.

b. Comment: At the International Workshop, it was determined that, while testing of all available methods of controlling the mealybug, will continue emphasis will be on biological control, the most promising approach at this time. The International Development Research Center (IDRC) is sponsoring, through the Commonwealth Institute of Biological Control, a three-year project on biological control of this pest in South America and Trinidad.

In this project, funds will be allocated for an entomologist to come to Zaire and concentrate on the biological control approach to the problem. Natural enemies of the mealybug will be surveyed in climatically and ecologically similar areas within the insect's natural distribution where it is not ~~con-~~ sidered a pest. The mealybug's natural distribution lies within the ecosystems of various geographic areas where the insect has established a niche for itself. In these areas the insect is part of an ecosystem where it is kept in balance by nature. The IITA/PRONAM program will be the focal point for solving the mealybug problem in Zaire. Promising natural enemies will be collected, studied by IITA/PRONAM in M'Vuazi under strict research controls. The release of a natural enemy will necessitate constant monitoring, recapture, and breeding to make an accurate assessment of its impact on controlling the mealybug.

c. Recommendation for Environmental Action: The Initial Environmental Examination reveals that the project will not have a significant effect on the environment, and therefore a Negative Determination is considered appropriate.

IMPACT IDENTIFICATION AND EVALUATION FORM

<u>Impact Areas and Sub-areas</u>	<u>Impact Identification, and Evaluation¹</u>
A. <u>LAND USE</u>	
1. Changing the character of the land through:	
a. Increasing the population.....	<u>N</u>
b. Extracting natural resources.....	<u>N</u>
c. Land clearing.....	<u>N</u>
d. Changing soil character.....	<u>N</u>
2. Altering natural defenses.....	<u>N</u>
3. Foreclosing important uses.....	<u>N</u>
4. Jeopardizing man or his works.....	<u>N</u>
5. Other factors.....	<u>None</u>
B. <u>WATER QUALITY</u>	
1. Physical state of water.....	<u>N</u>
2. Chemical and biological states.....	<u>N</u>
3. Ecological balance.....	<u>N</u>
4. Other factors.....	<u>None</u>
C. <u>ATMOSPHERIC</u>	
1. Air additives.....	<u>N</u>
2. Air pollution.....	<u>N</u>
3. Noise pollution.....	<u>N</u>
4. Other factors.....	<u>None</u>
D. <u>NATURAL RESOURCES</u>	
1. Diversion, altered use of water.....	<u>N</u>
2. Irreversible, inefficient commitments.....	<u>N</u>
3. Other factors.....	<u>None</u>
E. <u>CULTURAL</u>	
1. Altering physical symbols.....	<u>N</u>
2. Dilution of cultural traditions.....	<u>N</u>
3. Other factors.....	<u>None</u>

Use the following symbols: N - No environmental impact
 L - Little environmental impact
 M - Moderate environmental impact
 H - High environmental impact
 U - Unknown environmental impact

F. SOCIOECONOMIC

- 1. Changes in economic/employment patterns..... N
- 2. Changes in population..... N
- 3. Changes in cultural patterns..... N
- 4. Other factors..... None

G. HEALTH

- 1. Changing a natural environment..... N
- 2. Eliminating an ecosystem element..... N
- 3. Other factors..... None

H. GENERAL

- 1. International impacts..... N
- 2. Controversial impacts..... N
- 3. Larger program impacts..... N
- 4. Other factors..... None

I. OTHER POSSIBLE IMPACTS (not listed above)..... None

AID HANDBOOK 3, App 5C	Part I	TRANS. MEMO NO. 3:19	EFFECTIVE DATE February 15, 1978	PAGE NO. 5C(1)-1
------------------------	--------	-------------------------	-------------------------------------	---------------------

5C(1) - COUNTRY CHECKLIST

Listed below are, first, statutory criteria applicable generally to FAA funds, and then criteria applicable to individual fund sources: Development Assistance and Security Supporting Assistance funds.

A. GENERAL CRITERIA FOR COUNTRY

FOR SSA FUNDS:

1. FAA Sec. 116. Can it be demonstrated that contemplated assistance will directly benefit the needy? If not, has the Department of State determined that this government has engaged in consistent pattern of gross violations of internationally recognized human rights?
M.A. See answer to question No.B.2,a.
FOR DA Funds:
Yes
2. FAA Sec. 481. Has it been determined that the government of recipient country has failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully?
No
3. FAA Sec. 620(a). Does recipient country furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba?
No. To all points
4. FAA Sec. 620(b). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement?
Yes
5. FAA Sec. 620(c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government?
No. Zaire has substantial short-term debts to various private American banks & Ex-IM Bank & is in arrears in payments on some its loans. However, the GOZ and IMF are discussing a new stabilization program, including provisions for ensuring satisfactory payment of Zaire's debts.
6. FAA Sec. 620(e) (1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?
In 1974, Zaire nationalized U.S. oil firms and in Sept. 1975, Zaire initiated moves to nationalize the pharmaceutical industry. However as of Sept. 1976 Zaire has reversed its position & offered these same firms the opportunity to regain their lost businesses with 100% interest reduced to 60% share after about 5 years. This is a positive private step to attract back foreign private investors and will support domestic investment.

