BUREAU FOR AFRICA

CAMEROON

NATIONAL CEREALS RESEARCH

PROJECT NUMBER: 631-0013

Action Memorandum

PAF II

PROJECT PAPER

AUG 15 1979

ACTION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR FOR AFRICA

FROM : AFR/DR, ~~John~~ W. Koehring

SUBJECT: National Cereals Research and Extension - Cameroon 631-0013

Problem:

Your approval is required to authorize a grant of $875,000 from the FAA Section 103, Agriculture, Rural Development and Nutrition (FN) appropriation during FY 1979 to the Government of the United Republic of Cameroon for the National Cereals Research and Extension Project (631-0013). Your approval is also required for the proposed life of project funding of $7,697,000 as well as for proprietary procurement waiver.

Discussion:

A. Project Description

The purpose of the National Cereals Research Extension (NCRE) project is to develop the institutional capacity to provide high-quality research on maize, rice, sorghum and millet. The project is to facilitate the development of appropriate linkages and feedback mechanisms so that agronomic breakthroughs, improved inputs and improved farming practices support small farmer needs and requirements. Additional major objectives of the project are to develop trained manpower and to establish the physical plant and equipment needed to carry out a research program in Cameroon.

The project concentrates on applied research addressing farmer problems on research stations, i.e. tactical level research, and operational research which involves testing varieties and agronomic practices on the farmers' fields.

The problem of coordinating research, extension, production and marketing is recognized as being sufficiently complex that it requires special treatment. NCRE will support a Liaison and Testing Unit (LTU) which will design the methodology of the field tests, coordinate the testing program, study and analyze the results, coordinate the research project's activities with other organizations and, most importantly, service farmer needs.

The project's crop focus results from a concensus among the GURC, USAID/Yaounde and AID/W. Maize, rice, sorghum and millet are the most important cereals in Cameroon, have high potential for increased production and consumption, are crops where U.S. expertise is extensive and are crops which are not currently being given attention by other donors.

Project objectives are in accordance with the Congressional mandate and A.I.D. policies to assist the poor populations of the under-developed countries and are in conformance with our bilateral strategy policy.

A.I.D. support will finance long term assistance in the disciplines of agronomy, agricultural economics, plant breeding, extension and administration, and short term specialized assistance in plant protection, plant physiology, and the like. A.I.D. will also finance participant training and moderate amounts of construction, commodity procurement and technician support.

B. Financial Summary:

This grant will provide $7,697,000, all of which will come from Africa Bureau funds. Fiscal year 1979 funds were projected at $3,245,100, as shown below in column 2. However, because of Bureau funding constraints, only $875,000 is being obligated. The revised figures are presented in column 1.

Estimated Budget

	Revised FY 79	Original FY 79	Total
A.I.D.			
Technical Assistance Personnel and Support	504.4	1,871.0	4,142.0
Participant Training	29.6	109.8	480.8
Commodities/Construction	170.2	631.0	737.0
Other Costs	10.1	37.4	221.0
Inflation & Contingencies	160.7	595.9	2,116.2
Total	875.0	3,245.1	7,697.0
Other			
GURC	1,280.5	4,749.5	6,616.0
Total	2,155.5	7,994.6	14,313.0

C. Socio-Economic, Technical and Environmental Description:

This project, as designed, includes the requisite technical, financial, social, economic and administrative analyses. In each case, the project design team and project reviewers found that the project conformed to high standards and,thus,

implementation is recommended. The design was undertaken with expert assistance from a U.S. university professor, supervised by USAID/Yaounde, and conducted by the Cameroon Institute of Agricultural and Forestry Research and the International Institute for Tropical Agriculture.

This project does not provide for any massive physical interventions and, therefore, will not have any significant impact on the environment. The project may, through improved agronomic techniques and erosion control measures, have a positive, albeit minor, impact on farm land. The Executive Committee for Project Review recommends your approval of the Initial Environmental Examination recommendation for a Negative Determination for this technical assistance project (Annex E).

The country's record on human rights is acceptable.

D. Committee Action and Congressional Apprisement:

The Executive Committee for Project Review met June 1979 and recommended that the project be authorized by AA/AFR. The proposed new obligations for Africa Bureau funding were projected as follows:

FY 1979	$ 875,000
FY 1980	2,390,000
FY 1981	2,178,600
FY 1982	1,980,200
FY 1983	273,200
	$7,697,000

The Project Review Meeting comments to the field are presented in Annex H. The substantive highlights of that meeting are:

1. It was recommended that the project be amended to add sorghum and millet to the project research objectives. The Committee felt that even with the existence of SAFGRAD and the centrally funded CRSP project for sorghum and millet, considerable testing and adaptation would be needed in Cameroon. It was further decided to limit the project's crop focus to maize, sorghum, rice, and millet, as other donors are concerned with legumes and root crops.

2. It was recommended that the PP be revised so that competitive procurement could be used to select a Title XII institution to implement the project in collaboration with IITA and ICRASAT. This was a deviation from the original plan which called for the project to be implemented by a IITA.

3. It was acknowledged that expanding the project to include two additional crops and using a Title XII institution rather than IITA would substantially increase the cost of this project.

4. The issue of procurement of non-U.S. vehicles is being resolved by USAID/Y. U.S. manufactured vehicles will be purchased.

5. The PP recommended that Massey-Fergusson (U.S.) tractors and related farm equipment be used so that it would be compatible with existing equipment at IRAF. A proprietary procurement waiver has been submitted with the PP (Annex J).

6. Other issues were not of a substantive nature and have been resolved in the PP. The GURC and USAID/Y concur in the recommendations.

The project was reviewed and approved at a June 13th ECPR chaired by the Deputy Assistant Administrator. The Project Review Meeting presented no issues for resolution to the ECPR.

The project was included in the FY 1979 and FY 1980 Congressional Presentations. Both requested obligations of $875,000 and $900,000 for FY 1979 and 1980 respectively, and an estimated LOP cost of $6,000,000. As stated above, the final project design together with modifications suggested by AID/W, have produced a project which exceeds previous estimates by 28 percent. No Congressional Notification is necessary as FY 79 funds to be obligated will not exceed $875,000.

The Backstopping Officer in the Africa Bureau will be Russell Anderson, AFR/DR/CAWARAP. USAID/Yaounde's Project Manager will be Richard H. Goldman.

Recommendation: That you sign the attached PAF II, thereby authorizing the proposed project and the proprietary procurement presented in Annex J, and that you approve the Negative Determination recommended in the attached "Initial Environmental Examination."

Attachments:

(1) PAF II
(2) Initial Environmental Examination
(3) Project Paper

Drafted:AFR/DR/CAWARAP:RAnderson/USAID/Y:RGoldman:srs/bfc:8/15/79

Clearances:

AFR/DR/CAWARAP:LBond
AFR/DR/ENGR:JMorgan(draft)
AFR/DR/SDP:JNixon(draft)
AFR/DR/ARD:WFuglie(draft)
AFR/DR:NCohen (JWK for
AFR/CAWA:FScordato(draft)
AFR/DP:GCauvin
COM/ALI:CRaley(draft)
GC/AFR:AWilliams(draft)
USAID/Y:JWilliams(draft)
DAA/AFR:HNorth

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

PART II

COUNTRY : Cameroon

PROJECT : National Cereals Research and Extension

PROJECT NO. : 631-0013

Pursuant to Part I, Chapter 1, Section 103 of the Foreign Assistance Act of 1961, as amended, (the "Act"), I hereby authorize a Grant to the Government of the United Republic of Cameroon (the "Cooperating Country"), of not to exceed Eight Hundred Seventy Five Thousand United States Dollars ($875,000) to assist in financing certain foreign exchange and local currency costs of goods and services required for the project as described in the following paragraph.

The project consists of providing long and short term technical assistance, participant training, minor construction and related goods and services to assist the Institute of Agricultural and Forestry Research to institutionalize a high quality research program on maize, rice, sorghum and millet, and to further establish linkages and coordinate communications between researchers, extension organizations, and most importantly farmers (the "Project").

I approve the total level of A.I.D. appropriated funding planned for this Project of not to exceed Seven Million Six Hundred Ninety Seven Thousand United States Dollars ($7,697,000) Grant, during the period FY 1979 through FY 1983, including the funding authorized above and further increments during that period of grant funding up to $6,822,000, subject to the availability of funds and in accordance with A.I.D. allotment procedures.

I hereby authorize the initiation of negotiation and execution of the Project Agreement by the Officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority, subject to the following covenants and major conditions, and together with such other terms and conditions as A.I.D. may deem appropriate:

a. Source and Origin of Goods and Services

Goods and services, except for ocean shipping, financed by A.I.D. under the Grant shall have their source and origin in the United States or in the Cooperating Country, except as A.I.D. may otherwise agree in writing. Ocean shipping financed under the Grant shall be procured in the United States, except as A.I.D. may otherwise agree in writing.

b. Additional Project Agreement Provisions

1. The Project Agreement will contain the evaluation requirements as specified in the Project Paper.

2. The Project Agreement will contain a statement to the effect that the Project must, inter alia, service the needs of smallholder cultivators and must provide for a dialogue between them and researchers, extension organizations and marketing organizations.

c. Covenants

The Project Agreement shall contain covenants providing in substance as follows:

1. The Cooperating Country agrees to provide in a timely manner counterparts for A.I.D.-financed resident technicians.

2. The Cooperating Country agrees to provide to the Project in a timely manner, suitable office space, support facilities, and laboratory facilities.

3. The Cooperating Country agrees to provide adequate financing to support and maintain A.I.D. financed equipment, buildings and vehicles after the Project has ended.

d. Waiver

Based upon the justification in Annex J, I hereby authorize the proprietary procurement of 3 Massey Ferguson Model 268 Tractors, with components, at an approximate cost of $105,000.

Date: Aug 12, 1979

Goler T. Butcher
Assistant Administrator
for Africa

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

1. TRANSACTION CODE: C (A ADD, C CHANGE, D DELETE)

PP

2. DOCUMENT CODE: 3

3. COUNTRY ENTITY: Cameroon

4. DOCUMENT REVISION NUMBER: 1

5. PROJECT NUMBER (7 digits): 631-0013

6. BUREAU/OFFICE: A. SYMBOL AFR; B. CODE 06

7. PROJECT TITLE (Maximum 40 characters): National Cereals Research and Extension

8. ESTIMATED FY OF PROJECT COMPLETION: Phase I — FY 84

9. ESTIMATED DATE OF OBLIGATION: A. INITIAL FY 79; B. QUARTER 4 (Enter 1, 2, 3 or 4); C. FINAL FY 83

10. ESTIMATED COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. TOTAL	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. TOTAL
AID APPROPRIATED TOTAL						
(GRANT)	(658.8)	(216.2)	(875)	(5795.8)	(1901.2)	(7697.0)
(LOAN)	( )	( )	( )	( )	( )	( )
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY		1280.5	1280.5		6616.0	6616.0
OTHER DONOR(S)						
TOTALS	685.8	2496.7	4525.6	5795.8	8517.2	14,313.0

11. PROPOSED BUDGET APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. 1ST FY 79 F. GRANT	E. 1ST FY 79 G. LOAN	H. 2ND FY 80 I. GRANT	H. 2ND FY 80 J. LOAN	K. 3RD FY 81 L. GRANT	K. 3RD FY 81 M. LOAN
(1) ARD&N	111	080		875.0		2390.0		2178.6	
(2)									
(3)									
(4)									
TOTALS				875.0		2390.0		2178.6	

A. APPROPRIATION	N. 4TH FY 82 O. GRANT	N. 4TH FY 82 P. LOAN	Q. 5TH FY 83 R. GRANT	Q. 5TH FY 83 S. LOAN	LIFE OF PROJECT T. GRANT	LIFE OF PROJECT U. LOAN
(1)	1980.2		273.2		7697.0	
(2)						
(3)						
(4)						
TOTALS	1980.2		273.2		7697.0	

12. IN-DEPTH EVALUATION SCHEDULED: MM 11 YY 81

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: James E. Williams

TITLE: Director, USAID, Cameroon

DATE SIGNED: MM 05 DD 17 YY 79

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

AID 1330-4 (3-76)

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT IDENTIFICATION DOCUMENT FACESHEET

TO BE COMPLETED BY ORIGINATING OFFICE

1. TRANSACTION CODE: A (A = ADD, C = CHANGE, D = DELETE)

PID

2. DOCUMENT CODE: 1

3. COUNTRY/ENTITY: CAMEROON

4. DOCUMENT REVISION NUMBER:

5. PROJECT NUMBER (7 DIGITS): 631-0013

6. BUREAU/OFFICE: a. SYMBOL: AFR; b. CODE: 06

7. PROJECT TITLE (MAXIMUM 40 CHARACTERS): NATIONAL CEREALS IMPROVEMENT

8. PROPOSED NEXT DOCUMENT: A. 2 (2 = PRP, 3 = PP); B. DATE: MM 01, YY 73

9. ESTIMATED FY OF AUTHORIZATION/OBLIGATION: a. INITIAL FY 79; b. FINAL FY 81

10. ESTIMATED COSTS ($000 OR EQUIVALENT, $1 = 250)

FUNDING SOURCE	
A. AID APPROPRIATED	1,400
B. OTHER U.S. 1.	
B. OTHER U.S. 2.	
C. HOST COUNTRY	3,505
D. OTHER DONOR(S)	
TOTAL	4,905

11. PROPOSED BUDGET AID APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. FIRST FY 79 F. GRANT	E. FIRST FY 79 G. LOAN	LIFE OF PROJECT H. GRANT	LIFE OF PROJECT I. LOAN
(1) FN	111	080		528		1,400	
(2)							
(3)							
(4)							
			TOTAL	528		1,400	

12. SECONDARY TECHNICAL CODES (maximum six codes of three positions each): 070, 010, 610, 720

13. SPECIAL CONCERNS CODES (MAXIMUM SIX CODES OF FOUR POSITIONS EACH): BS, R/AG

14. SECONDARY PURPOSE CODE:

15. PROJECT GOAL (MAXIMUM 240 CHARACTERS)

To increase the production of maize and rice to meet domestic demand and thereby increase the income and nutritional level of the rural poor.

16. PROJECT PURPOSE (MAXIMUM 480 CHARACTERS)

Develop Cameroonian capability to more adequately cover research and production development of maize and rice while developing high-yielding, disease- and insect-resistant varieties of maize and rice and companionable production systems for distribution to farm holders, and to develop a small highly skilled extension capability to distribute research results to the smallholder.

17. PLANNING RESOURCE REQUIREMENTS (staff/funds)

PRP - 5 persons - 4 PM (two AID, one IITA, two Cameroonians) - $9,000 plus transportation and overhead estimated at $5,000.

AGR: — PRM: CONT:

18. ORIGINATING OFFICE CLEARANCE

Signature: John W. Koehring

Title: Regional Development Officer

Date Signed: MM May DD 5 YY 1977

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

AID 1330-2 (3-76)

TABLE OF CONTENTS

	Page
PP Face Sheet	i
PID Face Sheet	ii
Table of Contents	iii
I. SUMMARY AND CONCLUSIONS	I/1
II. PROJECT DESCRIPTION	
A. Introduction	II/1
B. Purpose and Strategy	/3
C. Project Outputs and Inputs	/12
III. PROJECT SPECIFIC ANALYSIS	III/1
A. Economic Feasibility	
B. Social Feasibility	/7
C. Technical Feasibility	/15
D. Administrative Feasibility	/22
E. Environmental Concerns	/25
IV. FINANCIAL ANALYSIS	IV/1
Table I. Projection of Expenditure	/2
Table II. Costing of Project Inputs/Outputs	/3
Table III. Summary of Cameroon Expenditures	/4
Table IV. Summary Cost Estimate and Financial Plan	/5
Table V. GURC Recurrent Cost	/6
V. EVALUATION	V/1
A. Annual Evaluations	
B. In-depth Evaluations	/1
C. Ex-Post Facto Evaluation	/1

	Page
VI. IMPLEMENTATION PLAN	VI/1
A. Contractor	/1
B. A.I.D.	/1
C. Cameroonian Government	/1
D. Research Program Implementation	/1
E. Implementation Schedule	/3
F. Procurement Schedule	/8

ANNEXES

Annex A. Logical Framework Matrix

Annex B. A.I.D. Project Statutory Checklist

Annex C. Request for Assistance

Annex D. PID Approval Cable

Annex E. Initial Environmental Examination

Annex F. Backup Tables
Table 1 - Technician Funding
Table 2 - Participant Training
Table 3 - Commodity Procurement List/Scheduling
Table 4 - Laboratory Equipment
Table 5 - GURC Personnel Expenditures
Table 6 - GURC Expenditures - Non Personnel

Annex G. A.I.D. and Other Donor Projects Related to Cereals Research and Extension Project

Annex H. Economic Analyses

Annex I. Extension and Farmer Field Trials/Demonstrations

Annex J. Draft Proprietary Procurement Waiver

Annex K. Reporting Cable-Project Review Committee Meeting

Annex L. Draft Scope of Work for Technical Services

Annex M. Authorization Package Memorandum, PAF II and Notification of Program Change.

Annex N. FAA Section 611(a)(1) - Certification

I. RECOMMENDATION AND ISSUES SUMMARY.

A. Recommendations

Grant FY 1979	$ 3,245,100
Grant FY 1980	$ 1,599,900
Grant FY 1981	$ 1,388,600
Grant FY 1982	$ 1,190,300
Grant FY 1983	$ 273,100

Waivers - Proprietary Procurement Waiver for purchase of three Massey Ferguson tractors.

Loans - None

Total New AID obligations $ 7,697,000

It is recommended that USAID/Yaounde be allotted $7,697,000 as shown above to initiate a five year National Cereals Research and Extension project in concert with Cameroon's National Office for Scientific and Technical Research and its Institute of Agriculture and Forestry Research.