PAGE NO. 5C(1)-2	EFFECTIVE DATE February 15, 1978	TRANS. MEMO NO. 3:19	AID HANDBOOK 3, App. 5C
---------------------	-------------------------------------	-------------------------	----------------------------

A

7. FAA Sec. 620(f); App. Sec. 108. Is recipient country a Communist country? Will assistance be provided to the Democratic Republic of Vietnam (North Vietnam), South Vietnam, Cambodia or Laos? No.
8. FAA Sec. 620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression? (a) No (b) No
9. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property? No.
10. FAA Sec. 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility or confiscation, has the AID Administrator within the past year considered denying assistance to such government for this reason? No, because no recent effort has been made by the U.S. to undertake an Investment Guaranty Agreement with Zaire. Consideration is provided in the approval process for the annual OYB.
11. FAA Sec. 620(o); Fishermen's Protective Act, Sec. 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing activities in international waters, N/A
- a. has any deduction required by Fishermen's Protective Act been made?
- b. has complete denial of assistance been considered by AID Administrator?
12. FAA Sec. 620(q); App. Sec. 504. (a) Is the government of the recipient country in default on interest or principal of any AID loan to the country? (b) Is country in default exceeding one year on interest or principal on U.S. loan under program for which App. Act appropriates funds, unless debt was earlier disputed, or appropriate steps taken to cure default? (a) Yes (b) No. On 5/24/76, the Administrator determined, in accordance with Section 620(q) of the FAA & Delegation of Authority issued thereunder, that it is in the national interest of the U.S. to provide assistance to Zaire.
- * 13. FAA Sec. 620(s). "If contemplated assistance is development loan (including Alliance loan) or security supporting assistance, has the Administrator taken into account the percentage of the country's budget which is for military expenditures, the amount of foreign exchange spent on military equipment and the amount spent for the purchase of sophisticated weapons systems?" (An affirmative answer may refer to the record of the taking into account, e.g.: "Yes as reported in annual report on implementation of Sec. 620(s)." This report is prepared at the time of approval by the Administrator of the Operational Year Budget.* Yes. Based on Zaire's recurring budget figures, Zaire's 1976 military expenditure is expected to be about the same as 1975 which is significantly less than that of 1974. In FY 76, Zaire concluded a \$19 million Foreign Military Sales Agreement with the U.S. No sophisticated weapons system were purchased in 1975. No figures are available on foreign exchange resources spent on military equipment. Neither US development assistance nor PL 480 funds are being directed for military expenditures. Since establishment of its recent stabilization program the GOZ

* Revised

Part I

AID HANDBOOK 3, App 5C	TRANS. MEMO NO 3:19	EFFECTIVE DATE February 15, 1978	PAGE NO. 5C(1)-3
------------------------	------------------------	-------------------------------------	---------------------

A13

* Upward changes in the Sec. 620(s) factors occurring in the course of the year, of sufficient significance to indicate that an affirmative answer might need review should still be reported, but the statutory checklist will not normally be the preferred vehicle to do so.) *

has also made a strong effort to have its military forces become as self-sufficient as possible in financing foodstuffs with and for its own personnel.

14. FAA Sec. 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?

No.

15. FAA Sec. 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the AID Administrator in determining the current AID Operational Year Budget?

UNDP reports that Zaire is not in arrears with its UN dues, assessments or other obligations.

16. FAA Sec. 620A. Has the country granted sanctuary from prosecution to any individual or group which has committed an act of international terrorism?

No

17. FAA Sec. 666. Does the country object, on basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. there to carry out economic development program under FAA?

No.

18. FAA Sec. 669. Has the country delivered or received nuclear reprocessing or enrichment equipment, materials or technology, without specified arrangements on safeguards, etc.?

No.

19. FAA Sec. 301. Has the country denied its citizens the right or opportunity to emigrate?

No.

B. FUNDING CRITERIA FOR COUNTRY1. Development Assistance Country Criteria

a. FAA Sec. 102(c), (d). Have criteria been established, and taken into account, to assess commitment and progress of country in effectively involving the poor in development, on such indexes as: (1) small-farm labor intensive agriculture, (2) reduced infant mortality, (3) population growth, (4) equality of income distribution, and (5) unemployment.

Yes.

b. FAA Sec. 201(b)(5), (7) & (8); Sec. 208; 211(a)(4), (7). Describe extent to which country is:

(1) Making appropriate efforts to increase food production and improve means for food storage and distribution.

Zaire has established a 5-year plan which emphasizes rural development & agriculture and is actively soliciting assistance from international donor community for this purpose.

* Revised

FILE NO.	EFFECTIVE DATE	TRANS. MEMO NO.	
5C(1)-4	February 15, 1978	3:19	AID HANDBOOK 3, App. 5C

81b

G-4

- (2) Creating a favorable climate for foreign and domestic private enterprise and investment.
- (3) Increasing the public's role in the developmental process.
- (4) (a) Allocating available budgetary resources to development.
- (b) Diverting such resources for unnecessary military expenditure and intervention in affairs of other free and independent nations.
- (5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.
- (6) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.
- c. FAA Sec. 201(b), 211(a). Is the country among the 20 countries in which development assistance loans may be made in this fiscal year, or among the 40 in which development assistance grants (other than for self-help projects) may be made? Yes
- d. FAA Sec. 115. Will country be furnished, in same fiscal year, either security supporting assistance, or Middle East peace funds? If so, is assistance for population programs, humanitarian aid through international organizations, or regional programs? No.
2. Security Supporting Assistance Country Criteria
- a. FAA Sec. 502B. Has the country engaged in a consistent pattern of gross violations of internationally recognized human rights? Is program in accordance with policy of this Section? No
Yes
- b. FAA Sec. 531. Is the Assistance to be furnished to a friendly country, organization, or body eligible to receive assistance? Yes
- c. FAA Sec. 509. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made? N/A

AID HANDBOOK 3, App 5C	TRANS. MEMO NO. 3:19	EFFECTIVE DATE February 15, 1978	PAGE NO. 5C(2)-i
------------------------	-------------------------	-------------------------------------	---------------------

G-5

5C(2) - PROJECT CHECKLIST

Listed below are, first, statutory criteria applicable generally to projects with FAA funds, and then project criteria applicable to individual fund sources: Development Assistance (with a sub-category for criteria applicable only to loans); and Security Supporting Assistance funds.

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

A. GENERAL CRITERIA FOR PROJECT.

1. App. Unnumbered; FAA Sec. 653(b)

<p>(a) Describe how Committees on Appropriations of Senate and House have been or will be notified concerning the project;</p> <p>(b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than \$1 million over that figure plus 10%)?</p>	<p>(a) FY 78 Congressional Notification submitted.</p> <p>(b) Yes</p>
--	---

2. FAA Sec. 611(a)(1). Prior to obligation in excess of \$100,000, will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?

	<p>(a) Yes</p> <p>(b) Yes</p>
--	-------------------------------

3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?

	<p>No further legislative action is required to implement the program.</p>
--	--

4. FAA Sec. 611(b); App. Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per Memorandum of the President dated Sept. 5, 1973 (replaces Memorandum of May 15, 1962; see Fed. Register, Vol 38, No. 174, Part III, Sept. 10, 1973)?

	<p>N/A</p>
--	------------

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed \$1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?

	<p>N/A</p>
--	------------

PAGE NO. 5C(2)-2	EFFECTIVE DATE February 15, 1978	TRANS. MEMO NO. 3:19	AID HANDBOOK 3, App. 5C
---------------------	-------------------------------------	-------------------------	----------------------------

A.

6. FAA Sec. 209, 619. Is project susceptible of execution as part of regional or multi-lateral project? If so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. If assistance is for newly independent country, is it furnished through multi-lateral organizations or plans to the maximum extent appropriate? No.
7. FAA Sec. 601(a); (and Sec. 201(f) for development loans). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions. The main purpose of the project is to develop capacity in the DOA in the areas of cassava research. To the extent that this is successful the project will improve the technical efficiency of the GOZ in increasing agricultural production.
8. FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise). The project will provide some US academic training & commodities. These inputs would be obtained in the US.
9. FAA Sec. 612(b); Sec. 636(n). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services. The GOZ will make a substantial local currency contribution to this project.
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency and, if so, what arrangements have been made for its release? No.

B. FUNDING CRITERIA FOR PROJECT1. Development Assistance Project Criteria

a. FAA Sec. 102(c); Sec. 111; Sec. 201a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production, spreading investment out from cities to small towns and rural areas; and (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions?

This project will develop cassava production packages using farmer participatory research. The primary client group for these research results is the rural subsistence farmer in Zaire. Farmers will benefit by having improved production packages defined, which are feasible in their milieu of labor-intensive agriculture.

AID HANDBOOK 3, App 5C.	TRANS. MEMO NO. 3:19	EFFECTIVE DATE February 15, 1978	PAGE NO. 5C(2)-3
-------------------------	-------------------------	-------------------------------------	---------------------

31

b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available? [Include only applicable paragraph -- e.g., a, b, etc. -- which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.]

- | | |
|--|--|
| (1) [103] for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; [103A] if for agricultural research, is full account taken of needs of small farmers; | Research activities in this project are designed to take full account of small farmers' needs. |
| (2) [104] for population planning or health; if so, extent to which activity extends low-cost, integrated delivery systems to provide health and family planning services, especially to rural areas and poor; | N/A |
| (3) [105] for education, public administration, or human resources development; if so, extent to which activity strengthens nonformal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development; | N/A |
| (4) [106] for technical assistance, energy, research, reconstruction, and selected development problems; if so, extent activity is: | N/A |
| (a) technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations; | N/A |
| (b) to help alleviate energy problem; | N/A |
| (c) research into, and evaluation of, economic development processes and techniques; | N/A |
| (d) reconstruction after natural or manmade disaster; | N/A |
| (e) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance; | N/A |
| (f) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development. | N/A |

PAGE NO.	EFFECTIVE DATE	TRANS. MEMO NO.	
50(2)-4	February 15, 1978	3:19	AID HANDBOOK 3, App. 5C

31

(5) [107] by grants for coordinated private effort to develop and disseminate intermediate technologies appropriate for developing countries.