B. Issues Summary.

The National Cereals Research and Extension project has been reviewed twice in Washington, once after the submission of the project identification document and once by the project committee subsequent to the first presentation of the Project Paper. Neither review raised issues which suggested that the project might not be appropriate for AID funding, though the reviewers did suggest, on both occasions, that the project be made more comprehensive. This expansion, which includes the addition of sorghum and millet to the crop focus of the project, has added to the projected funding needs which now stand at U.S. $7.7 million. A draft Congressional notification is necessary and has been submitted with the project paper.

All other points of concern or recommended courses of action are accepted and have been addressed in the Project Paper.

II. PROJECT DESCRIPTION

A. Introduction

The purpose of the National Cereals Research and Extension project (NCRE) is to develop the institutional capacity to provide high-quality research on maize, rice, sorghum and millet, as well as to develop efficient linkages to facilitate transmission of the research results to the farmer.

The project will be implemented within the Institute of Agriculture and Forestry Research (IRAF), a part of the Cameroonian Government's umbrella research organization - the National Office for Scientific and Technical Research (ONAREST). We propose that the project be implemented under a contract with an institution eligible for Title XII funds in coordination with the International Institute for Tropical Agriculture (IITA), and the International Research Center for the Semi Arid Tropics (ICRISAT). The International Institute for Tropical Agriculture is an international agricultural research center located at Ibadan, Nigeria. It possesses appropriate experience in maize and rice in the same climatic zones as much of Cameroon and has done substantial research on West African farming systems. IITA's scientific and analytical backstopping capability for agricultural research in the humid tropics is vital for the project's eventual success. The International Research Center for the Semi Arid Tropics is a younger institution located in Hydrabad, India and it is setting up a West African subcenter in the Sahel. ICRISAT has specialized expertise in sorghum and millet.

One of the major objectives of the project is the development of the institutional capacity, particularly trained manpower, but also the establishment of adequate physical facilities. For this reason, the project has two time phases to permit the training of Cameroonian researchers. This paper covers Phase I financing (FY 1979-83). External assistance will still be required in Phase II (FY 1984-86) at a reduced level.

The project concentrates on developing technology that can be directly used by farmers, i.e. "applied research at the tactical level"+, to develop suitable varieties and agronomic practices for maize, rice, sorghum and millet cultivation in each of Cameroon's four distinct ecological zones. Applied research at the tactical level will be carried out primarily on research stations.

The project is also concerned with "operational research"+. By this we mean the integration of technology pertaining to various crops and livestock into systems adapted to the local farm situation. Operational research involves testing varieties and agronomic practices on the farmers' fields.

+ For a full definition of these terms and their place within the gamut of research activity, please see the beginning of Section III/C below.

The researchers design the tests and supervise personnel of the extension services and/or parastatal organizations who in turn supervise the farmers executing the tests. Such activities are best described as "pre-extension" (Pré-vulgarisation) and are crucial components of the research process. The participating farmers are also, however, engaging in extension demonstrations which should result in a spread of the improved varieties and technologies to their neighbors, if they are suitably impressed by the results of the tests - "demonstration effect".

The farmer field trial/demonstrations should also shorten the time required for testing prior to the general release of research results.

The problems of the relationships between research, extension and production are of particular concern and thus one of the major points of concentration for the project. We therefore propose the establishment of a Liaison and Testing Unit (LTU) to design the methodology of the field tests; coordinate the testing program; study the results including the socio-economic impact of the proposed recommendations; feed back the results and other problems facing farmers to the researchers for further research; and translate the research results into recommendations for extension personnel.

One reason for choosing maize and rice is because significant research has been done on them which is directly applicable in Cameroon. The research results from elsewhere should now be tested, adapted and modified to Cameroon conditions, before new seed can be released for multiplication and distribution. IRAF has made sufficient progress on maize research to permit implementation of trials on farmers' fields. Rice research is not as advanced in Cameroon, but the international research institutions have built up a backlog of results which are ready for testing in Cameroon. Little research has been done on tropical sorghums and millet, but some work has been carried out in Cameroon.

The demand for both maize and rice is relatively high and income-elastic compared to other staples. Both crops have at least regional and probably national deficits at present. Almost all maize is grown by small farmers (mostly women) in the forest and highland regions. Rice is also grown by smallholders, who market more than half of their production. The large-scale development corporations produce substantial tonnages, primarily for export. Smallholder production should increase considerably as soon as there is a package which provides sufficient return to the farmer in growing a highly labor-intensive crop.

The project includes sorghum and millet because these two cereals are the dominant food crop of Northern Cameroon, one of the most nutritionally deprived parts of Cameroon. These crops are scarce in years of subnormal rainfall. Sorghum and millet consumption are less income-elastic than rice and maize. Increasing the reliability and yield of sorghum per hectare will not only help meet basic food needs more adequately, but will also permit families to diversify and raise other crops during the short growing season.

Applied agricultural research of a tactical nature at the national level has a very high rate of return over time, particularly when compared with capital investment in extension. In Cameroon, the payoff should be prompt and substantial for rice and maize, which have a backlog of research results. The returns to research investment in sorghum and millet will be slower, and strong local preferences will slow farmer adoption of new varieties.

Unless a substantial investment in agricultural research occurs now, the increase in productivity needed to meet Cameroon's future increased food needs will not occur. Therefore, the GURC and USAID/Y have decided that investment in applied and operational research on maize, rice, sorghum and millet in Cameroon should be given a very high priority among USAID's agriculture sector projects.

B. Purpose and Strategy

1. AID Objectives and Sector Strategy

a. General

The Cameroonian Government has stressed making development more relevant to the population as a whole. The Fourth Development Plan proposes an investment of $2.7 billion over five years; agriculture and livestock receive the third highest allocation among the sectors, second only to transport and mining/manufacturing. Roughly 30 to 40 percent of agriculture and livestock production expenditures should benefit the small farmer.

USAID/Yaounde's programming approach is to seek, within the Government's planned programs, projects which meet basic human needs. The highest priority is given to agricultural and rural development.

This project contributes towards the strategy by helping to meet long-term needs for increased crop production; development of institutions providing access to improved food technology; strengthening Cameroon's agricultural research capability in food crops; and facilitating the effectiveness of agricultural extension services.

b. Sector

The sector goal towards which NCRE project contributes is:

-- Increasing agricultural production and rural development.

In order to reach the sector goal, our assumptions are that:

-- GURC developmental and budget priorities continue to strees agricultural production and rural development.

-- Precipitation patterns remain normal.

-- GURC agencies and ministries implementing agricultural programs coordinate efforts to improve their effectiveness.

Although Cameroon does not now have an overall food deficit, increased food production capacity is very important to long-term development. The urban population will double in a dozen years while simultaneously the percentage of the population involved in food production will decrease. Cameroon also exports modest amounts of food products to Nigeria and Gabon, while simultaneously importing rice and maize. Imports of rice and maize could be replaced by domestic production. Cameroon imports almost all of her wheat and flour needs and probably will continue to do so in the near term. Small producers must have access to improved technology, as well as the infrastructure required to market their production in order to meet their needs and that of the urban population.

Each of Cameroon's four general ecological areas has its own basic food crops and cash crops. (figure 1).

The lowland humid forest zones which consist of Eastern, Center South, Littoral, and Southwestern provinces. There are two distinct zones: one being the wet lowland forest around Mt. Cameroon and the coast; the other having moderate rainfall and typified by a mixture of primarily deciduous trees. The basic foodcrops in this area are root crops, tubers, and maize, with cocoa and Robusta coffee as cash crops. Major nutritional problems of protein deficiency and goiter exist in the forest zone. Consumption of cassava, which contains a trace of cyanide, which inhibits the metabolism of iodine, as the staple food exacerbates the problem.

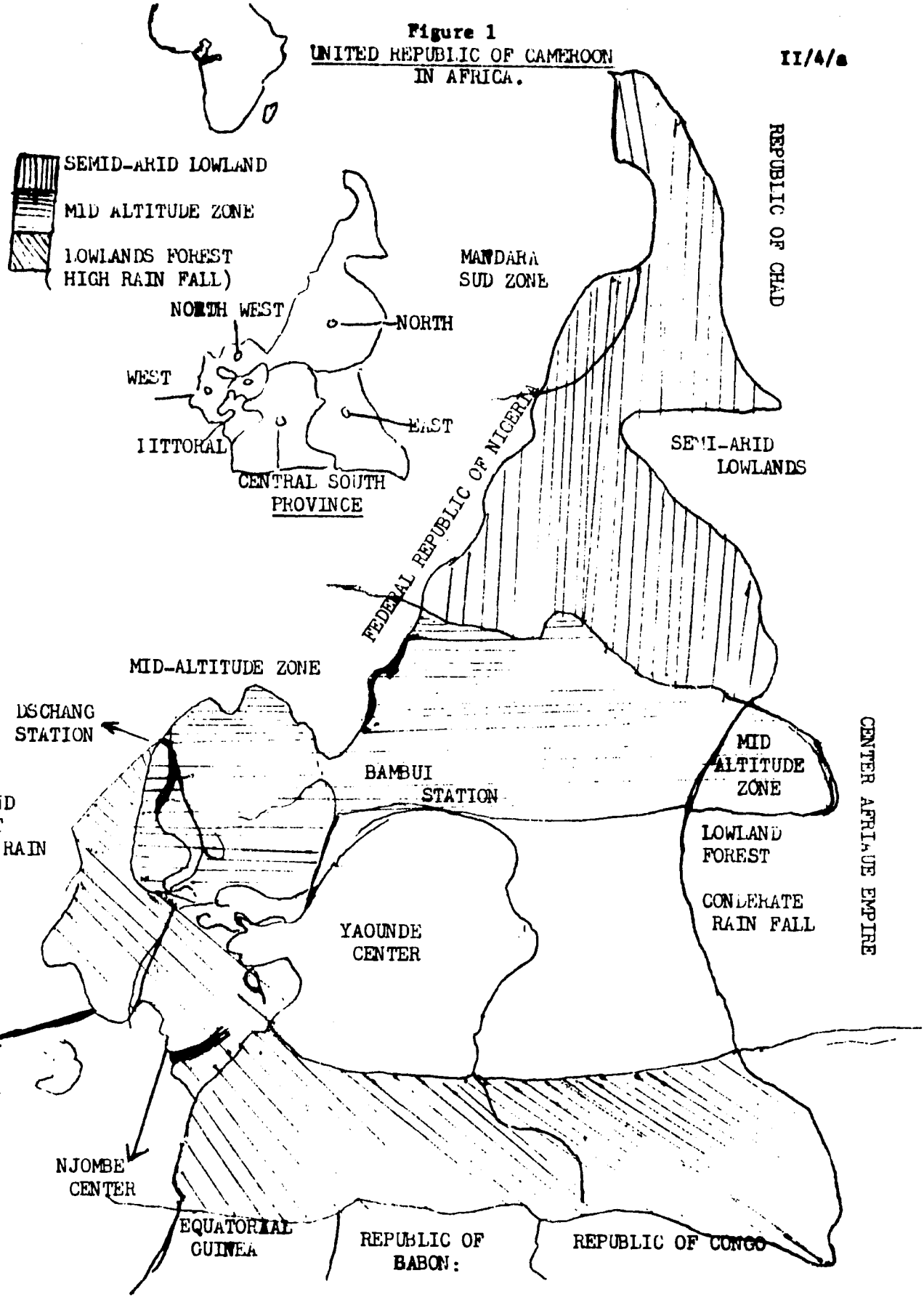
The Western Highlands and Adamaoua Plateau. These highland areas share a similar ecology, but are very different sociologically. The Adamaoua plateau has a sparse Fulani-dominated population. Northwestern and Western provinces are densely settled by people possessing complex intensive cropping systems. Corn, cocoyam, yam, and cassava dominate the food crops, while Arabica coffee is the chief cash crop. The highlands supply much of Douala's food and export food to Gabon.

The Northern Savannah Zone stretches up to the Mandara Mountains and Lake Chad, where Sahelian conditions prevail. The major food crops are sorghum, millet and peanuts, with cotton the predominant cash crop. In the wetter areas more sorghum is produced, while millet is the larger crop in the Sahelian zone. The brief heavy rains and prolonged dry season limit agricultural production and cause acute seasonal labor shortages. The area's finely balanced ecology has suffered environmental abuse from overgrazing. The Mandara Mountains should be considered a subzone because it is markedly drier, rockier and has steep slopes that pose particular erosion hazards.

AID bilateral agricultural sector and other projects related to NCRE include:

(1) North Cameroon Seed Multiplication (on-going) concerns establishment and institutionalization of a system for the production, distribution and use of improved peanut and sorghum seed. The lessons learned from the

Figure 1
UNITED REPUBLIC OF CAMEROON
IN AFRICA.



extension end of this project should facilitate implementation of the farmer field trials in NCRE.

(2) National Seed Service (proposed) will expand the North Cameroon Seed Multiplication project and establish a national seed service. To be effective, the seed service must be supplied with improved varieties of seed suited to the various ecological zones. A seed service relies on research stations for the provision of seed stock.

(3) Centers for Training Farm Families (on-going) provides assistance in establishing a region-wide network of agricultural innovators in the northern-most four departments of Northern province. These farmers will play a key role in executing field test/demonstrations for the sorghum and millet research program.

(4) North Cameroon Livestock and Agricultural Development (starting up) demonstrates the effectiveness of a number of integrated actions for improving livestock and agricultural production. The research results will be incorporated into extension programs used by this project.

(5) Agricultural Management and Planning (starting up) will institutionalize a planning unit with the Ministry of Agriculture to plan, design and evaluate projects in the rural sector. It will provide crucial statistics on prices and production to enable decision makers to identify the appropriate targets for agricultural research, production, marketing, etc.

(6) Cooperative Development (proposed) will upgrade the managerial capacity of the agricultural cooperatives in Cameroon in order to meet the marketing, credit and production needs of small farmers. Cooperatives will provide a key link in field trial/demonstration surveillance, and will benefit from research results.

(7) Social Science Research and Training (starting up) will develop a center for economic and social science research in Cameroon, as well as carry out research, collect data and disseminate socio-economic analyses for development programs in Northern Cameroon. This project will develop data which can be used to facilitate adoption of improved agricultural technologies, as well as indicate areas for further research.

(8) Higher Education for Development (proposed for FY-1980) will support university programs in training, research and extension for agriculture and business administration. This project will, inter alia, provide badly needed manpower for implementing agricultural research.

AID Regionally and Centrally Funded Projects relevant to the NCRE project include:

(1) Regional Food Crop Protection (on-going) will strengthen the plant protection units' ability to combat plant pests and will provide farmers with information on pest management practices. The IRAF researchers will work closely with plant protection units and will develop resistant and

tolerant varieties as well as agronomic methods which reduce crop loss from pest damage.

(2) Major Cereals (phasing out) strengthens the applied agricultural research capabilities of 16 West African countries within a regional framework, particularly the development, dissemination and multiplication of high yielding varieties of staple cereals (corn, millet, sorghum). The Cameroonian maize research program already uses varieties of maize developed by the project.

(3) SAFGRAD (starting up) will develop and strengthen regional research and testing programs for cereals (particularly sorghum and millet, but also maize), grain legumes (cowpea and peanut) and related cropping systems for the sudanian savanna and sahelian zones. NCRE should benefit from maize and cropping systems research done under this project.

(4) WARDA (on-going) is a multinational program which concentrates on testing and introducing new varieties of rice into West Africa. NCRE will use rice varieties screened by the WARDA program.

(5) CRSP for Grain Sorghum/Pearl Millet (starting up). This centrally funded project is being implemented by a consortium of U.S. universities. It conducts research on problems which limit grain sorghum and pearl millet production. USAID/Y has indicated its interest in having some research carried out in Cameroon, particularly in the area of breeding and plant pathology in the Lake Chad basin. This new project will complement NCRE's stress on sorghum agronomy and operational research at the farm level.

(6) CRSP for Legumes and Cowpeas (starting up). This centrally funded research project on legumes should eventually contribute varieties and practices which improve the effectiveness of NCRE-developed successive and interplanted cropping systems, that include cereals.

For additional information, see Annex G.

c. The Subsector

AID's subgoal for this project is:

-- Building an institutional capacity for applied agricultural research.

The Technical Advisory Board of the Consultative Group for the International Agricultural Research Institutions has stressed the need to develop national research systems specializing in applied research. While the international institutes execute basic and applied research, their solutions to problems cannot result in major production increases until national research institutions can make adaptations to specific local ecological, social and

economic conditions. In addition, the process of technology transfer to farmers must begin before the research actually results in increased production.

Both the British and the French built agricultural research institutions in Cameroon. They have undergone many reorganizations, are under-staffed, and still remain dependent on expatriate personnel to fill line positions. Until recently, the agricultural research institutions concentrated almost exclusively on perennial and cash crops.

The current agricultural research organization, IRAF, is a major component of ONAREST and reports to the Ministry of Economic Affairs and Planning. The ONAREST Governing Council has representation from the Ministries of Agriculture and Livestock, among others. Most of the agricultural research is conducted within specialized independent research institutions originally set up as separate entities for perennial tree crops, forestry and other crops.

One of AID's more important long-term goals in Cameroon is to contribute towards developing national institutional capability in applied agricultural research, particularly food crops.

We assume, in order to reach our subsector goal, that adequate human and financial resources will be provided for agricultural research and that other donors provide adequate assistance to other aspects of agricultural research, as well as work on complementary crops and cropping systems.

2. Project Purpose

The purpose of the NCRE project is:

-- To develop Cameroonian institutional capacity to provide high quality applicable research on cereals crops (particularly maize, rice, sorghum and millet) and to facilitate transmission of research results to the farmer. The cereals research will be integrated into a cropping systems approach to food production and will be aimed at solving the problems of small farmers.

The project consists of two phases: Phase I of five years, and Phase II of three years. Since NCRE is an institution-building project, we expect it will be at least eight years before all the Cameroonians return from training and would be able to run the research program without assistance from resident foreign advisors. The AID contract staff will be sharply reduced in Phase II.

The conditions that indicate that the project has achieved its Phase I purpose include:

-- Cereals research program being implemented by Cameroonian staff with limited expatriate advisors at the end of Phase I. At the

end of Phase II, the cereals research program will be implemented without external assistance by a fully qualified Cameroonian staff.