N/A

c. FAA Sec. 110(a); Sec. 208(e). Is the recipient country willing to contribute funds to the project, and in what manner has or will it provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)?

Yes. The GOZ has assured USAID/Kinshasa

d. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing?

N/A

e. FAA Sec. 207; Sec. 113. Extent to which assistance reflects appropriate emphasis on; (1) encouraging development of democratic, economic, political, and social institutions; (2) self-help in meeting the country's food needs; (3) improving availability of trained worker-power in the country; (4) programs designed to meet the country's health needs; (5) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or (6) integrating women into the recipient country's national economy.

The project will promote the capacity of the rural population to feed itself, and better its economic & social conditions

f. FAA Sec. 231(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

The project responds to the GOZ's desire to use the country's research & training facilities, such as INERA, PRONAM & UNAZA.

AID HANDBOOK 3, App 5C	TRANS. MEMO NO. 3:19	EFFECTIVE DATE February 15, 1978	PAGE NO. 5C(2)-5
------------------------	-------------------------	-------------------------------------	---------------------

81

g. FAA Sec. 201(b)(2)-(4) and -(8); Sec. 201(e); Sec. 211(a)(1)-(3) and -(8). Does the activity give reasonable promise of contributing to the development: of economic resources, or to the increase of productive capacities and self-sustaining economic growth; or of educational or other institutions directed toward social progress? Is it related to and consistent with other development activities, and will it contribute to realizable long-range objectives? And does project paper provide information and conclusion on an activity's economic and technical soundness?

See Part II and III of PP.

The project is consistent with DAP objectives within the agricultural sector.

h. FAA Sec. 201(b)(6); Sec. 211(a)(5), (6). Information and conclusion on possible effects of the assistance on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving or safeguarding the U.S. balance-of-payments position.

The project will have no discernable impact on U.S. economy.

2. Development Assistance Project Criteria (Loans only)

a. FAA Sec. 201(b)(1). Information and conclusion on availability of financing from other free-world sources, including private sources within U.S.

N/A

b. FAA Sec. 201(b)(2); 201(d). Information and conclusion on (1) capacity of the country to repay the loan, including reasonableness of repayment prospects, and (2) reasonableness and legality (under laws of country and U.S.) of lending and relending terms of the loan.

c. FAA Sec. 201(e). If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds \$100,000, has country submitted to AID an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner?

d. FAA Sec. 201(f). Does project paper describe how project will promote the country's economic development taking into account the country's human and material resources requirements and relationship between ultimate objectives of the project and overall economic development?

PAGE NO.	EFFECTIVE DATE	TRANS. MEMO NO.	AID HANDBOOK
5C(2)-6	February 15, 1978	3:19	3, App. 5C

82

e. FAA Sec. 202(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources?

f. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there an agreement by the recipient country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan?

3. Project Criteria Solely for Security Supporting Assistance

FAA Sec. 531. How will this assistance support promote economic or political stability?

It will promote increased economic well being.

4. Additional Criteria for Alliance for Progress

N/A

[Note: Alliance for Progress projects should add the following two items to a project checklist.]

a. FAA Sec. 251(b)(1), -(8). Does assistance take into account principles of the Act of Bogota and the Charter of Punta del Este; and to what extent will the activity contribute to the economic or political integration of Latin America?

b. FAA Sec. 251(b)(8); 251(h). For loans, has there been taken into account the effort made by recipient nation to repatriate capital invested in other countries by their own citizens? Is loan consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress (now "CEPCIES," the Permanent Executive Committee of the OAS) in its annual review of national development activities?

AID HANDBOOK 3, App 5C	TRANS. MEMO NO. 3:19	EFFECTIVE DATE February 15, 1978	PAGE NO. 5C(3)-1
------------------------	-------------------------	-------------------------------------	---------------------

5C(3) - STANDAPD ITEM CHECKLIST

Listed below are statutory items which normally will be covered routinely in those provisions of an assistance agreement dealing with its implementation, or covered in the agreement by exclusion (as where certain uses of funds are permitted, but other uses not).

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

A. Procurement

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

2. FAA Sec. 604(a). Will all commodity procurement financed be from the U.S. except as otherwise determined by the President or under delegation from him? Yes

3. FAA Sec. 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will agreement require that marine insurance be placed in the U.S. on commodities financed? Yes

4. FAA Sec. 604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? No agricultural commodities will be financed from this grant.

5. FAA Sec. 603(a). Will U.S. Government excess personal property be utilized wherever practicable in lieu of the procurement of new items? Yes

6. IMA Sec. 901(b). (a) Compliance with requirement that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates. Yes

7. FAA Sec. 621. If technical assistance is financed, will such assistance be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis? If the facilities of other Federal agencies will be utilized, It is expected that IITA will provide the expertise since it has a virtual monopoly on knowledge of manioc research.

PAGE NO. 5C(3)-2	EFFECTIVE DATE February 15, 1978	TRANS. MEMO NO. 3:19	AID HANDBOOK 3, App. 5C
---------------------	-------------------------------------	-------------------------	----------------------------

A7

are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?

8. International Air Transport. Fair Competitive Practices Act, 1974

If air transportation of persons or property is financed on grant basis, will provision be made that U.S.-flag carriers will be utilized to the extent such service is available? Yes

B. Construction

1. FAA Sec. 601(d). If a capital (e.g., construction) project, are engineering and professional services of U.S. firms and their affiliates to be used to the maximum extent consistent with the national interest? N/A

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

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

C. Other Restrictions

1. FAA Sec. 201(d). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter? N/A

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

3. FAA Sec. 620(h). Do arrangements preclude promoting or assisting the foreign aid projects or activities of Communist-Bloc countries, contrary to the best interests of the U.S.? Yes

4. FAA Sec. 636(i). Is financing not permitted to be used, without waiver, for purchase, long-term lease, or exchange of motor vehicle manufactured outside the U.S. or guaranty of such transaction? Yes

AID HANDBOOK 3, App C	TRANS. MEMO NO. 3:19	EFFECTIVE DATE February 15, 1978	PAGE NO. 5C(3)-3
-----------------------	-------------------------	-------------------------------------	---------------------

C.

5. Will arrangements preclude use of financing:
- a. FAA Sec. 114. to pay for performance of abortions or to motivate or coerce persons to practice abortions? **Yes**
 - b. FAA Sec. 620(g). to compensate owners for expropriated nationalized property? **Yes**
 - c. FAA Sec. 660. to finance police training or other law enforcement assistance, except for narcotics programs? **Yes**
 - d. FAA Sec. 662. for CIA activities? **Yes**
 - e. App. Sec. 103. to pay pensions, etc., for military personnel? **Yes**
 - f. App. Sec. 106. to pay U.N. assessments? **Yes**
 - g. App. Sec. 107. to carry out provisions of FAA Sections 202(d) and 251(h)? (transfer to multilateral organization for lending). **Yes**
 - h. App. Sec. 531. to be used for publicity or propaganda purposes within U.S. not authorized by Congress? **Yes**

UNCLASSIFIED
(Department of State

INCURRING
TELEGRAM

PAGE 01 KINGHA 08709 111559Z
ACTION AID-70

1784

KINGHA 08709 111559Z

TOTAL DOLS 4388.

ANNEX H

INFO OCT-81 AF-1B /031 W

-----848849 111605Z /40

R 111200Z AUG 78
FM AMEMBASSY KINSHASA
TO SECSTATE WASHDC 1388

6. ADVISE ASAP RE AID/W CONCURRENCE ABOVE DIVISIONS OF LABOR
AND UNDERSTANDINGS.
DAVIS

UNCLAS KINSHASA 8709

AIDAC

E.D. 11652: N/A
TAGS: H/A
SUBJECT: OBLIGATIONS - FY 78

Adler
AFR
ZP
PPC
CAIET
AA/OS
CTP
OS/HEA

REF: A) WISEMAN-CRANE TELCON 8/7/78; B) STATE 280734

1. SCHEDULED REQUESTS FOR ALLOTMENTS AND OBLIGATIONS CURRENTLY
DELAYED PENDING RESOLUTION OF DEBT PAYMENT ARREARAGES AND
REFORM PACKAGE ISSUES. NONETHELESS, MISSION DE RES BE
PREPARED FOR POSSIBLE RAPID END OF FY ALLOTMENT/OBLIGATION
ACTIVITY. IN THIS CONNECTION WE WISH CLOSEST COORDINATION
POSSIBLE WITH AID/W. ACCORDINGLY, FOLLOWING RUN DOWN HIGH-
LIGHTS FUNDING AND DOCUMENTATION STATUS OF REMAINDER OYB.

2. WE HAVE FOUR PROJECT OBLIGATIONS WHICH ARE FULLY READY TO
GO UPON RECEIPT CONFIRMATION OF ADVICE OF CONGRESSIAL
NOTIFICATIONS AND ALLOTMENTS:

- A) IMELOKO CPG \$ 410,000
- B) KARAWA CPG \$ 500,000
- C) FISHPOND CULTURE \$ 500,000
- D) CASSAVA OUTREACH \$1,500,000

FISH PONDS ADVICE OF PROGRAM CHANGE POUCHED AND SENT APO TO
AID/W AUGUST 7. GOZ REQUEST FOR CASSAVA PROJECT RECEIVED
8/8. WILL ADVISE BY SEPTTEL RE PARA 4 REFTEL REQUEST FOR GOZ
REACTION RE LOCAL COSTS COMPOUNDED TOTAL TO APPROXIMATELY
EQUIVALENT DOLS 19 MILLION. FISH PONDS, KARAWA AND IMELOKO
PAFS I AND II TO BE DISPATCHED ASAP ATTN. AFR/OR. CASSAVA PAFS
I AND II PREPARED BY F. SANDS LEFT IN AFR/OR. WE ASSUME THAT
NO OTHER USAID ACTION IS NECESSARY FOR THESE PROJECTS OTHER
THAN PREPARATION OF PROAGS FOR SIGNATURE. ADVISE IF THIS
ASSUMPTION INCORRECT.