-- The cereals program produces research results on cereals relevant to the problems faced by the small food crop producers.

-- Advanced field testing demonstration programs are undertaken in each major ecological zone for maize and rice and in the north for sorghum and millet. These tests incorporate economic evaluation of recommended agronomic practices.

-- Cereals crops research is coordinated with research on other food and perennial crops to develop cropping systems recommendations for each part of the country.

-- Linkages are established with:

(i) Other national and international organizations conducting agronomic and socio-economic research in the agriculture sector;

(ii) Implementing ministries and development corporations in Cameroon.

-- Adequate physical facilities are established for cereals research.

It was decided to limit the project to maize, rice, sorghum and millet because of limited GURC financial and human resources. Another factor was the degree to which research in Cameroon on a particular crop was being financed by other donors. (See II.C.2.c.). Maize, sorghum, millet and rice are the most widely grown cereal crops in the country. All four have a much higher protein content than manioc. The current amount of research being done on these crops will permit rapid adaptation and prompt release to farmers. These crops have a relatively high elasticity of demand in Cameroon and are in short supply. With the partial exception of maize in the Mandara Mountains and non-irrigated rice in many parts of the North, these crops can be grown in all major ecological zones.

We decided to eliminate wheat as a project component because it can only be grown in limited areas, because current economic returns appear to be less optimal than what can be expected for maize and rice, and because local milling/marketing channels are practically non-existent. Legume research, which lags behind grains, is covered by IRAF research at Dschang, the proposed center north project and ZAPI-East's IITA researcher. However, the farmer field trials in maize will usually be implemented within cropping systems which involve interplanting and successive cropping with various other foodcrops, including peanuts, cowpeas and other legumes. Sorghum field trials will also be implemented in a cropping system context.

Consequently, the field testing portion of the project will require close cooperation with the legume researchers. Collaboration with IITA, the Institute of Agricultural Research of Ahmadu Bello University (Nigeria) and SAFGRAD will also be necessary.

The Root and Tuber research (including Cassava) at IRAF is financed by Canada and Belgium under a contract with IITA. Again, NCRE will work closely with the roots and tuber program on maize field trial/demonstrations in a multiple-cropping context in the forest and mountain zones.

One of the major assumptions for achieving the project purpose is that a sufficient number of Cameroonians with B.Sc. scientific and socio-economic training are available for obtaining advanced degrees. The GURC must continue to place priority on food crop research so that sufficient operating funds are made available for project operations. Socio-economic and agronomic research must be closely linked in designing the crop research and field testing programs.

Researchers must use field test results and take them into account when designing future research activities. In addition, the cereals research program should incorporate research to find solutions to problems which the small farmer faces. We also assume that the various institutions, ministries and parastatal organizations will coordinate their research and work together on design and testing of extension practices. Land must be made available for crops research while spare parts must be easily obtainable for field equipment and vehicles.

3. Beneficiaries (Also see Annex L)

a. Primary and Secondary Beneficiaries

The primary beneficiaries are limited to participants who receive training, employees of research and extension organizations who receive on-the-job training, and more than 3,760 farmers who will be involved in the field trial/demonstrations by the end of the project.

The secondary beneficiaries are more important in determining the success or failure of investment in research. They are farmers who use seed and/or agronomic practices stemming from the research project. By 1990 (four years after the last obligation of funds in Phase II), it is conceivable that more than 500,000 families will benefit from the project. Some of them will grow more than one of the cereals. A decade after the end of Phase II almost every Cameroonian who grows rice or maize should benefit from the project. We would expect that two-thirds of the farmers growing sorghum should benefit from the research results. The project's field trial/demonstration program should accelerate the spread of innovation so that varieties are released to farmers as soon as three or four years after they are first developed. We think that our expectations on adoption rate are not unrealistic given the historical experiences with agricultural innovation acceptance among small farmers in developing countries.[1/]

1/ See footnote, page II/10.

The research and the field trial/demonstration program will concentrate on producing research recommendations applicable to smallholders. Particular attention will be paid to "operational" research on how to use the new varieties in successive and interplanted cropping systems. At present almost all maize is grown on small interplanted plots where the combined acreage per household is two hectares or less. In the case of rice, research will be done on both upland and irrigated rice suitable for smallholders without access to much fertilizer or sophisticated water management technologies. The accent will be placed on successive cropping systems which maintain soil fertility, despite the shortage of chemical fertilizers.

Sorghum is grown as a subsistence crop throughout the north. It will be tested in interplanted, successive and monocropped systems.

b. Women

Foodcrop production gives women stature in the family and they have great freedom of action. They direct the uses to which food will be put and they often control the income from sales. The traditional role of the southern Cameroonian women includes food production for herself and her children. The major beneficiaries of maize research in the forest and highland areas will be women. Higher yields will permit growing more maize with less effort per unit produced. Women rarely grow rice but in the highlands they work on the rice fields and sometimes share profits with their husbands. The sex roles in agriculture are not as clearly delineated in the north. Women, however, often have their own fields and determine use of the crops harvested therefrom. In conclusion, we assume that a minimum of 70 percent of the secondary beneficiaries will be women foodcrop farmers rather than men.

Since the role of women is an integral part of food crop production, a separate detailed analysis of women has not been written. We have included discussions of women's roles in this beneficiaries section and the social feasibility section (Section III/B).

c. The Highlands

The major region of concentration for maize research will be the densely populated Western highlands, where approximately two-thirds of the country's maize is grown. Additional land is not available, thus necessitating

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1/ In Bangladesh, despite civil war and famine, winter crop rice production increased from 500,000 tons to 2,500,000 tons in a decade and is attributed to the fact that 2/3 of the production was from IRRI varieties.

The rate of adoption of hybrid maize in Western Kenya was faster than what is foreseen in Cameroon. The hybrid 611 and others were released in 1964 and by 1973 in the two zones with the most suitable ecological conditions 94,8 and 89,2 percent of the farmers surveyed were using purchased hybrid seed and two thirds used commercial fertilizer (Gerhart).

increased yields to raise production. The inhabitants should continue to pick up profitable agricultural technology rapidly. Women grow almost all the maize in this region. The relatively undeveloped river bottomlands should present an opportunity for increased rice production, particularly by younger men without other access to cropland.

Although the highland economy is relatively well monitized, the per capita income of the rural highlanders is low ($ 70-80) compared with the national average per capita GDP of nearly $300. The percentage of young children with chronic malnutrition is higher than the national average.

By 1990, we estimate that approximately 200,000 families in Western and Northwestern provinces will benefit from this project.

d. The Forest Zones

The Eastern Province is the poorest forest zone province with a rural per capita income of approximately $ 80-90. It has the highest rate of malnutrition in the country. Women grow maize, but men usually clear the forest for their wives. Since married men usually have tree crop plantations and/or seek outside employment, they may not devote as much time to land clearance as formerly. Continuous land clearance permits extended fallow periods permitting regeneration of soil fertility. Consequently, improved maize yields and better agronomic practices will allow women to increase their families' maize consumption (thus improving their nutrition) as well as earning pocket money by selling maize in excess to their needs.

Current rice yields are so low that men will not grow it. Land clearance and drainage have heavy labor requirements. Research is needed on agronomic practices to increase yields as well as breeding in disease resistance. Unemployed young men should be able to get good returns growing rice as a cash crop, provided yields are sufficiently high.

Parts of the Central South Province are nearly as poor as the East. Although the Lékié region is somewhat wealthier, it should not be neglected because it sells food to Yaounde. A higher percentage of the maize and rice grown is marketed in the Central South, but foodcrop production faces the same kinds of constraints which necessitate increased yields through improve varieties, better agronomic practices and disease control.

We estimate that by 1990 about 100,000 families in the forest zones will benefit from the project.

e. The North

With per capita rural incomes in cash and kind at about $70 in the north plains and considerably less in the Mandara, the inhabitants live close to the margin in a drought-prone region. The malnutrition rate is the second highest in the country.

Among the non-Fulani, agricultural roles are not clearly differentiated by sex, since both men and women work in the fields. Fulani with high socio-economic status hire laborers rather than work the land themselves.

The short agricultural season causes bottlenecks because sufficient labor is not available at key points in the agricultural cycle, thus limiting food production. Weeding presents the greatest problem. A family without oxen can manage two hectares of land at most. With oxen, the areas under cultivation may expand to five hectares if the farmer can find labor for weeding. The yield of staple cereals must increase to provide sufficient food and reserve stocks, as well as some surplus for market. In addition, cash crop production cannot increase until more cereals are produced on less land.

Sorghum and millet are the staple foodcrops of the north and are grown by almost every family engaged in subsistence agriculture. Maize is not yet widely grown, but in Benoue department and other areas with suitable rainfall patterns it easily outyields sorghum while requiring roughly the same amount of labor. Although rice can be grown in suitable lowlands throughout the north, irrigation becomes necessary in the drier regions. NCRE will concentrate its research on rice varieties and cultivation techniques suitable for the small farmer and not on mechanized production. We expect that SEMRY rice project (See II/D) will benefit indirectly from the research done under this project, particularly on disease resistance.

We estimate that by 1990, at least 200,000 families will benefit from research done under the project. Some families will grow maize and/or rice in addition to sorghum/millet.

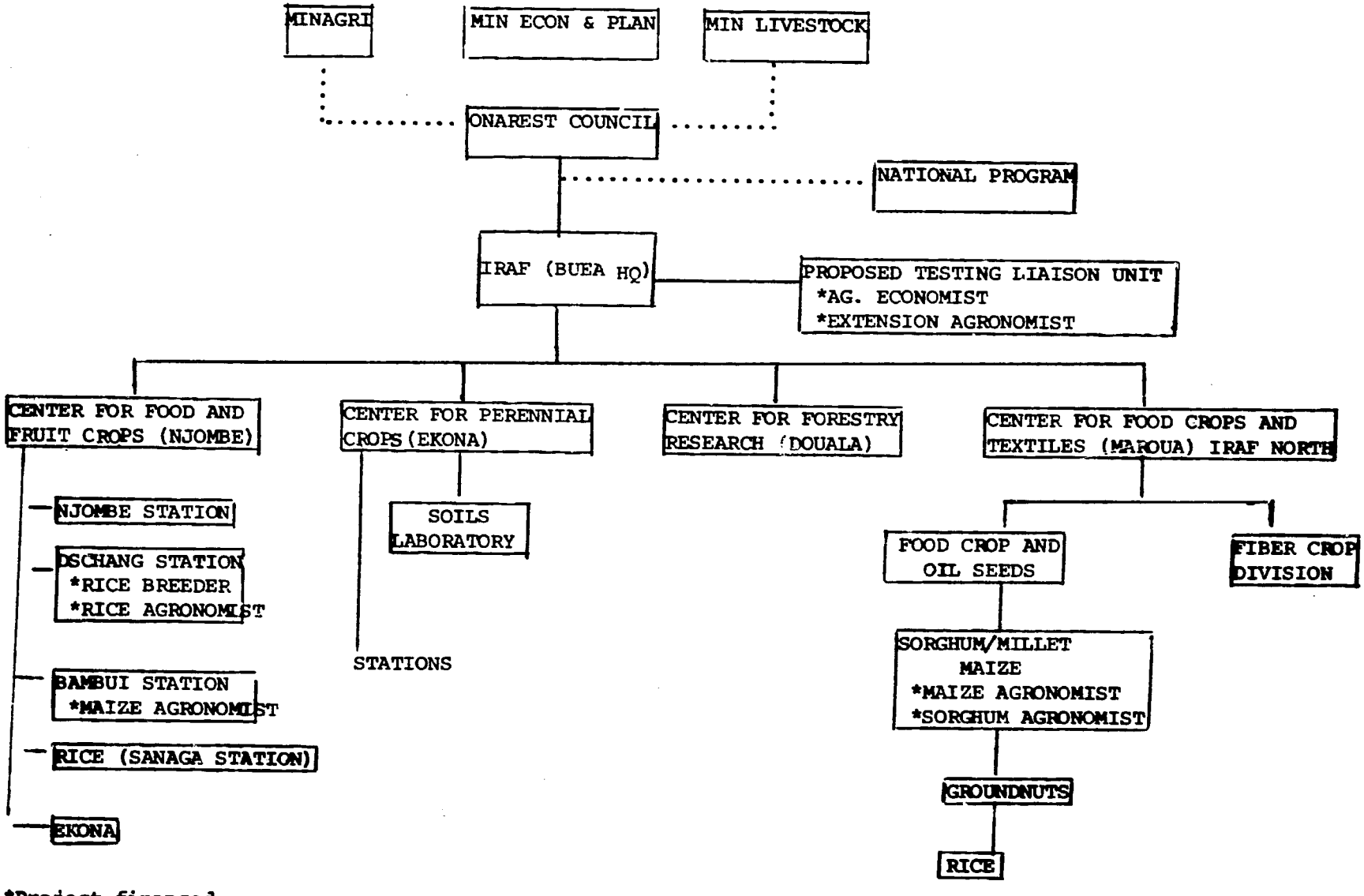
C. Project Outputs and Inputs

1. Outputs

a. "Development of Cameroonian-Staffed Institutional Capacity Working on Maize and Rice Research".

By the end of Phase II, the Cameroonian agricultural research institutions will have developed the institutional capability to carry out research and advanced farmer field trials on maize, rice and sorghum, in keeping with the country's needs and to develop the necessary linkages to facilitate transmission of research results to farmers. By the end of Phase II of the project in FY-1986, there will be four members with their Ph.D. degree, ten with M.Sc.'s, and two with B.Sc.'s (See Figure II). By the end of Phase I, Cameroonians will fill two Ph.D. level positions, 11 M.Sc. positions and three with B.Sc. positions. (Two M.Sc. holders will obtain Ph.D. in Phase II and one B.Sc. will get a M.Sc.).

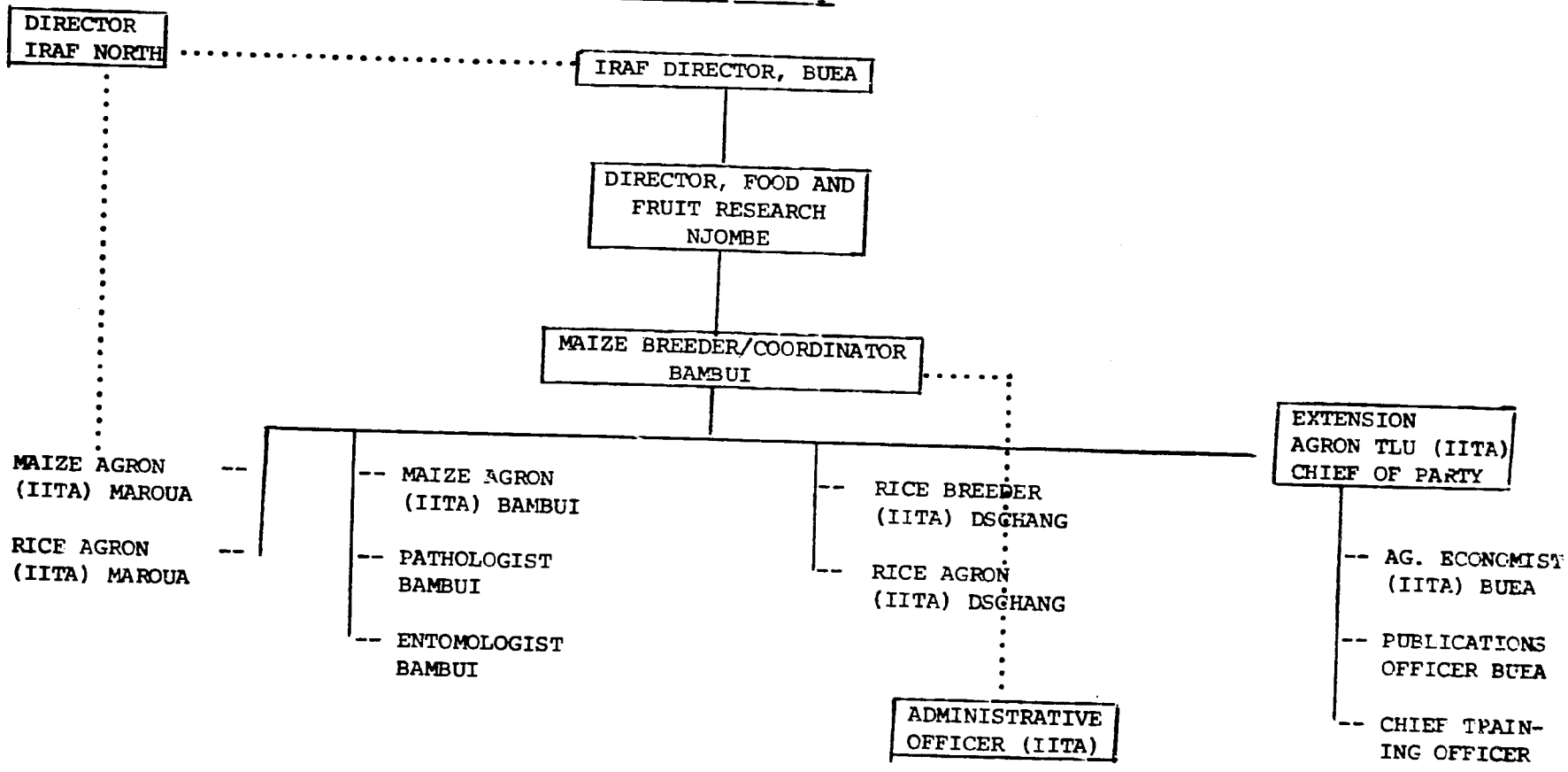
Table 1
IRAF Organization



*Project financed.

Table 2

Project Hierarchy



N.B. When a Cameroonian takes over as Administrative Officer, he will report directly to the Maize Breeder/Coordinator.

We recommend that by the end of the project a woman fill one agronomist (extension) position at Bambui and one in the lowland forest zone because they will have more success in reaching women who grow maize. If a suitable Foufoulde-speaking candidate were found, we would recommend that a female extension agronomist be assigned to IRAF north.