3. HEALTH SYSTEMS - MISSION WILL SUBMIT ADVICE OF PROGRAM
CHANGE RE HEALTH SYSTEMS PROJECT ASAP. WILL ALSO SUBMIT SIMUL-
TANEOUSLY INFORMATION FOR PREPARATION BY DESK OF ACTION MEMO-
RANDUM FOR AA/AFR RE CHANGED DIRECTION OF PROJECT INCLUDING
NEW ROLE OF HUMAN PLANNING AND SYSTEMS INC. CONTRACT TEAM. ANTICI-
PATE TIMELY DESK FOLLOW-UP ACTION WITH CONGRESSIONAL NOTIFICA-
TION WHEN APPROPRIATE. ADVISE IF OTHER ACTIONS REQUIRED FROM USAID.
CONTRACT TEAM FUNDS AVAILABLE FROM FY 76 OBLIGATION IN AMOUNT
DOLS 667. WHEN PROHIBITIONS LIFTED MISSION WILL REQUEST
ALLOTMENT FY 78 DOLS 600 ADD ON TO RAISE CONTRACT AMOUNT TO
LOP TOTAL OF 1,267. FY1 DOLS 600 DERIVED FROM DELAYED GRAIN
MARKETING PROJECT DOLS 860. DIFFERENCE ADDED TO AGRIC.
MARKETING LOAN.

4. PROPOSED CIDFP PROJECT FY 78 FUNDING LEVEL TOTALS DOLS
350 PROVIDING PP APPROVED BY AID/W. USAID-GOZ REVIEW PROCESS
CURRENTLY UNDERWAY. IN THIS CONNECTION USAID WILL REQUEST
GOZ APPROVAL PRIOR SUBMISSION TO AID/W. ENR ADVISOR R. DODSON
PREPARED HANDCARRY PP AND DEFEND UPON RECEIPT ADVICE RE TIMING
PP REVIEW. WILL DISPATCH ADVANCE COPY ASAP FOR REPRODUCTION AND
DISTRIBUTION, OR ALTERNATIVELY DOOSON COULD CARRY COPY FOR
IMMEDIATE REPRODUCTION AND READING BY COMMITTEE MEMBERS.

5. ANTICIPATE AID/W ACKNOWLEDGEMENT OF AGRIC. MARKETING LOAN
APPROVAL ASAP PRIOR OUR INITIATION LENGTHY/COMPLEX GOZ
CLEARANCE PROCESS WITHIN VERY LIMITED TIME FRAME. MISSION CURRENTLY
PREPARING COMMODITY LISTS WITH DOA. CURRENT LOAN AUTHORIZATION

UNCLASSIFIED

AID Project Number 660-0077

Project Grant Agreement

Dated: , 1978

Between The Republic of Zaire (Grantee)

and

The United States of America, acting through
The Agency for International Development (AID)

Article 1: The Agreement

The purpose of this agreement is to set out the understandings of the parties named above ("Parties") with respect to the undertakings by the Grantee of the Project described below, and with respect to the financing of the Project by the Parties.

Article 2: The Project

Section 2.1. Definition of the Project: The project, which is further described in Annex 1, consists of assistance to the National Manioc Program (PRONAM) to develop a capability in the following areas:

- (a) identification of high yielding, disease and insect resistant cassava varieties, and the identification of improved cultural practices;
- (b) on a regional basis, multiplying improved plant material and establishing a system for distributing this material to farmers;
- (c) identification of an improved quality of cassava product in terms of consumer acceptance, nutritional value, and processing characteristics;
- (d) training intermediate level research workers and extension supervisors; and

- (e) serving a front-line role in the identification and control of economically significant cassava diseases and insect problems.

Annex 1, attached, amplifies the above description of the Project. Within the limits of the above definition of the Project, elements of the amplified description stated in Annex 1. may be changed by written agreement of the authorized representatives of the Parties named in Section 8.2. without formal amendment of this Agreement.

Section 2.2. Incremental Nature of Project:

- (a) AID's contribution to the Project will be provided in increments, the initial one being made available in accordance with Section 3.1 of this Agreement. Subsequent increments will be subject to the availability of funds to AID for this purpose, and to the mutual agreement of the Parties, at the time of a subsequent increment, to proceed.
- (b) Within the overall Project Assistance Completion Date (PACD) stated in this Agreement, AID, based upon consultation with the Grantee, may specify in Project Implementation Letters appropriate time periods for the utilization of funds granted by AID under an individual increment of assistance.

Article 3: Financing

Section 3.1. The Grant: To assist the Grantee to meet the costs of carrying out the Project, AID pursuant to the Foreign Assistance Act of 1961, as amended, agrees to grant the Grantee under the terms of this Agreement not to exceed one million, five hundred thousand United States Dollars (§ 1,500,000) the first year. The life-of-Project Grant, providing funds are available, is estimated to be three million seven hundred seventy eight thousand United States Dollars (§ 3,778,000).

The Grant may be used only to finance foreign exchange costs, as defined in Section 6.1. of goods and services required for the Project.

Section 3.2. Grantee Resources for the Project:

- (a) The Grantee agrees to provide or cause to be provided for the Project all funds, in addition to the Grant, and all other resources required to carry out the Project effectively and in a timely manner.
- (b) The resources provided by the Grantee for the Project will be not less than the equivalent of U.S. \$ 5,332,000, including costs borne on an in-kind basis.