We assume that Cameroonian personnel can be released for training from their current positions and that, once trained, the personnel will stay with the cereals program for several years.

b. "Development and Implementation of Research Programs for Maize, Rice and Sorghum, Including Field Trial Demonstration on Farmer's Fields".

The objectives of the agronomic program will be to increase maize, rice, sorghum and millet yields through developing improved varieties with disease and insect resistance adapted to the major ecological zones. The researchers will develop management practices to permit optimum performance of new varieties in terms of sustained yield and disease resistance. Maize and sorghum management practices will include interplanting and succession planting using legumes to increase nitrogen fixation. Root and tuber crops will also be worked into maize cropping systems. In the case of rice research, recommendations will include crop rotations. The researchers will develop packages of cultural and management practices for optimum maintenance of farm productivity and economic returns, and will test these packages of practices at the farm level. The time required to test and release new varieties will be sharply reduced by the use of minikit trials in farmers' fields of promising varieties and agronomic practices.

Output targets include developing long-term integrated national research plans for maize, rice and sorghum/millet in FY-1980. Implementation of shorter-term research projects within the plan will begin in FY-1980 for maize and rice, and in FY-1981 for sorghum. Research results (e.g. recommended practices, improved varieties and packages) will be released for general extension after the 1980 growing season for maize, 1981 for rice and 1983 for sorghum.

The following is given as an example of a single field trial/demonstration program for maize in Eastern Province, with a single cooperating agency, ZAPI-East. IRAF's role is that of conducting operational research under field conditions. It is not itself involved in direct extension work with farmers. ZAPI's own extension agents and their immediate supervisors have continuing direct contact with participating farmers. The IRAF staff will, however, make spot checks for verification of data.

The Extension Agronomist, of the Testing and Liaison Unit, designs the test, aided by the regional maize agronomist (extension) and economist (TLU), using suggestions of the maize breeder, the Root Crops program and IRAF's legume researchers. They also contact the IRAF agricultural research officer and the IITA consultant attached to ZAPI. The TLU personnel and

the maize agronomist prepare instructions for the extension assistants and for the selection of participating farmers. The Maize Agronomist (extension) works with the ZAPI extension officer and ZAPI research advisor to select the extension assistants. Each extension assistant will supervise five to ten participating farmers, all within bicycling distance. The number supervised will depend on population density (See Annex I for selection criteria).

The Extension Agronomist (TLU), Senior Training Officer (TLU) and the Maize Agronomist run a brief training program for the participating extension assistants and extension officer to teach them about the package, how to keep the records, how to select farmers, and the timing of visits. The workload on extension personnel should be kept light, i.e. each assistant should have relatively few farmers since they have many other tasks to accomplish for their extension service agency. The supervisory ZAPI extension officer should make spot checks. The economist, maize agronomist and extension agronomist should also visit a representative sample of farms.

The "package" would be assembled by the participating agencies, using planting materials from IRAF, pieces of string for measurement, and instructions to the farmer prepared by the Testing Liaison Unit, all stowed in plastic bags.

In the rare circumstances in which monocropped maize would be tested, a plot of about 0.04 hectares (1/10 of an acre) would be used. Usually a maize trial in Southern Cameroon would involve interplanting. In this prototype, we are using a mixture of maize and groundnuts and an appropriate size plot might be 0.8 ha. The package would include four varieties, one of which would be a common local variety, the three others improved ones. Since soil quality may vary sufficiently to distort trial results, samples should be taken for soil tests to be processed at the Ekona soils laboratory. Tests should include pH, phosphate, potash, and magnesium, as well as an analysis of the soil's texture and any unusual physical characteristics. The extension assistant would visit the farmer at land preparation, planting, weeding, just as harvest begins and after harvest.

Field trials results, including labor and cash inputs, will be processed and evaluated for both economic and agronomic results by the Maize Agronomist (extension), the plant breeders, and the TLU economist. Plant diseases and pest damage will be analyzed as well as any sociological consequences of agronomic practices. These results will be fed back to the researchers and TLU to guide them in selecting further research activities and field test programs.

NCRE personnel must develop joint testing programs with the agricultural extension agencies, development corporations, cooperatives, etc. There are

at least four such organizations in each ecological zone with which the IRAF personnel can work on this operational research. IRAF will have to negotiate with each. It will not be necessary to have each possible agency participate: there should merely be sufficient numbers of tests run to provide an adequate data base upon which firm extension recommendations can be made.

Farmer Field Trial/Demonstration
(number of participating farmers)

FY	1980	1981	1982	1983	1984
Maize	300	1,080	1,680	1,800	1,800
Rice	60	330	750	1,020	1,020
Sorghum	-	60	360	720	840

For additional information see Annex I concerning research-extension linkages and field testing programs.

In order to reach these output targets, we assume that:

-- IRAF and extension agencies coordinate in formulating research and testing programs.

-- Sufficient senior staff are available to plan and implement research projects as scheduled.

-- The GURC can finance most operational expenses and all salaries for Cameroonian staff.

c. "Develop and Operate Liaison and Testing Unit to Transmit Agronomic Research Results to Extension Agencies and Farmers Problems to the Researchers, as well as Determining Economic and Social Consequences of Agronomic Research".

Section II/C/1/b above describes the part the TLU will play in the design and evaluation of field tests for rice, maize and sorghums. They will analyze the results of the tests to determine the economic and agronomic validity of cropping practices and recommended varieties.

The TLU is, above all else, concerned with "operational research" and has a "horizontal" approach stressing cropping systems. A small producer does not adopt (or adapt) innovations based upon the analysis of one crop, but considers the innovation in light of its impact on the entire farm enterprise and upon the well-being of the family unit. The TLU will need access to a computer to process the data on intercropping. Cameroon and IITA have facilities which can accomodate any analysis contemplated. The project may want to purchase a desk top model as the program expands.

The other role practiced by the TLU will be that of translating the research results into a form which the extension agencies and development corporations can use as recommendations in carrying out agricultural programs. Because of changing conditions affecting pest infestation and the availability of basic plant materials, as well as the fact that eventually the TLU will tailor recommendations for crops other than cereals, we prefer to view this activity as one requiring qualitative evaluation rather than establish quantitative targets.

We suggest that recommendations be prepared at two levels for each crop in each ecological zone:

(i) High technology: for areas of intensive agriculture with easy access to modern agricultural inputs, credit, and agricultural extension personnel.

(ii) Medium-low technology: for areas with a few extension agents and scarce inputs.

In addition, the TLU will bring crop production problems bothering the extension service personnel and the farmers to the attention of research scientists. A key device to bring the exchange about is periodic "cropping conferences".

Some of the TLU's testing program operations and formulation of extension recommendations will be run jointly with the evaluation units attached to ongoing or proposed integrated rural development programs in various parts of Cameroon. They will work closely in test design, evaluation and formulation of recommendations with the crop agronomists and other scientists based at the IRAF stations.

The TLU will have, at the end of Phase II, an extension agronomist, an economist, a rural sociologist, a chief training officer, and a publications officer. All except the senior extension agronomist should be on board at the end of Phase I.

We assume that:

-- IRAF obtains authority to establish the unit;

-- Other extension and quasi-extension agencies coordinate with the unit; and

-- The social scientists are permitted to participate in designing the methodology for the field tests and will cooperate with the biological scientists.

d. "Establish and Maintain Links and Exchange of Information with International, African and Cameroonian Institutions Conducting Agronomic and Socio-Economic Research".

One of the limiting factors on Cameroonian agricultural research is lack of knowledge about ongoing research and breakthroughs in other research institutions working on similar programs. IRAF and the universities exchange relatively little information, and IRAF's research results are not distributed widely. One method of opening up channels of communications are periodic cropping conferences on specific problems or crops. Although the situation has improved recently in regard to IRAF sharing information with IITA, CIMMYT and IRRI, relatively little has been done to obtain information and materials from other countries. Cameroon's bilingualism should enable her researchers to obtain and use results from both the francophone and the anglophone countries and reduce duplications of efforts.

By 1981, the linkages within and outside Cameroon should be fully established. This could include the exchange of plant materials and research results on cereals, and information exchanges with individuals and institutions working on perennial crops, roots and tubers, economics and rural sociology.

e. "Adequate Physical Facilities and Equipment for Carrying Out the Cereals Research Program".

Several factors guided us in selecting the station sites, physical facilities and equipment for the NCRE. First of all, we needed to cover all major ecological zones where rice, maize, millet and sorghum can be grown successfully. Secondly, maximum use should be made of physical facilities and equipment of existing and planned IRAF research programs. Thirdly, the extension trials in farmers' fields should mesh their requirements with those of the agencies implementing extension programs.

The headquarters for the maize-breeding program is the existing station at Bambui, at 1,600 meters in the Bamenda highlands. It has adequate land at substations between 700 meters (at Befang) and at 1,900 meters (Bambui upper farm). It will need an additional laboratory/office building, a storage shed, a modest irrigation system for the dry season, and eventually four more houses for senior staff (rental housing can be found in Bamenda, about 25 minutes away). Bambui is within six hours of Douala by good roads.

The Cameroonian Government intends to make the Dschang station and the Mbos substations the major center for rice research. Dschang, in the Western Province, has altitude and climate similar to Bambui. It is accessible by good roads and possesses an airstrip served by Cameroonian Airlines. It is the site of the proposed new University Center for Agriculture which will, under current plans, take over the site currently used by IRAF for conducting field trials. Adequate housing can be found in Dschang.

The Center for Food and Textile Research (IRAF North) outside Maroua in the sudanic savanna is the main research center for Northern Cameroon. It is at an altitude of 200 meters. It has 50 hectares of land and is negotiating for more. Temporary laboratory and office facilities are available. We expect that the IBRD Center North project will provide any additional buildings if needed in the IRAF north center for cereals and related activities.

Njombe is the headquarters for the Food and Fruit Crops Research Center of IRAF as well as the National Root and Tuber program. It is located in Littoral Province in the humid lowlands. No houses are available for rent in the vicinity and therefore housing must be built before assigning GURC cereals project technicians there. Njombe station has just obtained an additional 50 hectares of land to be used for food crops research. Food crop research can also be done at Ekona headquarters for perennial crops research in Southwestern Province. At an altitude of 550 meters it is 20 minutes by car from Buea and 75 minutes from Douala. Ekona has good facilities, including the major soil science laboratory for the entire country.

For experiments with varieties and cropping patterns suitable for the moderate rainfall lowland forest, it is suggested that IRAF negotiate with the Faculty of Agriculture of the University of Yaounde (ENSA) for about 20 ha. of arable land at Nkolbisson. This area has an altitude of 700 meters and about 1,570 mm of rain which is bimodal in its distribution. ENSA has several office and laboratory buildings, and temporary office/laboratory space can be arranged. However, a permanent building will eventually be needed, and this question should be addressed in the mid-project evaluation.

2. Inputs

a. U.S. Government

Technicians: In order to meet the project output targets, 32.5 work years of long-term technicians services are needed in Phase I. Three work years are required in Phase II. These positions are:

Maize Agronomist (extension) (FSR-5 level) at Bambui. The advisor will devise and conduct agronomic experiments in maize for the forest and highland zones, working with the Cameroonian Senior Maize Breeder. He/she will, inter alia, focus on cropping associations, cultivation techniques and time of planting. He will assist in planning and implementing field trial/demonstrations in his zones.

Rice Agronomist (extension) (FSR-5 level) will be assigned to Dschang. The agronomist will have a parallel scope of work except that he covers the entire country and works on rice.

Rice Breeder (FSR-3 level). Will be posted at Dschang. The breeder will concentrate on adaptation trials and breeding rice varieties for small farmers in all four ecological regions. He/she will make recommendations for farmer field trial/demonstrations and assist in their design.

Maize Agronomist (extension) (FSR-5 level) is posted at Maroua. He/she has the same scope of work as his/her southern counterpart but works only in the north.

Sorghum Agronomist (extension)(FSR-5 level) at Maroua has the same duties as the Northern Maize Agronomist but works on sorghum.

The Administrator (FSR-5 level) assigned to Buea, will concentrate on project procurement, personnel administration and logistic matters.

Extension Agronomist (FSR-3 level) assigned to Buea. This individual will establish and direct the Testing and Liaison Unit. His/her work will use an operational research approach to the problems of the farmer. He/she will design the field testing/demonstration program, help train test supervisors and extension agents, and evaluate the test results for agronomic and socio-economic conclusions. He/she will help transform the research results into recommendations for extension personnel to use.

Agricultural Economist (FSR-4 level) posted in Buea. The economist will work with the Extension Agronomist in the TLU and will concentrate on the economic consequences of proposed extension recommendations using the field test/demonstrations program. He/she will also analyze the labor requirements of various agronomic recommendations and train test supervisors and extension agents in gathering the necessary data for the studies.

The timing of the Advisors' tours of duty are contained in Annex F as are more detailed scopes of work. The Chief of Party will probably be the Extension Agronomist stationed in Buea. It is strongly recommended that a woman fill at least one of the seven technical positions.

Fourteen months of funding for consultant services are included in the contract for FY-1979, six work months in FY-1980, and six work months for two years after that. In addition, AID intends to finance three work months of contract services in both FY-1981 and 1983 from outside the institutional contract to participate in the in-depth evaluations.

Total personnel costs and support are estimated at $4,142,000 during Phase I.

Participants: AID proposes to finance two participants for the M.Sc. and Ph.D. degree training in the U.S. The individuals will become the Rice Breeder (with pathology minor) at Dschang/Bambui, and the Extension Agronomist in charge of the liaison unit. Each of them will have at least six months of work experience with IRAF prior to beginning their M.Sc. studies. They will spend a year between the M.Sc. and the Ph.D. working on the NCRE project before returning to the U.S. for their Ph.D. coursework. Research for the dissertation must be done in Cameroon on a topic relevant to cereals research and production, and will be supervised by cooperative arrangements between the U.S. university, IITA and an appropriate Nigerian University if necessary (Ibadan or Ife for the forest and highland areas, Ahmadu Bello/Institute of Agricultural Research at Samaru for the north). AID financing includes a return visit to the U.S. for defense of the dissertation.

AID will also provide participant training for 9 Cameroonians for M.Sc. degrees. The candidates should work for IRAF for at least six months prior to beginning their studies in the United States will receive their training for the following positions:

Maize Agronomist (extension) -Bambui;
Rice Agronomist (extension) -Bambui/Dschang;
Maize Breeder - Maroua;
Sorghum Agronomist (pathology minor) - Maroua;
Sorghum Agronomist (extension) - Maroua;
Maize Breeder - Ekona/Njombé;
Rice Agronomist (extension) - Maroua;
Cereals Pathologist - Yaounde;
Agricultural Economist - Liaison and Testing Unit.

AID will finance the last three years of B.Sc. level training for up to three participants. These will occur only when the participant cannot receive appropriate training in Cameroon due either to course requirements or language of instruction. The three will be chosen from among the following candidates for the B.Sc. positions: Maize Agronomist - Maroua; Cereals Agronomist - Ekona/Njombé; and Cereals Agronomist - Yaounde. It would be particularly appropriate to train women for any one of the three maize cereals agronomy positions.

Short-term training in third countries will be done under the institutional contract in applied biological and social science aspects of research at the appropriate international research institutions; including the International Institute of Tropical Agriculture in Ibadan, Nigeria (IITA), the International Center for Maize and Wheat (CIMMYT) in Mexico, and the International Rice Research Institute (IRRI) in the Philippines. We intend to train four participants for five months each during every year of the first phase of the project and three trainees for three months each year for four years. We also propose that one individual receive a special

nine-month training program before becoming the chief trainer of extension personnel who do direct supervision of the field test demonstration program.

Total participant training amounts to $480,800 in Phase I of the project.

Commodities: AID will finance several categories of commodities, including laboratory equipment ($74,000), vehicles, parts and tools ($201,000), and field equipment and parts ($262,000).

AID is in the process of standardizing vehicles purchased for projects and intends to select an American supplier for passenger and four-wheel drive vehicles. An integrated spare parts supply system will be part of the standardization. Under this project we will need four four-wheel drive passenger vehicles, four station wagons (small), and a five ton truck.

A proprietary procurement waiver will be needed for purchasing three Massey-Fergusson (Model 265) tractors and associated equipment. (These are the same as the 165's currently used by IRAF). See Annex L for draft waiver.

Construction: AID intends to construct a laboratory and office building and a storage shed for equipment at Njombe and Bambui ($200,000). We expect that the IBRD Center North project will finance construction at Maroua.

Other Costs: Approximately $120,000 will go into extension trials operations, which includes a small amount of agricultural inputs purchased locally, preparation of training materials for extension personnel, meetings to train personnel and analyze results, and computer time to analyze field trial results, particularly economic analysis.

AID will finance repairs for the project vehicles. AID will also finance POL costs for the four all-terrain vehicles used in the extension trials program and for the advisors' vehicles. Total vehicle support costs financed by AID are estimated at $101,000.

b. Cameroonian Government

Personnel: IRAF will supply three scientists with M.Sc. or higher degrees from the beginning of the project. These are the Senior Maize Breeder (soon expected to complete Ph.D. dissertation), the Cereals Pathologist (Ph.D.) and the Entomologist (M.Sc.). The first two are already on IRAF staff working on cereals-related research. The numbers will gradually increase so that by 1983 there will be 16 professionals working full or part time on the cereals program. In addition, the GURC will provide the services and finance the salaries of research assistants with B.Sc. degrees, intermediate level assistants and general field workers. The wages, salaries and benefits of these people will come to about $1,143,400. Soils scientists and economists who will be doing part time work on cereals research and extension demonstrations are on loan from other parts of IRAF and ONAREST. For details see Annex F.

Training: The GURC has already financed the training of the maize breeder, the cereals pathologist and the entomologist. The government will finance in-country B.Sc. level training for individuals who will eventually work as research assistants on cereals.

Land and Buildings: The Cameroonian Government will provide the following land for research and building sites:

Bambui	70 hectares	$1,428,000
Maroua	50 hectares	1,000,000
Ekona/Njombé	70 hectares	1,400,000
Yaounde	10 hectares	400,000
		$ 4,228,000

At Bambui station the GURC will provide the following existing buildings: two houses for senior officials, one medium size office building, one guest house and one field shed valued at $134,200. By the end of the project, the GURC will also construct suitable housing for senior officials (four houses valued at a total of $164,000).

At Njombé, the Government will construct houses for senior staff.

At Maroua, the GURC will build two houses by the end of the project to house senior staff. They will also lend laboratory space and field shed until such facilities can be constructed under the Center North project.

Commodities: The GURC will provide, at Bambui, one Renault 12 station wagon, 1 Peugeot 404 station wagon, one Land Rover, one old Massey-Ferguson 165 tractor with implements. At Maroua a tractor and implements will be supplied. The GURC will make available one tractor and implements and one Peugeot 404 pick-up truck at Ekona/Njombé.

Other Costs: The GURC provide fuel and electricity for research station operations, including the two-wheel drive passenger vehicles provided by AID.

c. Other Donor Activities in Agricultural Research

1. SEMRY I and II are IBRD and French Government-supported projects for the mechanized production of irrigated rice. SEMRY II contains assistance for applied rice research, and may receive some eventual benefit from research done under NCRE to benefit small farmers. SEMRY also includes some operational research on sorghum, which farmers grow for their own subsistence.

2. Western Highlands Rural Development Project is a new IBRD-financed integrated agricultural development project, which has both research and extension components. It includes maize extension and has an evaluation component that may facilitate coordinated farmer field trials.

3. The ZAPI-East project of IBRD is an integrated agricultural development program which includes applied research and extension of food crops. We hope to work out a cooperative field testing program with ZAPI staff.

4. The proposed IBRD Center North Rural Development Project includes support of IRAF-North and agricultural extension activities within the framework of an integrated agricultural development project. It is also closely related to SAFGRAD.

5. UNDP/FAO Soils Research Project includes the development of the soils laboratory and testing program at Ekona, which will be used to test soils of fields used in the field test demonstration program. The AID sponsored Benchmark Soils Project (Hawaii) will also be doing soils research in conjunction with the Ekona station.

6. The Canadian Government is financing research on improving yields, disease resistance, nutritive value and agronomic practices on root crops at Njombé, using an integrated cropping systems approach.

7. The West Germans and the European Development Fund intend to start an integrated Rural Development Project for Northwestern Province, the first phase of which will be feeder roads. It will eventually provide a means of conducting field trial/demonstrations.

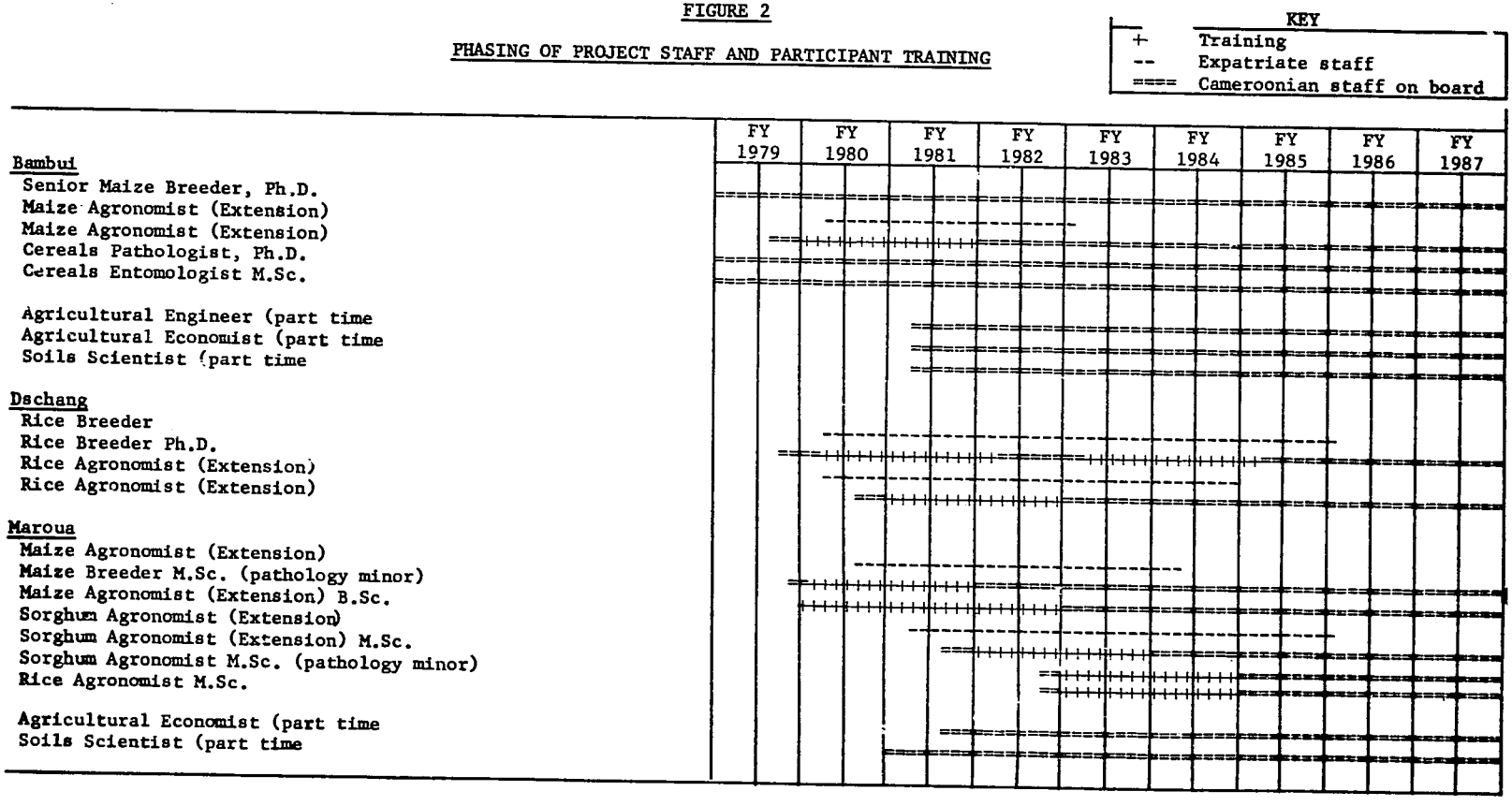
8. The French Government provides agricultural researchers and extension personnel to ONAREST and to various development corporations. It has also provided capital assistance to SEMRY, the Upper Noun Valley, and the Mbos Plain Rice Cultivation Corporation. We expect that the first field trials in rice will be run in the Noun Valley and the Mbos Plain in cooperation with these advisors.

9. The Upper Benoué Valley Development Agency is in charge of the regional rural development program in that area of Northern Cameroon. The European Development Fund and the French are financing a wide variety of crop trial work and socio-economic studies to determine potential for settlement in this sparsely populated area. Their program should facilitate joint implementation of field trial/demonstrations.

For additional information on how these programs will tie into the cereals research and extension, please see Annex G.

FIGURE 2

PHASING OF PROJECT STAFF AND PARTICIPANT TRAINING



	FY 1979	FY 1980	FY 1981	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987
Njombé									
Maize Breeder M.Sc.									
Cereals Agronomist (Extension) B.Sc.									
Soils Scientist (part time from Ekona)									
Yaoundé									
Cereals Pathologist M.Sc.									
Cereals Agronomist (Extension), B.Sc., M.Sc.									
Agricultural Economist (part time									
Soils Scientist (part time									
Buea									
Administrative Officer									
Administrative Officer									
Liaison and Testing Unit									
Extension Agronomist									
Extension Agronomist, Ph.D.									
Agricultural Economist									
Agricultural Economist M.Sc.									
Publications Officer									
Chief Training Officer									
Rural Sociologist (on loan)									

III. PROJECT SPECIFIC ANALYSIS

A. Economic

1. Rate of Return and Benefit - Cost of Agricultural Research

Research projects are not revenue-generating projects. IRAF may gain some revenues from seed multiplication but earning income is incidental to the project objective of establishing an institutional capacity for cereals research. It takes a decade to feel the full impact of agricultural research as improved varieties and technologies reach most farmers and thus increase production.

Studies have been made on the rate of return in countries where reliable agricultural production and price data are available for extended time periods. Internal rates of return to investment in agricultural research in developing countries vary from 26 to 46 percent according to a number of recent studies, while an indirect rate of return related to investment in scientific research reached 60 percent per annum. The rate of return on resources devoted to extension are usually 12 to 15 percent (see Annex H for a summary of the literature on this issue).

If data were available for calculating the internal rate of return for NCRE, we would expect it would be at least twenty-five to thirty percent. The rate of return would probably be at least double the rate for investment in extension. One reason for the high returns is that there is a higher elasticity of demand for rice in Cameroon than in countries where it is the major staple. Corn has a somewhat higher price elasticity than most staples, because it is substituted for cassava and root crops as well as used to make beer commercially and feed chickens in commercial poultry operations. Sorghum and millet have a low elasticity of demand.

2. Production, Consumption and Prices

From what we can tell from the available statistics for subsistence food-drop production and consumption, Cameroon does not have a national food deficit, however, the results of the GURC/UCLA nutrition survey indicate one percent of children less than 5 years old suffer from acute malnutrition and 22 percent of preschool Cameroonian children were chronically malnourished.2/ Substitution of one food for another

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2/ Acute malnutrition is defined as less than 80 percent of their expected weight for their height according to WHO International Standards. Chronic malnutrition is defined as less than 90 percent of the standard height for their age.

is particularly common between manioc, other root-crops, corn and rice. Thus it is difficult to get an accurate impression of demand and supply for a single crop. However, the Ministry of Economic Affairs and Planning is seeking funding for a household expenditure survey which would supply elasticity data.

a. Rice

IBRD data prepared for the SEMRY II Project Appraisal Paper, indicates that while domestic production and consumption should be approximately equal in 1990, there will be substantial imports (to supply southern Cameroon) and exports (to northern Nigeria from SEMRY).

	Domestic Production	Imports (tons)	Exports (tons)	Consumption	Kg/per person
1970	12,080	7,760	-	19,840	3.0
1971	9,260	31,880	-	41,140	6.1
1975	16,080	1,710	-	23,790	3.2
1980	41,780	13,260	16,990	38,050	4.7
1985	82,970	12,210	37,490	57,690	6.3
1990	88,790	30,440	30,490	88,770	8.7

(See Annex H, Table I for additional details.)

It is estimated that rice consumption will increase at least as fast as GNP, i.e., at five to six percent per annum through 1981 and at seven percent thereafter because of changing consumption habits and rapidly increasing prices of competing traditional foodstuffs.

In estimating future production, it is assumed that SEMRY and other large-scale projects will not encounter major administrative or plant disease problems. Both the Upper Noun Valley and the Mbos project can increase production considerably once they have disease-resistant varieties.

RICE PRODUCTION
(MT OF RICE)

	SEMRY	Other Northern (modern)	High-lands	Other (Traditional)	Total
1976	14,680	-	1,500	6,500	22,680
1978	20,190	-	4,550	7,420	32,160
1980	26,170	390	6,870	8,350	41,780
1985	53,440	1,950	16,930	10,650	82,970
1990	53,440	1,950	20,440	12,960	88,790

(See Annex H, Table 2 for additional information.)

b. Corn

Reliable current estimates on maize production and consumption are not available at present. The FAO estimated corn production at 350,000 MT in 1971, while the Third Five-Year Plan used 265,000 MT for the same year. The Ministry of Agriculture figures for 1974/75 and 1975/76 corn production are very inconsistent and contain major omissions (see Annex H).

We think that corn production in recent years, despite substantial swings due to climatic conditions, averages about 300,000-325,000 MT per year, and that the average annual production increase has been less than the rate of population. Our reasoning is based on price increases which could be tied to inflation and/or the Nigerian market.

Northwestern and Western Provinces probably account for 65 percent of the corn grown in Cameroon. They feed Douala. Already about 40 percent of the crop is marketed. The Center South produces about 12-15 percent of the country's corn, Littoral between 5 and 10 percent, the East 5-6 percent and Southwest 2 to 3 percent. The North only produces 6 percent of the country's production.

Alternative projections of demand for corn.

	2.5% increase per year (unchanged per capita)	4% increase per year	6% increase per year
1977	325,000	325,000	325,000
1980	349,989	365,581	387,080
1985	395,981	444,789	578,001
1990	448,016	541,154	693,202

On the consumption side, the four percent rate assumes some substitution of corn for root crops as incomes rise. The six percent rate implies greater substitution for root crops and for sorghum in the north, as well as increased use for brewing and poultry feed.

Therefore, the major corn growing area of the highlands must increase yields substantially above the current estimated rate of 1,000 kg/ha. Additional land is not available in any quantity outside of the Foumban area. Corn production in the Center South and East must also increase substantially, while in the North (particularly Benoue), higher yielding corn can substitute for sorghum, thus getting more grain production from the same acreage with little increase in labor requirements.

c. Sorghum/Millet

The data on area planted and production of sorghum/millet are less satisfactory than those on maize. For example, FAO estimated in the early 1970's 565,000 ha. were planted in sorghum/millet, while IBRD gives 400,000 ha. north of the Adamaoua, and the North Cameroon resource inventory states that 341,000 ha. were grown in the same area. In the early 1970's, the IBRD believed production was about 260,000 MT, while the inventory assumed 1974 production was about 239,000. More recent Ministry of Agriculture statistics for north of the Adamaoua cite 356,613 metric tons of sorghum/millet were produced on 459,134 ha. in 1976/77 and that 291,213 MT was grown on 437,642 ha. in 1977/78.

We can only conclude that sorghum and millet production more or less keeps up with population growth in non-drought years in the semi-arid zone. The balance is precarious. It is probable that the Mandara Mountains region has a food grain deficit in most years. As urbanization increases during

the next 15 years, technological breakthroughs are needed to let farmers produce sufficient sorghum/millet to feed both the urban and the rural populace. Labor shortages at peak periods limit the acreage that a family can work and the amount of food that they can grow at present.

d. Prices

Corn and rice prices fluctuate abruptly from month to month. Urban rice retail prices rose an average of 15 percent a year between 1971 and 1976 at Bafoussam, going from 19.5 CFA/kg to 60 CFA/kg by 1977. IBRD estimated that in 1977 it cost 108.8 CFA/kg retail for imported rice in Yaounde and that the retail price for SEMRY rice of similar quality would be 130 CFA/kg because of high transportation costs. Even in the 1985 projections, SEMRY rice in Yaounde remains more expensive than imported rice. Rice prices will continue to rise in the foreseeable future.

The stagnation of corn production is reflected in increasing prices with the exception of the 1978 bumper crop. During the first five months of 1978, the Bafoussam retail prices varied between 69 and 84 CFA/kg. During the same period, Yaounde corn prices averaged 80 CFA/kg, compared to 90 CFA/kg in 1977. Corn prices in the highlands may level off when the proposed commercial production programs start up near Foumban.

Sorghum and millet prices vary widely during the year. They will also vary according to the size of crop and type of sorghum. The combination of inelastic demand and producer consumption of 90-95 percent of the crop results in acute price gyrations. In normal years the urban market retail price has varied from 60 to 80 CFA/kg.

3. Farm Budgets

The data available for compiling farm budgets are inadequate. Consequently, we have used low market prices and yield figures in making our calculations. Labor costs have been inputed at 400 CFA/day in the northern plains (because of labor shortages at key points in the agricultural cycle) and 300 CFA/day in the rest of rural Cameroon. When otherwise unemployed young men engage in growing corn and rice in the South, however, the opportunity cost of labor should be considered as being much lower. The data were insufficient to permit analyses of multiple and inter-cropping systems.

a. Corn

Using appropriate agronomic practices and varieties, plus some fertilizer, a farmer in the Garoua area should begin to make a profit on corn once the yield is about 1,300 kg/ha. The anticipated yield on good soils should be about 2,000 kg/ha. In the highlands good soil and rainfall conditions raise the average yield to the equivalent of 1,000 kg/ha. in pure stands.

Farmers break even using the unimproved local varieties. If a moderate level of improved agronomic practices and varieties are used (but no fertilizer), the break-even point is roughly 1,340 kg/ha. The yield anticipated using moderate levels of technology is about 2,000 kg.

In Eastern Province the labor requirements are high and farm gate prices are low due to the distance from market. Using traditional methods, the farmer produces the equivalent of 700 kg/ha. and loses more than 20,000 CFA if labor costs are imputed. If a moderate level of improved technology is used to maximize available nutrients for improved varieties, the break-even point is about 1,450 kg/ha. The anticipated yield at this level of technology under farm conditions is about 1,700 kg/ha. Using the prices and conditions that prevail 40 to 60 km north of Yaounde, the break-even point under moderate levels of technology is about 1,120 kg/ha. in pure stands.

b. Rice

Rice growing using local varieties and practices results in a loss in the North and in the highlands if labor costs are imputed. Although a moderate level of improved inputs will permit the northern farmer to make a profit when the rice yield is about 1,240 kg/ha., a higher technology of transplanted rice requires yeilds of 1,445 kg/ha. to break even. On good soils, farmers should easily obtain yields of 1,600 kg/ha. and 2,400 kg/ha. respectively. In the highlands the break-even point for a moderate level of inputs is 1,140 kg/ha, whereas for the high technology the break-even point rises to about 1,545 kg/ha. Anticipated yields in the highlands using disease-resistant varieties should be about 1,700 kg/ha and 2,200 kg/ha. respectively.

Rice cultivation is not worthwhile in Eastern Province because the labor requirements are large, using local varieties and yields are poor. However, for otherwise unemployed young men using practices developed under a pilot scheme in the ZAPI east region, they can begin to show a profit and cover all capital costs before finishing year 3 of the project.

c. Sorghums

Sorghums are not as profitable as maize in the North, but they are less risky in the drought-prone regions. In calculating the farm budgets, we inputed labor costs at 400 CFA/day in the plains and 200 CFA/day in the Mandara region because of the acute labor shortages at various times in the cropping year. A hectare of unimproved sorghum in the Garoua area

loses the farmer 12,970 CFA, in Maroua 23,440 CFA, and in the Mandara 8,440 CFA. If inputs of a moderate technology are used, the break-even points for yield are: Garoua 1,213 kg/ha, Maroua 1,395 kg/ha, and Mandara 845 kg/ha. The anticipated yields under farm conditions are 1,900 kg/ha. in Garoua under good precipitation and soil conditions, 1,700 kg/ha. in the drier Maroua area on good soils, and 1,100 kg/ha. in the drought-prone Mandara Maountains and their shallow soils.