Section 3.3. Project Assistance Completion Date (PACD):

- (a) The PACD, which is October 1, 1982, or such other date as the Parties may agree to in writing, is the date by which the Parties estimate that all services financed under the Grant will have been performed and all goods financed under the Grant will have been furnished for the Project as contemplated in this Agreement.
- (b) Except as AID may otherwise agree in writing, AID will not issue or approve documentation which would authorize disbursement of the Grant for Services performed subsequent to the PACD or for goods furnished for the Project, as contemplated in this Agreement, subsequent to the PACD.
- (c) Requests for disbursement accompanied by necessary supporting documentation prescribed in Project Implementation Letters are to be received by AID or any bank described in Section 7.1 no later than nine (9) months following the PACD, or such other period as AID agrees to in writing. After such period, AID giving notice in writing to the Grantee, may at any time or times reduce the amount or the Grant by all or any part thereof for which requests for disbursement, accompanied by necessary supporting documentation prescribed in Project Implementation Letters, were not received before the expiration of said period.

Article 4: Conditions Precedent to Disbursement

Section 4.1. First Disbursement: Prior to the first dollar disbursement under the Grant, or to the issuance by AID of documentation pursuant to which disbursement will be made, the Grantee will, except as the Parties may otherwise agree in writing, furnish to AID in form and substance satisfactory to AID:

- (a) documentary evidence of a bank account in Kinshasa which will serve as a depository for the local currency of the budget;
- (b) documentary evidence of the deposit in said bank account of the local currency equivalent of \$ 500,000 to cover the cost of the first year's operations; and
- (c) documentary evidence that the Grantee is not in arrears to the International Institute of Tropical Agriculture (IITA) Ibadan, Nigeria for the research component of PRONAM under the Memorandum of Agreement between the Grantee and IITA of April 1973.

Section 4.2. Additional Disbursements: Prior to any local currency disbursements under the Project or to the issuance by the Grantee of any documentation pursuant to which disbursement will be made, the Grantee will, except as the Parties may otherwise agree in writing, furnish to AID in form and substance.

- (a) a statement of the name(s) of the persons or acting in the office of the Grantee specified in Section 8.2 together with specimen signatures for each person specified in such statement, including a one-paragraph description of the procedures to be established for effecting withdrawals from the local currency accounts.

Section 4.3. Notification: When A.I.D. has determined that the conditions precedent specified in Section 4.1 and 4.2 have been met, it will promptly notify the Grantee.

Section 4.4. Terminal Dates for Conditions Precedent:

- (a) If all of the conditions specified in Section 4.1 have not been met within ninety (90) days from the

date of this Agreement, or such later date as A.I.D. may agree to in writing, A.I.D., at its option, may terminate this Agreement by written notice to the Grantee.

- (b) If all the conditions specified in Section 4.2 have not been met within 180 days from the date of the Agreement, or such later date as AID may agree to in writing, AID, at its option, may cancel the then undisbursed balance of the Grant.

Article 5: Special Covenants

Section 5.1. Project Evaluation: The Parties agree to establish an evaluation program as part of the Project. Except as the Parties otherwise agree in writing, the following format will be used as the basis for evaluation.

- (a) Evaluation Plan: Three categories of evaluation will be performed during the life of the project:
- On-going (formative) evaluation.
 - Annual evaluations at the end of the first and third year.
 - An in-depth mid-project evaluation.
 - End of project evaluation.

The evaluation will follow the process outlined in the PP:

1. On-going (formative) Evaluation.

The project is designed to develop the institutional capability of PRONAM to conduct adaptive and applied research on cassava which will in turn result in the identification of improved technical packages acceptable to small farmers. The project is going to be located in five areas greatly dispersed geographically. It will therefore be important that minimum basic data be obtained from each area concerning its operations from both the administrative and technical point of view. This will permit the project managers to diagnose problems as they arise and to formulate solutions on an on-going basis.

Thus, the project will develop data collection and analysis procedures which will permit the project staff and others to monitor project implementation and the achievement of project objectives in terms of:

Financial, commodity, training and technical assistance inputs and their allocation to the various substations.

The results of these inputs will be measured in terms of research results (improved varieties and practices identified and accepted), personnel trained at each substation, and the inter-relationship which exists between the participant small farmers and project personnel in terms of their implications for the acceptability of research packages developed under the project for small farmers.

The key assumption or other possible changed conditions or data revisions which may imply increased risk with respect to successful project implementation.

2. Annual Evaluations

Annual evaluations that are scheduled for the end of the first and third years will be carried out by AID. The purpose of these evaluations will be to reexamine project strategy and to assess actual performance against planned performance as presented in the logical framework. Based on the results of these evaluations corrective action will be identified and taken. These actions will be reflected in annual work plans to be prepared by the staff at PRONAM and approved by AID, DOA and IITA.

3. The in-depth mid-project evaluation

The in-depth mid-project evaluation will be conducted at the end of year two and will be the most extensive evaluation. It will be undertaken by a combined team representing AID, IITA, PRONAM, and the Department of Agriculture and will at AID's discretion involve an outside consultant. Based on the results of this major evaluation, adjustments will be made as necessary and agreed upon by AID and the GOZ in the basic design of the project including strategy, approach, implementation and financing.