B. Social Feasibility

This section discusses population size, social structure, and organization of agricultural work in project area. It also addresses the problem of transferring research results in regions where the traditional approach to agricultural extension seems particularly ineffective. Experience with improved varieties in other countries indicates that most of the technological shift is spread through non-formal farmer-to-farmer methods, rather than through a formal extension service.

In many parts of Cameroon, the farmer growing subsistence crops is usually a woman. In other regions both men and women grow foodcrops. One of the key ways that women obtain stature in society is through foodcrop production. They decide what they will do and determine their own work schedule. The harvest from their own fields belongs to them, and they determine its end use. When a market exists for food crops, they sell their surplus and usually keep the income. Cultivation of food crops also gives women rights of usufruct to the property, so that although a man may be titular owner, the woman using the land cannot be dispossessed easily. Because of the scope of women's role in food production, we discuss it as a part of the whole, rather than devote a separate section to women farmers.

1. The North

a. Population

The area of Northern Cameroon which will benefit most from the maize and rice research will be the plains dwellers of Benoue, Diamare, Mayo-Danai and Logone et Chari departments (population about 1,534,000 in 1976). More than 80 percent of the population is "rural" while perhaps half of the urban inhabitants grow a large percentage of their own food.[3/] In addition, the overwhelmingly rural department of Margui-Wandala (Mandara Mountains) with its 496,000 inhabitants, will benefit from sorghum/millet research as well as the four plains departments.

3/ The Cameroonian census definition of "urban" is very broad and tends to include many large villages in what we would classify as rural districts.

b. Social Structure

Perhaps half of the plains dwellers are Fulani or Boulbe. They were, in the 17th and 18th centuries, cattle-owning semi-namads who imposed a hierarchical form of government in the Maroua, Garoua and Adamaoua regions as a result of the great jihad at the beginning of the nineteenth century. Cameroonian Fulani are organized into 21 lamindats. The Lamido (chief) still has considerable influence in local government and particularly in the use and allocation of land and in the implementation of agricultural production programs.

At present, about 80 percent of the Fulani are sedentary and live by agriculture and cattle-raising. They often live in towns, and wealthier prominent Fulani prefer to hire laborers to farm their fields rather than do the work themselves. This is particularly true in the case of Fulani women who have inherited land under Islamic law. About 14 percent of the Fulani engage in a variety of occupations in the towns, particularly commerce. The semi-nomadic M'Bororo herdsmen speak a Fulfoulde dialect, but most Fulani do not consider them as true Fulani. Many Kirdi have adopted nomadic Fulani dress, customs and the Islamic religion. They are considered Fulani by assimilation. We do not have data on the degree to which "assimilated" Fulani cultivate their own lands.

Tribes along the Chadian border, including the Massa and Toupouri have avoided being submerged by the Fulani hegemony, although sometimes they have picked up the forms of Fulani social organization. These groups live in dispersed settlements and live by agriculture, livestock and fishing. Some of them have taken to modern agricultural technologies very rapidly.

The Mafa live in the Mandara Mountains and sometimes spill over into the nearby plains. The real social units are the individual hills covered with scattered dwellings and, for the most part, the individual household manages its own affairs. Some parts of the Mafa country may have population densities of up to 245 people per square kilometer, which strains the capacity of the rocky, steep hillsides to provide subsistence to the inhabitants. Usually the youngest son farms with his father and inherits the land and the older sons must go elsewhere.

c. Cropping Systems and Allocation of Agricultural Work

The most common crops of the plains are millet and sorghum (both rainy season and transplanted) which are sometimes supplemented by maize or rice. The northerners grow rice primarily as a cash crop. Peanuts may be eaten or raised for cash. They occasionally raise cassava, yam and sweet potatoes

but these crops do less well in the North than in the South. They grow cotton as their main cash crop and eat fish from the rivers and Lake Chad. Beef is seldom eaten by the Fulani; they prefer to make money by selling the milk and will very rarely sacrifice a healthy animal for meat.

Most inhabitants of the central plains practice a shifting, extensive agriculture. They do not appear to have developed sophisticated intercropping systems similar to Hausa Nigeria. In some areas, cotton rotates with sorghum on heavy soils and on sandy soils cotton may be followed by sorghum interplanted with peanut before prolonged fallow. Transplanted sorghums are grown in the clayey lowlands, without rotation or interplanting. In the Mandara, the Mafa use a complex system of mulching and intercropping to grow sorghum/millet and other crops on terraces. Even when the Mafa move to the plains, their cropping systems remain intensive.

Fulani men, if they can afford it, prefer to hire laborers to cultivate the fields. Fulan women work their own "kitchen gardens." In times of extreme labor shortage in the cropping cycle, Fulani women will work in their husband's fields, particularly if he does not have a high standing in the Fulani hierarchy. They prefer to trade or process food, rather than grow it. Non-Fulani men and women plow, plant, weed and harvest - the division of labor being based upon whether the man or woman owns (or has usage rights) to the field. Women also grow peanuts and most other minor crops as well as sorghum/millet to meet household needs. Toupouri women receive two plots of their own land after marriage in addition to usufruct of other land allocated by their husbands. Mafa women help men cultivate sorghum and at the same time have their own fields of secondary crops (particularly peanuts.

The short rainy season places heavy demands on agricultural labor in order to grow sufficient food for subsistence. All members of the family must pitch in and work at these times, and the boundaries of traditional roles may be ignored in times of acute labor shortages.

d. Factors Affecting the Spread of Innovation

There are several factors behind the common judgment that "the peasant is very conservative and won't change his methods." The northern farmers live too close to the edge of subsistence to take unnecessary risks unless the change assures a maximization of production for the entire cropping operation. Shortages of labor at key points of growing season may prevent a farmer from adapting recommended planting/weeding dates. Subsistence farmers consider food for their families more important than cash crop production, but Cameroonian extension efforts have favored cash crops. Finally, working the land oneself is not a prestigious occupation for a Fulani.

We think the "conservative peasant" cliche is overstated. Many will accept changed technologies when given the chance. Examples of innovation are:

- The Mandara terracing systems;
- The production of onions and other truck crops in Diamare;
- The rapid change into double-cropped irrigated transplated rice cultivation in the SEMRY project; and
- The introduction of cotton and peanuts.

We expect, however, that the rate of change will not be very rapid in the North because of the risks of crop failure and low literacy rates.

People like localized varieties of sorghum (usually white). Strong local taste preferences must be considered when developing sorghum varieties (Red seeded IRAT 55 is not acceptable in some areas). In addition, sorghum stalks have many uses and a very short sorghum may not be accepted. On the other hand, if it isn't sorghum or millet, children, in particular, seem to accept anything that makes a gray white gruel. (Under the World Food Program, they eat millet, sorghum, maize and wheat soy blend). Consequently, if a high-yielding white maize can be found, it will probably be accepted rapidly.

The traditional roles of men and women do not appear to limit agricultural innovation of and by themselves, but both sexes should be trained by extension personnel. However, the lack of traditional and modern organizations extending beyond near relatives among the northern women will probably mean the diffusion of innovation will be slow, since the extension worker will reach fewer people by indirect means. We have found little concrete information on the role of Fulani women in crop production. We think, however, that the success of innovations in the "kitchen garden field" will require Fulfulde-speaking female extension personnel.

Socio-economic testing of agricultural research results is absolutely essential. The recommended varieties and practices must appear to possess a clear superiority in terms of yield and maximizing "profitability" as well as minimizing risks. The farmer must be able to see the results. Inputs, when required, must be readily available and inexpensive, and the labor requirements must be manageable so as not to conflict with the peak demands of other crops.

2. The Highlands

a. Population

The Cameroon highlands are densely populated agricultural districts, where the rural population sometimes reaches 290 people per square kilometer. Northwestern and Western provinces have about 2,016,000 people. The largest group in the highlands is the Bamileke. The Tikar of the Bamenda area make up perhaps a quarter, and the Widekum group represents about a tenth of the population. The rural population density is low among the Bamoun (who are highly urbanized).

b. Tribal Structure

The typical structure of the Bamileke and other highland tribes consists of numerous chiefdoms with powerful ruling chiefs and associations that play an important political and social role. The Fon (chief) grants cultivation rights to male heads of families. Land can pass from one generation to another, but it goes to only one chosen successor. The other sons have to go elsewhere or rely on special allocations of land from the Fon. These factors have contributed to social tensions and provide the impetus behind the Bamileke enterprises and migration to the cities.

Women inherit directly both personal property and land usage rights from their matrikin, and female inheritors have the right to a portion of the bride-wealth payments for certain females in the matrilineage. Thus, a women did not have to depend exclusively on her husband for land to provide sufficient food for her household.

c. Cropping Patterns

Farms are small. In the Western Province, the average family of seven (three working adults) farms 1.3 hectares of assorted annual and perennial crops on land which may slope 25 percent. Every are of arable land becomes a corn, coffee or vegetable patch. The system incorporates numerous shrubs, trees, cereals and root crops all grown on the same ridge. Mulching, split ridging and many types of crops all contribute to erosion control and maintenance of soil fertility.

d. Agricultural Roles

Women are generally responsible for almost all the food production and may spend up to 190 days of work a year on agriculture alone. They often encroach upon coffee trees planted by men to plant their own annual crops.

The female administrative societies of many highland tribes were used to organize cooperative work in the fields, and the corn mill societies in the 1950's served as the nucleus of cooperatives and community development

programs in the Northwest. Women often sell substantial quantities (35 to 40 percent) of food crops and exercise considerable control over the use of the proceeds. Many women have developed large-scale food trading businesses, but much of the Douala food trade is run by male wholesalers.

Men raise bananas, plantains and coffee, as well as build houses and repair fences. Rice cultivation, done primarily by men, is spreading rather rapidly where suitable land is available. Up to 60 percent of production reaches commercial markets. The recent turning of the "terms of trade" in favor of food crops and away from Arabica coffee has meant that men have begun to produce other foodcrops, including maize for market. The recently announced cocoa and coffee price increase to producers may turn male farmers back to tree crops again.

e. Consequences for Agricultural Research and Extension

The most important factor is the overwhelming importance of women in food crop production. We are reasonably certain that male extension agents speaking to men about improved practices and varieties for women's crops does result in some loss of information in transmission before it reaches the female producer. Consequently, the most effective maize testing demonstration programs will probably be women working with other women in cooperatives, community development, or even through informal work groups or traditional associations. It would be an advantage to have one female member of the Contract Team hold the crop agronomist, extension agronomy or economist positions. At least one Cameroonian female extension agronomist should be recruited for the Bambui research station to supervise the field trial demonstration programs well before the end of Phase I. Extension personnel for women's crops should be predominantly female, but outside of community development programs they are the exception rather than the rule.

Traditional organizations, such as the Mansu society of superior female farmers among the Bamileke, the cooperatives, and development societies could be an important conduit of information on both crops and can facilitate implementation of field trial and demonstration programs. Since the traditional role of the chief and queen mother includes responsibility for overseeing and supervising agricultural production, enlisting the support of the local Fon and the Mafo in the field testing and demonstration program should accelerate the transfer of the recommended practices.

The local habit of eating corn "green" on the cob instead of drying it, will, as maize consumption increases, improve nutrition and reduce protein deficiencies among children, especially if high lysine genes are bred into the recommended varieties.

The highlands are in the midst of an agricultural revolution. The adoption and adaptation of innovative agronomic practices and new varieties and crops should be very rapid. Since the farmers have sophisticated reactions to price changes, it is important that the advanced field tests and demonstrations in the highlands include micro-economic analysis before the particular package is "recommended" and extended on a widespread scale.

3. The Lowlands Forest Zone

a. Population

There are many different ethnic groups living in Center South and Eastern Provinces. Most have similarities in social and work organization. Eastern Province has a small, sparse and very poor population (366,000 inhabitants, 291,000 of whom live in "rural" areas). Center South Province, including Yaounde, has more than 1,497,000 inhabitants and 994,000 live in rural districts. It has some wealthy, densely populated cocoa regions, as well as very poor rural areas. Littoral Province includes Douala, and only 233,000 out of 935,000 inhabitants are considered as rural residents. About 420,000 of the 621,000 inhabitants of Southwestern Province live in the rural districts. For the purpose of this project, we are most concerned with Center South and Eastern Provinces.

b. Social Structure

A number of ethnic groups collectively known as Pahouin live in Center South and Eastern Provinces. Other forest tribes in these provinces, and in Southwestern and Littoral Provinces, have similar social structures. These people are patriarchal, live in very small hamlets of 5 to 20 houses, often along a road, and are closely affiliated in the lineage group. There is less political and social cohesion than in the highlands. Until quite recently, most members of these groups were hunters and gatherers, rather than sedentary agriculturalists. Age groupings still tend to limit the activities to which each member of the lineage group is entitled. Adult manhood is reached only in marriage and the high brideprice of today, paid mostly in cash, delays marriage. Introduction of cash crops has weakened the principle of inalienable lineage holdings of land. Women are dependent on either husbands or fathers for allocation of land to grow food crops.

The "work team" is based on the traditional "machete" group, whereby several families cooperate in land clearing, cash crop plantation rehabilitation or other tasks. The teams have six to ten members and may be organized on the basis of age, sex, strength, friendship, proximity or family.

c. Farming Systems

In much of Eastern Province, the average annually cultivated area is about two hectares per family with three active adult workers. The family uses a much larger area over time because of the requirements of shifting cultivation. Food crop fields may be three to six kilometers away from the village, whereas perennial crops and firewood is closer. The limiting factor of food crop acreage is the family's ability to clear land.

Among the forest tribes, there is a sharp division of labor between the sexes. Men are responsible for cocoa and coffee production (although women work as laborers on those crops). Men clear away the forest for the main food crop fields where women grow a mixture of interplanted crops including manioc (the overwhelming food staple), cocoyams and plantains. In addition, the men traditionally cut the poles and build yam storage huts, while women work on the yam field. Employment in the cities, lumbering, and tree crop production have drawn many men away from land-clearing and yam-staking.

Growing food crops is still a rather demeaning activity for a man, although this attitude changes when the possibility of marketing specialty crops for the urban market is perceived. Rice was grown by men under forced labor while the original Douala-Yaounde railroad was under construction. It has not been a popular crop since then, but has recently shown signs of revival. Because young men are not permitted by tribal law to have cocoa and coffee plantations, food crop cultivation for the urban market may generate considerable employment and income.

Women are primarily responsible for feeding and clothing their children. Consequently, they grow most food crops. In addition to their main fields, they have a "peanut field" (named according to the season in which it is planted). This field includes manioc, maize, gumbo, pepper, green vegetables and plantains. Often women form workgroups and do all the work themselves, including clearing the bush from the field which had been fallow. In some areas, they also grow minor crops such as sweet potatores, greens, and very early corn under irrigation for the urban market. Women have gone increasingly into food trading over the past two decades.

d. Implications for the Adoption of New Technologies

In sociological theory, the segmentation of social organization among the forest people should facilitate rapid modernization, but we think changes in agricultural technology probably will not occur as rapidly as in the highlands because of physical distances and small size of the hamlets. Despite the spread of the tree crops before and after World War II and the recent shift toward food crop production for sale,[4/] the small size of the

4/ In the 1950's, only two percent of the family cash income came from agricultural products other than cocoa in the Lekie area northwest of Yaounde. Now 40 percent comes from food crops.

settlements will hinder change in the less populated regions. Many places lack adequate road and transportation networks. The forest groups do not have the traditional drive towards commerce and marketing typical of the highland groups.

The Testing and Liaison Unit activities must specifically address the fact that women are primarily responsible for growing food crops. Provision should be made so that women supervise at least some of the field tests. It will be more difficult to find women with high levels of education to work with theprogram in the forest than in the highlands, but serious efforts should be made to have at least one Cameroonian woman as an extension agronomy officer in the forest zone.

The ZAPI-Est program has been quite successful in using teams of extension agents consisting of one woman and one man to cover the same district. The problem of protein deficiency is particularly acute in the forest region and the female extension agent has a better chance to teach some rudimentary child nutrition, including substituting maize for some of the manioc in the diet. Consequently, the varieties recommended in the forest zone must clearly demonstrate much higher yields in order to compete with manioc. Maize varieties high in lysine should be tested because of high levels of an essential amino acid, thus improving nutrition.

A deliberate effort should be made to encourage the allocation of land to young men for market crop production as a part of rural development programs and thus reduce unemployment among unmarried men. The development of appropriate, effective and cheap hand tools may further reduce the stigma of food crop production.

If suitable high-yielding production packages were available for rice and the farmer obtained sufficient return for labor and land-clearing costs, it would become an attractive crop. Under the ZAPI-Est program, Dutch volunteers have experimented with cooperative workgroups engaged in rice production and have met with better than average success in the pilot activities. A serious effort should be made to use innovative leaders as key individuals in the formation of workgroups and in extending recommended practices in test demonstrations.

Given the problems in land-clearing and labor constraints, potential rice and maize agronomic and varietal recommendations should be tested regarding the micro-economic aspects of the farm enterprise as well as trade-offs with tree crop production.

C. Technical Analysis

1. The Need for Basic and Applied Research

During the past two decades, progress has been made in the development of a global agricultural research system which can support national research programs. Since per capita food production in most LDC's is either stable

(as in Cameroon) or declining, there is evidence that the system is not working as it should. James Johnston of the Rockefeller Foundation has listed the components of the global system as follows:

Basic research is conducted to increase man's knowledge and, thus, does not need to justify itself in relation to productive processes.

Supportive basic research holds some promise of contributing ultimately to some identified need (e.g. nitrogen fixation).

Applied research of a strategic nature consists of biological, chemical, physical or social science research aimed at solving problems affecting large areas or regions. The international agricultural research centers such as CIMMYT, IRRI and IITA execute this type of research. Much of the resultant technology must be tested and further adopted before it can be transferred to the farmer.

Applied research of a tactical nature develops technology which can be used directly by farmers. It is supported by strategic research which develops improved varieties for further adoption. It requires an intimate knowledge of farm conditions and markets. The technology cannot be considered ready for release until it has been thoroughly tested on an adequate sample of farms under farmer management. This is the point where the system breaks down, particularly since experiments are conducted on economically important crops with little understanding of how the farmer would use the results.

Operational research concerns the integration of technology pertaining to various crops (and animals) into system adapted to the local farm situation. The research efforts are fully effective only when the recommended practices are integrated into a manageable and profitable system for the farmer. It is still, according to Johnston, the researcher's responsibility but must be carried out in cooperation with the extension agents, who often lack sufficient skills and training to extend the technology.

The National Cereals Research and Extension Project concentrates upon applied research of a tactical nature at the four research stations and, for the extension liaison unit, an operational research. Maize and rice have benefited greatly from advances in applied strategic research, but Cameroon has not yet profited from the full extent of research done to date. Although less research has been done on sorghum, Cameroon can still benefit from research done in Africa and elsewhere.

2. Ecology, Climate and Needs for Applied Tactical Research in Maize, Rice and Sorghum/Millet in Cameroon

Each ecological zone in Cameroon has different problems which limit the maize and rice yields and which determine the direction of research. While Cameroon's maize yield was 92 percent of the average yield in Africa in

1961-65 and had increased 20 percent by 1975-76, Cameroon has better soils and climatic conditions than many African countries and is not taking advantage of it due to lack of applied tactical and operational research.

One of the major objectives of the research program should be breeding in resistance to pests and diseases as well as developing agronomic packages which maximize yields without requiring the heavy fertilizer and pesticide inputs which the small farmer often cannot obtain or afford.

a. Semi-Arid Lowlands (less than 1,000 mm of rainfall).

Almost all of the precipitation occurs during three or four months of the year. The lowlands grade into a true sahelian climate in the northern reaches and in the Mandara Mountains to the west. In some areas the soils do not have sufficient moisture for consistent successful maize cultivation. The soils are neutral or slightly acid and tend to be shallow and sometimes sandy on the uplands. Alluvial deposits have left pockets of silt, loam and clay which are more fertile and drought-resistant than upland soils.

The subsistence crops of the region are sorghums and millet. Relatively little maize is produced in the area. Rice has become an important cash crop in the Yagoua area under SEMRY. Rain-fed rice is grown where soil and water conditions permit.

Unimproved maize yields vary between 400 to 800 kg/ha. The North Cameroon Resource Survey stated that a moderate level of improved agronomic technology should lead to yields of 2,200-2,800 kg/ha. on favorable soils under farm conditions. The major cereals project of AID determined that the yield potential of newly developed maize composites in the guinea savanna was far higher than expected. When recommended practices are used, the yields reached more than 9,500 kg/ha. in experimental fields and 5,000 kg/ha. in farmers' fields. In this paper, USAID/Y uses 2,000 kg/ha. as a reasonable estimate of maize yields (with limited fertilizer, proper cultivation techniques and rotation/implementing) in the Garoua area.

Top priority should be given to developing acceptable short-season, drought-tolerant maize varieties for the North. Most consumers prefer white grained, demi-dent, floury maize varieties. Agronomic research on planting time and moisture considerations is critical for obtaining high yields because of maize's sensitivity to drought during tasselling. Resistance to stem-borer and leaf-diseases such as blight (*Helminthosporium maydis*) and rust (*Puccinia polysora*) should be bred into the maize varieties to maximize yields. To date there have been few problems with *Striga* (witchweed) parasitizing maize in Cameroon. The most suitable varieties presently available for the North

are Sumaru 123, NCA and TZB (the first two were developed under the major cereals project). Upper Volta Early is disease-susceptible. Practically no work has been done on agronomy, pathology and other related disciplines in order to develop a package of acceptable production practices adpated to the local farming systems. Work should also be done on cropping systems to take advantage of residual fertilizers and intercropping with legumes.

Local rice varieties, grown using traditional cultivation practices, yield 800 to 1,500 kg/ha. of paddy. According to the North Cameroon Resources Inventory, rain-fed rice under moderate inputs on clay soils should yield 1,600 to 2,000 kg/ha. of hulled rice, while irrigated rice under moderate inputs should yield 3,000-4,000 kg/ha. of hulled rice. For purposes of this project, we are using 1,600 kg/ha. as the anticipated yield for rain-fed rice under moderate inputs and 2,400 kg/ha. for irrigated rice produced with a higher level of technology.

Rain-fed rice is cultivated in the bottomlands. Since it competes with other wet season crops for labor, particular emphasis should be placed on research regarding planting date, fertilization and weed control. Rice planting must follow other main crops, but it must be harvested earlier. Some research has been done in the North, including work by IRAF personnel who conducted field trials with introduced Brazilian upland varieties such as Danielle. IAC, Batatais and Pratau.

Rice should have high yield and early maturity in the North. Cold tolerance is particularly important for irrigated dry-season rice. The varieties should be resistant to foliar diseases, particularly blast. Insects are not yet a major problem in the North. Seeds used in SEMRY are older IRRI varieties which are not particularly disease-resistant and which have long growing seasons. The SEMRY II project contains applied research directed towards the needs of the project. Almost no work has been done on rice agronomy in northern Cameroon.

Sorghums originated in Africa and species (or subspecies depending on the taxonomist) interbreed easily. Both Caffra and Durra types are found in Cameroon. Wet season sorghum accounts for 60 percent of the area planted in sorghum. There are five major types, some of which are early and some late. Yields vary from 400 to 700 kg/ha. in the Diamare plains around Maroua. Yields are higher in the Garoua area. The transplanted dry-season sorghums (the most common type is called Mouskouri) are grown on about 40 percent of the land in sorghum. The yield of common local Mouskouri may reach 1,500 kg/ha. under favorable conditions.

A relatively limited amount of penicillary millet is interplanted among sorghums, particularly in the Mandara Mountains. Millet acreage is about a tenth of that planted in sorghum.

Most local sorghums are tall (four meters) and prone to lodging. Yields are not particularly responsive to fertilizer. The inflorescence of early-season sorghums are subject to rot from head mold when grown in the guinea savanna. If planted late, these varieties are subject to midge attack and shoot fly. Leaf-diseases are common, as are covered smut, loose smut, and head smut. Striga infestation necessitates intensive weeding and also limits the number of years sorghum can be grown on the same field. Imported varieties are particularly susceptible to striga. Bird damage to ripening grain is heavy. IRAF 55, an improved variety is not suitable for all regions, and its red grains limit its acceptability. Other improved varities do very poorly in farmers' fields.

Research in Cameroon should take advantage of work done under the major cereals project. That project did identify sorghum lines with some resistance to striga, leaf-diseases, shoot fly, and other diseases and pests. The NCRE should also concentrate on agronomic practices, particularly interplanting with grain legumes and experimentation with innoculates to increase fixation of nitrogen in mixed sorghum/legume cropping systems. Since very short-stalked varieties may not be accepted because stalks are used for fences and construction in northern Cameroon, research efforts should concentrate on developing improved sorghums of an intermediate height. Efforts should also take into account consumer taste preferences (e.g. a white grained improved variety). In addition, detailed socio-economic research should be done on including sorghum in farming systems and spreading peak labor requirements more equitably through the growing system.

Millet is very drought-tolerant, gives consistent low yields, and it is susceptible to down mildew, smut and ergot.

The French had financed a field trials officer at Maroua under the major cereals project, and AID trained a sorghum breeder (who is now in charge of IRAF's food crops research). SAFGRAD, the successor project, is designed to develop and strengthen a regional research and testing program for cereals (sorghum, millet and maize), grain legumes (cowpea and peanut) and related systems, as well as training a cadre of agricultural scientists in the Sudanian sahelian zones of Africa. Screening of germplasm will be done at Samaru, Nigeria and Kamboinse Saria, Upper Volta. AID is expected to finance the posting of the Accelerated Crop Production Officer to Maroua under this project. FAC is planning to support varietal trials for sorghum at SEMRY's research station. One objective of the research would be to minimize labor requirements during peak demand periods for rice cultivation.

The proposed IBRD/FAO rural development project for Center North Cameroon includes support of agricultural and forestry research as well as crop production on sorghum, cotton and peanuts, with a lesser emphasis on maize and rice. This project places a very high priority on research in sorghum breeding and agronomy, but will not begin operations for at least a year. The project does not, however, finance agronomists and plant breeders.

b. Mid-Altitude Zones with 1,000 mm or more of Rain (Western Highlands and Adamaoua Plateau).

In the western highlands, crops are grown at altitudes between 1,000 and 2,000 meters, although some bottomlands are only 700 meters above sea level. Crops benefit from the nine-month long rainy season. The area has steep hillsides with soils derived from basalt or gneiss that contain a high amount of organic matter. The soils are moderately to severely susceptible to erosion. Most soils have moderate to high agricultural value. The alluvial bottomlands need drainage and flood protection before they can be used for intensive agriculture.

Almost all arable land in Western Province is under permanent cultivation, even on slopes as steep as 25 percent. The percentage of land in crops is slightly lower in Northwestern Province. In order to limit erosion and maintain fertility, specific agronomic practices must be provided. Maize is the primary foodgrain, while rice has become a major crop in some areas under various development projects in the bottomlands.

The Adamaoua plateau is well-suited to both rice and maize, but relatively little of either crop is grown in this sparsely populated region.

Northwestern and Western Provinces have an excellent potential for increasing maize yeilds due to long, cool growing seasons. Research should concentrate on breeding for high yields in labor-intensive intercropping systems. Since maize is sensitive to altitude, testing must be done at various elevations before varieties are released. The major thrust of pathology research should be to control leaf diseases such as blight (Helminthosporium turcicum) and rust (Puccinia sorghi) and smuts.

Yield trials on imported and locally developed varieties have been carried out at Bambui and Dschang. The best mid-altitude varieties are Green Revolution (a long season hybrid which can yield ten tons ha.); Composite Camerounais d'Altitude (COCA - a long hybrid with a potential yield of nine tons); Bambui composite A (BACOA - early, five tons/ha.); Bambui composite B (slightly later six tons/ha.). These varieties need further testing for yield under farmer management as well as for disease and pest resistance. The germ plasm came from IITA, CIMMYT, East African Agricultural and Forestry Research Organization, IRAF and from research bodies in the U.S.

Research problems should concentrate on finding suitable cold-tolerant rice varieties with resistance to blast and stem borers. Currently used varieties are very susceptible to blast, and almost no work has been done to determine more resistant substitute varieties. The packages of agronomic practices should concentrate on determining proper planting dates and weed control methods. Some Brazilian upland varieties are being tested this growing season at Bambui plain and Babumgo substations of the Bambui research station.

c. Lowland Forest with Moderate Rainfall (Center South and Part of Eastern Provinces) and High Rainfall (Southwestern and Eastern Provinces and the Coastal Strip)

Although these two regions are grouped for discussion purposes, there are significant differences between them requiring extensive field trials to develop recommended agricultural practices for maize and rice.

Maize is one of the most common food crops in this area. Although the lowlands are well-suited to rain-fed rice, relatively little is grown at present, partially because yields are too low to provide a sufficient return to the farmer. The soils in these areas are often rather acidic and heavily leached. The application of heavy doses of fertilizer to plantation crops in some areas of Southwestern Province has increased the acidity.

Maize can be grown during both wet seasons because of the bimodal rainfall pattern. Research should concentrate on high protein maize to increase protein availability in the diet. The research should also take into account that most maize is eaten green as corn on the cob. Ear rot and stalk rot are problems in both rainy seasons. Planting time should be adjusted to reduce the incidence of streak. The major focus of the agronomic work will be to find suitable cropping systems for each growing season and zone which maximizes the return per unit of land to the farmer.

The specific problems of the first rainy season (March-June) are low light reception due to overcast skies and high rainfall. To cope with this, research should be done into the development of maize with upright leaves so that other crops interplanted with maize are not shaded out. During the second rainy season (late August-November), the major breeding objective should be early maturity because the rains will often quit abruptly several weeks earlier than normal, thus reducing yield sharply. Ekona White and Dkona Yellow are the most suitable varieties tested to date for the lowlands but research should be done on disease and pest resistance as well as adaptability into the local farming systems.

Rice blast disease causes severe losses and research should concentrate on breeding resistance into the cultivars. In addition the low yield of most rice varieties in common use do not give an adequate return to the farmer. Breeding activities should thus concentrate on developing high yielding, lodging-resistance varieties acceptable to the local farmers. Increasing rice production also depends on developing a package of practices which gives special attention to soil and water management.

3. Other Food Crops Research

a. Rootcrops

The Canadian Government, with some Belgian support, is financing a root-crops research project on cassava, cocoyam, taro and yams.

b. Legumes

IRAF has one researcher at Dschang who is working on legumes. Progress to date is limited and more should be done, particularly on cowpeas, soybeans, and other edible legumes, as well as the development of suitable agronomic practices and interplanting to improve soil nutrients. There are good varieties of groundnuts available for North Cameroon, which were developed in Nigeria and Senegal. More work is needed on varieties and agronomic practices for the humid areas as well as integration of groundnuts into multiple cropping systems. When conducting the farmer field trials/ demonstrations, intercropping and successive cropping systems for cereals which involve legumes should be used.

c. Soil Science

Cameroon has a number of trained soil scientists and more are currently attending graduate schools. There are three Dutch soil scientists (FAO-financed) attached to the well-equipped soils laboratory at Ekona, which carries out high quality work. The existing FAO-supported pedology programs under IRAF can meet the soils science requirements for NCRE without further input from AID.

D. Administrative Feasibility

1. Government of the United Republic of Cameroon

a. ONAREST and IRAF

The National Office of SCIentific and Technical Research (ONAREST) directs and coordinates all scientific and technical research in Cameroon. It reports to the Ministry of Economic Affairs and Planning. ONAREST was established in 1974 and was reorganized into five institutes in 1976. The Institute of Agricultural and Forestry Research (IRAF) has its headquarters in Buea and its personnel carry out research in the relevant natural science disciplines. A National Program Committee determines the direction of agricultural research. IRAF must borrow agricultural economists and rural sociologists from the Institute of Social Sciences (ISH) on secondment.

IRAF itself is a rather loose conglomeration with relatively little internal coordination. It faces a large number of agro-ecological conditions and must do research on a very large number of crops. It is in the process of transition from an entirely expatriate-operated and directed organization to an institution which is funded and directed by Cameroonians nationals. Often its flexibility is reduced by tight budgets and delayed central government allocations. If increased operational independence were granted to the four major centers of IRAF within a national administrative framework along with guarantees for adequate financial support, the Centers should be able to increase effectiveness in executing agricultural research programs.

IRAF uses a system of budgeting by program. In it the research work is divided into programs, wherein one distinguishes between purely administrative and research personnel, between administrative costs and research recurrent costs under operating expenditures. In the case of equipment, administrative equipment is separated from that necessary for executing research. The system has problems caused by overlapping end-uses. In addition, funds are only made available on an annual basis. Budgetary allocations may cease before completion of a research activity.

b. The Ministry of Agriculture

The Ministry of Agriculture has a complex structure at the national, provincial and district levels. Both the Directorates of Agriculture and of Community Development engage in food crop extension work. These services are not strong and at the local level are hampered by insufficient and inadequately trained personnel and by the lack of a coherent work program as well as the means to implement it. The situation is particularly bad in northern Cameroon.

c. Other Cameroonian Entities Engaged in Extension

A number of parastatal organizations, such as SODECOTON, SEMRY, the cooperative federations and private voluntary organizations are engaged in agricultural extension work with varying degrees of success (see Annex I for more information).

2. U.S. Government-AID

We propose that competitive procurement be used to select a Title XII institution for an institutional contract. The Title XII institution would be expected to collaborate with the International Institute of Tropical Agriculture (and the International Crops Research Institute for the Semi-Arid Tropics in the case of sorghum) in implementing the project. The request for proposal will be so drawn up that a major basis for awarding the contract will be the way the contractor makes the best use of IITA's research and backstopping capability in farming systems maize, and rice research, and training.

IITA is located in a region with conditions similar to many regions found in Cameroon. Its objective is to conduct research on food crop production in the humid and subhumid tropics. IITA's major research programs are farming systems, cereals improvement, grain legume improvement, and tuber and root-crop improvement. IITA has backstopping capability in the scientific and socio-economic disciplines relevant to tropical agriculture. It has training programs in applied research and crop production and can give them in French, if necessary. It can supervise Ph.D. dissertation field work in collaboration with American and/or Nigerian universities. IITA personnel worked with IRAF technicians in preparing the technical project proposal and the analysis upon which this Project Paper is based.

ICRISAT is the international agricultural research institute for the semi-arid tropics, and its headquarters is in Hyderabad, India. It specializes in sorghums, millets, grain legumes and cropping systems of the semi-arid tropics. ICRISAT is doing considerable agricultural research on the problems of the Sahel. It is a major contractor under the SAFGRAD project, particularly on sorghum, millet and peanuts.

3. Solutions to Organizational Issues

a. Where will the AID-financed technicians work and to whom will they report?

The NCRE personnel will work in several different parts of IRAF. The Cameroonian Coordinator of the project is the Senior Maize Breeder posted at Bambui. Bambui should be the headquarters of the project and is in the major maize-growing region. The Coordinator reports to the Director of the Center for Food and Fruit Research at Njombe, who in turn reports to the Director of IRAF in Buea. The Rice Breeder and Agronomist at Dschang will report to the Coordinator at Bambui. The Sorghum and Maize Agronomists at Maroua report to the Coordinator at Bambui, but they work at the Center for Food and Textile Research (and thus will report to its director when working on non-NCRE activities).