The evaluation can be divided into the following functions:

1. Descriptive: Level of performance and state of environment;
2. Diagnostic: Why objectives were or were not achieved as planned;
3. Prognostic: What achievement can be expected with or without changing strategy (level and type of inputs); and
4. Prescriptive: What changes could be made.

4. End of Project Evaluation

This evaluation will be undertaken over a period of six weeks. U.S.-based Ph.D. research specialists (preferably persons who have been involved in setting up the information system for the project) will arrive with the evaluation team and remain two weeks after conclusion of the evaluation. These last two weeks will be spent readjusting the information system to reflect changes in the project design.

The final end of project evaluation, will be oriented to summing up project achievement. It will assess causality and analyze the replicability of the project strategy and operations in terms of their utility for future projects.

Article 6: Procurement Source

Section 6.1. Foreign Exchange costs: Disbursements pursuant to Section 7.1 will be used exclusively to finance the costs of goods and services required for the Project having their source and origin in the United States (Code 000 of the AID Geographic Code Book as in effect at the time orders are placed or contracts entered into for such goods or services) ("Foreign Exchange Costs"), except as AID may otherwise agree in writing, and except as provided in the Project Grant Standard Provisions Annex, Section C.1(b) with respect to marine insurance.

Section 6.2. Local Currency Costs: Disbursements pursuant to

Section 7.2 will be used exclusively to finance the costs of goods and services required for the Project having their source and, except as AID may otherwise agree in writing, their origin in Zaire ("Local Currency Costs"). (To the extent provided for under this Agreement, "Local Currency Costs" may also include the provision of local currency resources required for the Project.)

Article 7: Disbursement

Section 7.1. Disbursement for Foreign Exchange Costs:

- (a) After satisfaction of conditions precedent, the Grantee may obtain disbursements of funds under the Grant for the Foreign Exchange of goods or services required for the Project in accordance with the terms of this Agreement by such of the following methods as may be mutually agreed upon:
- (1) by submitting to AID, with necessary supporting documentation as prescribed in Project Implementation Letters, (A) requests for reimbursement for such goods or services, or (B) requests for AID to procure commodities or services in Grantee's behalf for the Project; or
 - (2) by requesting AID to issue Letters of Commitment for specified amounts (A) to one or more U.S. banks satisfactory to AID, committing AID to reimburse such banks for payments made by them to contractors or suppliers, under Letters of Credit or otherwise, for such goods or services, or (B) directly to one or more contractors or suppliers, committing AID to pay such contractors or suppliers for such goods or services.
- (b) Banking charges incurred by Grantee in connection with Letters of Commitment and Letters of Credit will be financed under the Grant unless Grantee instructs AID to the contrary. Such other charges as the Parties may agree to may also be financed under the Grant.

Section 7.2. Other Forms of Disbursement: Disbursement of the Grant may also be made through such other means as the Parties may agree to in writing.

Section 7.3. Rate of Exchange: Except as may be more specifically provided under Section 7.2, if funds provided under the Grant are introduced into Zaire by AID or any public or private agency for purposes of carrying out obligations of AID hereunder, the Grantee will make such arrangements as may be necessary so that such funds may be converted into currency of Zaire at the highest rate of exchange which at the time the conversion is made, is not unlawful in Zaire.

Article 8: Miscellaneous

Section 8.1. Communications: Any notice, request, document, or other communication submitted by either Party to the other under this Agreement will be in writing or by telegram or cable, and will be deemed duly given or sent when delivered to such party at the following addresses:

All such communications will be in English, unless the Parties otherwise agree in writing. Other addresses may be substituted for the above upon the giving of notice.

Section 8.2. Representatives: For all purposes relevant to this Agreement, the Grantee will be represented by the individual holding or acting in the office of Secretary of State, Department of Agriculture and AID will be represented by the individual holding or acting in the Office of Director, USAID, each of whom, by written notice, may designate additional representatives for all purposes other than exercising the power under Section 2.1 to revise elements of the amplified description in Annex 1. The

names of the representatives of the Grantee, with specimen signatures, will be provided to AID, which may accept as duly authorized any instrument signed by such representatives in implementation of this Agreement, until receipt or written notice of revocation of their authority.

Section 8.3. Standard Provisions Annex: A "Project Grant Standard Provisions Annex" (Annex 2) is attached to and forms part of this Agreement.

Section 8.4. Language of Agreement: This Agreement is prepared in both English and French. In the event of ambiguity or conflict between the two versions, the English language version will control.

IN WITNESS WHEREOF, the Grantee and the United States of America, each acting through its duly authorized representative, have caused this Agreement to be signed in their names and delivered as of the day and year first above written.

PROJECT NUMBER:	ADDRESS:	ACTION:	DATE:	INITIALS:
6600077004201		✓	8/27/81	BSP
CATALOGUE		✓	8/27/81	BSP
ABSTRACT		✓	8/27/81	BSP
PICUP				

The Republic of Zaire
By: _____
Title: _____

United States of America
By: _____
Title: _____

COMMENTS: _____