The Extension Agronomist heading the Testing and Liaison Unit will be located in Buea. He reports to the Director of IRAF itself. Since the TLU approach concentrates upon operational research from the farmer's point of view and the TLU will eventually work on all crops, it should function as a staff office reporting to IRAF's Director. However, for purposes of the NCRE, the Extension Agronomist counterpart is the Cameroonian Coordinator. We expect that the Extension Agronomist will be the Chief of Party for the contract. (See Tables I & II of Annex K for further information).

b. How should the Field Trial Program be Administered? (See Annex I and Section II of Project Papers)

IRAF's mandate does not cover extension activities although it does cover operational research. The key to the success of the field trial program will be careful design (by TLU) and training and supervision of the extension assistants from other agencies who work with participating farmers in carrying out the tests. The Ministry of Agriculture's Extension Service

does not have close ties with ONAREST. As outlined in Section II above, there are at least four or five parastatal organizations engaged in extension activities in each ecological zone, some of which implement extension programs in rural development projects. IRAF should make arrangements with a number of those organizations to supervise the field trial demonstrations and formalize this in letters of understanding. It is not necessary that all of these organizations participate, but two or three per ecological zone should do so in order to have an adequate number of tests.

c. How can AID best administer this program?

Transportation links are good between Buea, Ekona, Njombe, Dschang and Bambui stations (which are all within six hours or less from one another). All commodities will come through Douala, about 70 km from Buea. Links with Yaounde are more difficult. Commercial air service connects Douala with Maroua. We propose that the Contract have an Administrative Officer, who would be based in Buea to handle routine project logistic and implementation matters.

d. Construction

The GURC has obtained land at Njombe for conducting the trials. We are requesting the plans and specifications. A 611(a) certification will be prepared and attached to this paper.

E. Environmental Concerns

The NCRE project will have a minimal primary impact on the environment. Much of the research undertaken concerns assisting farmers to raise improved varieties and increase yields without resorting to heavy fertilizer and other chemical inputs. An Initial Environmental Examination is included as Annex E.

IV. FINANCIAL ANALYSIS

The total cost of Phase I of the NCRE (FY 1979-83) is $14,313,000. The AID-funded portion of foreign exchange and local expenditures under Phase I amounts to $7,697,000 of the total.

The resources of the GURC and AID devoted to attaining output 1, a fully staffed and trained Cameroonian research capability, amount to $1,852,200 of which $1,360,800 is AID-financed. Output 2, development and implementation of corn, rice and sorghum research programs, including tests on farmers' fields, amounts to $3,675,300 of which AID will provide $2,718,700. Output 3 concerns the establishment of the Testing and Liaison unit and its costs in Phase I are met by AID and amount to $1,786,900. Output 4, the coordination of research programs and exchange of information, is again an AID-financed input of $562,600. Output 5, adequate physical facilities and equipment for research, requires $6,436,000 of which AID will finance $1,268,000. This item represents, inter alia, the value of the existing lands, buildings and equipment used in the project.

The GURC contributions include salaries of all Cameroonians working on cereals research programs. They will also meet electricity and fuel costs for the research stations and provide most of the lands and buildings used by the project.

AID funds will finance, in the first phase of the project, 32-1/2 years of long-term technicians' services and 32 workmonths of short-term consultant services under the institutional contracts, as well as six months of services for evaluations. The total personnel and travel and transportation costs are $4,140,000 without allowing for inflation. This includes residential furnishings and equipment, rent, utilities, maintenance costs, travel and transportation and contract overhead costs; calculated at a rate of $9,500 per man-month for long-term personnel and $11,500 per man-month for short-term personnel.

In Phase I, AID will finance two participants for the M.Sc. and Ph.D. and nine others for M.Sc. at a total cost of $348,000 in Phase I. AID may finance third-country B.Sc.-level training for three participants as well as short-term training for 33 participants in third countries. ($132,800).

AID will finance capital costs including vehicles, field equipment and parts, two laboratory/office buildings and two field sheds for a total of $737,000. AID will also pay for the local costs of extension trial operations ($120,000). AID will finance POL for the four-wheel-drive vehicles used for farmers' field trials. The total pre-inflation cost of AID's contribution is $5,580,000. The inflation factor adds $1,558,000, calculated at a rate of 10% per annum compounded yearly and a contingency factor of 10% adds $558,700 for a total of $7,697,000. See Annex F for additional details.

TABLE I

PROJECTION OF EXPENDITURES BY FISCAL YEAR
($000)

	1979	1980	1981	1982	1983	1984	Total
Technical Assistance:							
Long Term	-	798.0	912.0	912.0	627.0	456.0	3705.0
Short Term*	34.5	103.5	23.0	103.5	69.0	103.5	437.0
Total Technical Assistance	34.5	901.5	935.0	1015.5	696.0	559.5	4142.0
Capital Assets:							
Vehicles and Spare Parts	35.8	107.2	8.0	17.0	17.0	16.0	201.0
Field Equipment and Parts	56.3	168.7	7.0	10.0	10.0	10.0	262.0
Lab Equipment	15.8	47.2	1.5	3.1	3.2	3.2	74.0
Buildings, Office and Lab	35.0	105.0	-	-	-	-	140.0
Buildings - Storage	15.0	45.0	-	-	-	-	60.0
Total Capital Assets	157.9	473.1	16.5	30.1	30.2	29.2	737.0
Participant Training Costs							
United States (Long-Term)	45.6	85.2	85.2	79.2	52.8	-	348.0
Third Country	24.6	31.3	38.3	19.3	19.3	-	132.8
Total Participant Training	70.2	116.5	123.5	98.5	72.1	-	480.8
Other Costs:							
Vehicle Support	8.5	18.5	18.5	18.5	18.5	18.5	101.0
Extension Trials Operations	3.8	16.2	21.3	26.2	30.0	22.5	120.0
Total Other Costs	12.3	34.7	39.8	44.7	48.5	41.0	221.0
Subtotal	274.9	1525.8	1114.8	1188.8	846.8	629.7	5580.8
Contingency	27.5	152.6	111.5	118.9	84.7	63.0	558.2
Inflation	-	152.6	234.1	393.6	393.1	384.6	1558.0
Total Project Costs	302.4	1831.0	1460.4	1701.3	1324.6	1077.3	7697.0

*Includes six work months for evaluations in FY 1981 and in FY 1983, $30,000 each.

TABLE II

COSTING OF PROJECT INPUTS/OUTPUTS
($000)

PROJECT INPUTS	PROJECT OUTPUTS #1	#2	#3	#4	#5	Total
AID Appropriated:						
Technical Assistance	481.7	1883.5	1126.4	389.4	261.0	4142.0
Capital Assets	12.0	42.3	22.1	9.2	651.4	737.0
Participant Training	480.8	-	-	-	-	480.8
Other Costs	11.7	46.0	147.4	9.5	6.4	221.0
Contingency	98.8	197.0	129.5	40.8	92.1	558.2
Inflation	275.8	549.9	361.5	113.7	257.1	1558.0
Total AID Appropriated	1360.8	2718.7	1786.9	562.6	1268.0	7697.0
GURC Inputs:						
Personnel	453.2	690.2	-	-	-	1143.4
Capital Assets	-	-	-	-	4766.1	4766.1
Other Costs	-	192.0	-	-	-	192.0
Inflation	38.2	74.4	-	-	401.9	514.5
Total GURC Inputs	491.4	956.6	-	-	5168.0	6616.0
Total Project Costs	1852.2	3675.3	1786.9	562.6	6436.0	14,313.0

TABLE III

Summary of Cameroon Expenditures
For 6-Year Period Beginning FY 1979

($000)

	1979	1980	1981	1982	1983	1984	Total
Personnel Costs:	136.4	142.8	182.6	200.6	233.0	248.0	1143.4
Capital Assets:							
Land, Bambui (70 HA)	1428.6	-	-	-	-	-	1428.6
Land, Maroua (50 HA)	1000.0	-	-	-	-	-	1000.0
Land, Ekona/Njombe (70 HA)	1400.0	-	-	-	-	-	1400.0
Land, Yaounde (10 HA)	400.0	-	-	-	-	-	400.0
Buildings, Type A	81.6	-	-	82.0	82.0	-	245.6
Buildings, 1 Office	40.8	-	-	-	-	-	40.8
Buildings, 1 Guest House	12.0	-	-	-	-	-	12.0
Vehicles, Bambui and upkeep	188.6	-	-	-	-	-	188.6
Vehicles, Maroua and upkeep	10.0	-	-	-	-	-	10.0
Vehicles, Ekona/Njombe and upkeep	40.5	-	-	-	-	-	40.5
Total Capital Assets	4602.1	-	-	82.0	82.0	-	4766.1
Other Costs:							
Fuel and Utilities for Stations	8.0	15.0	25.0	30.0	35.0	35.0	148.0
Local Supplies and Chemicals	3.0	5.0	7.0	9.0	10.0	10.0	44.0
Total Other Costs	11.0	20.0	32.0	39.0	45.0	45.0	192.0
Total Costs Before Inflation	4749.5	162.8	214.6	321.6	360.0	293.0	6101.5
Inflation Factor	-	16.4	45.2	106.6	167.3	179.0	514.5
Total GURC Contribution	4749.5	179.2	259.8	428.2	527.3	472.0	6616.0

TABLE IV

SUMMARY COST ESTIMATE AND FINANCIAL PLAN
($000)

	USAID		GURC		
	FX	LC	FX	LC	Total
Technical Assistance	3531.5	610.5	-	1143.4	5285.4
Capital Assets	322.8	414.2	-	4766.1	5503.1
Participant Training	348.0	132.8	-	-	480.8
Other Costs	-	221.0	-	192.0	413.0
Contingency	420.3	137.9	-	-	558.2
Inflation	1173.2	384.8	-	514.5	2072.5
Total	5795.8	1901.2	-	6616.0	14,313.0

Table V. GURC Increase in Annual Recurring Costs
(U.S. $ 000)

	From 1979-1983	After USAID Withdrawal
Personnel @	-	-
Vehicles & Field Equipment Operating Costs	-	120.0*
Lab Equipment - Operating Costs	-	24.0*
Buildings - Operating Costs	27.0	36.0
Supplies & Chemicals	7.0	10.0
	34.0	190.0

@ Assumes all personnel on-board or budgeted for employment by IRAF.

* Includes depreciation which is not a cash expense, but is budgeted to provide for replacement of vehicles & equipment.

Annual recurring costs to the GURC will have increased by $34,000 in 1983, as a direct result of this project. As can be seen in the table, these increases may be attributed to the operating costs of buildings constructed for the project, and other costs of expanded project activities. This increase represents only 0.5% of total GURC project costs. However, after USAID withdrawal, GURC will take over support and replacement costs of all project vehicles and equipment, resulting in an increase in annual recurring costs of $190,000 per year; or 2.9% of total GURC project costs.

V. EVALUATION

A. Annual Evaluations

A routine evaluation, PES I and II, will be done in January 1981 using the annual reports of the contractor, other documentation, and site visits to determine if the project is keeping its schedule and progress is made towards reaching the output targets as well as identifying implementation problems. Thereafter PES I and II should be completed every 15-18 months unless a major evaluation takes precedence. The GURC contract personnel and outside consultants, as necessary, will participate in these evaluations.

B. In-Depth Evaluations

In early 1982, at harvest time during the second cropping season of the project, an in-depth evaluation of the project should be held. It should be conducted by USAID, outside personnel, as necessary, and GURC personnel. Evaluations should focus on the quantity and quality of corn research, rice, millet and sorghum, particularly the effectiveness of the administration and techniques of field trial demonstration programs. The evaluation team must visit the research stations and farmer field test sites as appropriate. The comprehensive evaluations should also specifically include a brief survey of related food crop protection and production programs and consider whether the project should do research on other crops. These evaluations should result in recommendations on whether or not to devote considerable additional resources to improving the Yaounde IRAF station's food crop research capability. The evaluators will also analyze the effectiveness of the project in contributing to sector goal objectives.

The 1983 comprehensive evaluation should differ in that its main purpose would be to make detailed recommendations for assistance under Phase II of the project. The evaluation team should again visit some of the same villages participating in the earlier field test demonstration programs. It should also attempt to measure the progress made in institutionalizing cereals research capability.

C. Ex-Post Facto Evaluations

A project evaluation of a research institution should be done about three to five years after the end of the project, the purpose being to determine the degree to which the improved varieties and agronomic techniques have spread. This evaluation should include villages with a history of participating in the field trial demonstration program, and also villages which did not participate in the program.

VI. IMPLEMENTATION PLAN

A. Contractor

The Request for Proposals will be so drawn up that a basis for awarding the contract will be the way the contractor makes use of IITA's on-going research and backstopping capability in small-scale farming systems in the humid tropics, maize and rice research, and practical training in agricultural research. The contractor shall use a similar collaborative approach with ICRASAT for sorghum research and related systems.

B. AID

USAID's role will be primarily that of project monitor and evaluator. USAID will designate a project manager, who will be responsible for approving the annual work plans of the contractor. USAID will initiate procurement of project vehicles, appliances and furniture for the long-term contract personnel, and the laboratory equipment (in consultation with the contractor). USAID will also coordinate construction with IRAF, public works and a local architectural and engineering firm. Construction inspections will also be performed by the USAID engineer.

C. Cameroonian Government

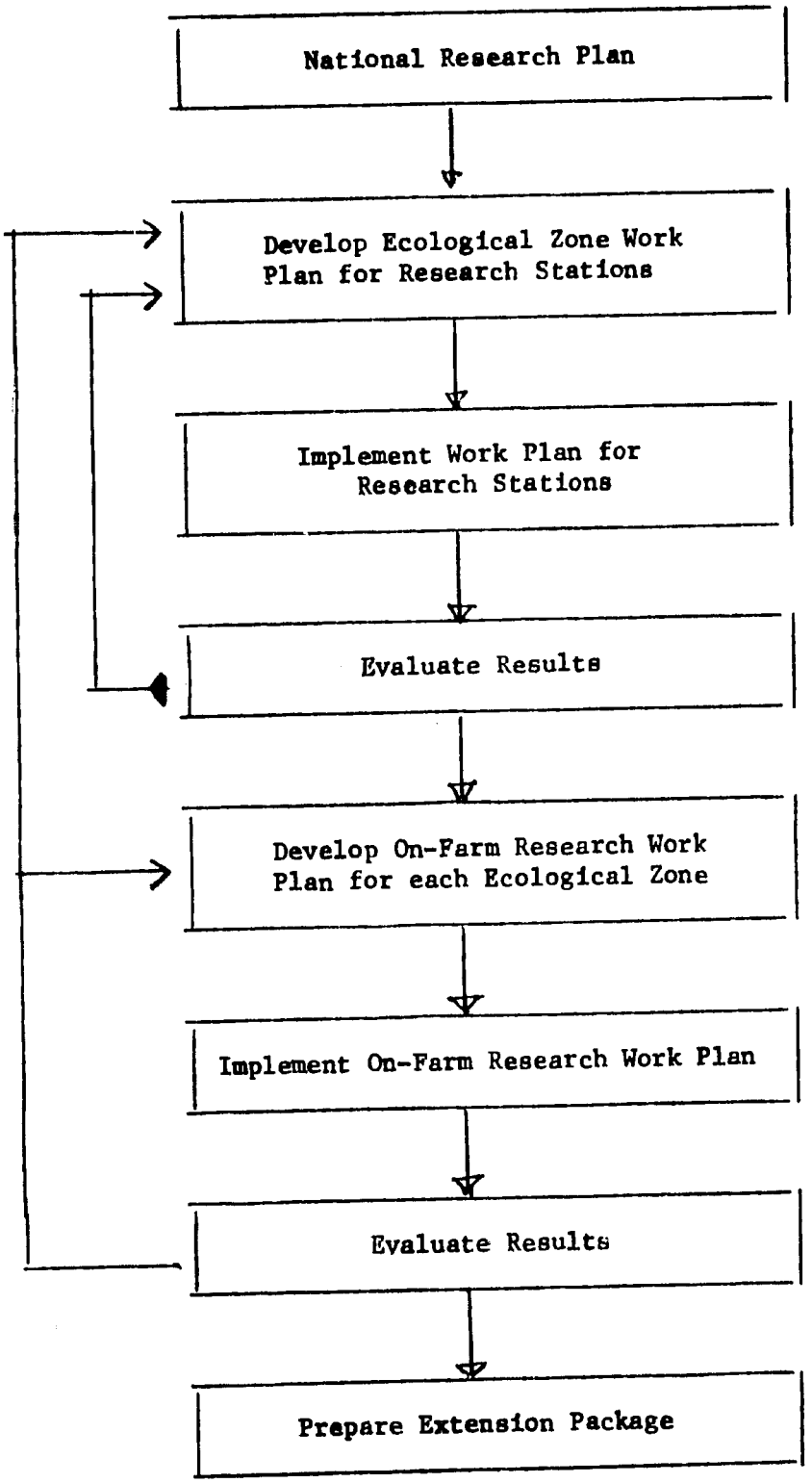
ONAREST will be the GURC's executing agency. The major administrative unit for project implementation will be IRAF (Agricultural and Forestry Research Institution). The request for assistance can be found in Annex C.

This project paper has been discussed with ONAREST and reviewed in detail by IRAF. It was prepared on the basis of a joint IRAF-IITA proposal. IRAF personnel prepared the technical paper which is the basis for the technical information and approach to research problems used in the project paper. The general design of the project has been discussed with the Ministry of Plan.

D. Research Program Implementation

The following chart, see below, gives a schematic outline of steps taken in implementing the research and testing program. In practice, the on-station work and the field trial/demonstration program will run simultaneously.

RESEARCH PROGRAM IMPLEMENTATION



The annual cropping year program for research station and farmer field trials follows (planting and harvest dates are rough estimates):

1. 1 - 31 January: Plan detailed research experiments for stations and field trials for each ecological zone and crop (contractor and IRAF).

2. 1 February - 31 May: Prepare kits for field trials (IRAF extension agencies).

3. 15 February - 10 May: Provide short-course training to field supervisors of farmer field trials (contractor-IRAF-extension agency).

4. 1 March - 20 April: Plant forest zone (first raining season) and highland (long cycle) maize trials on stations (IRAF-contractor) and farmers' fields (extension agencies).

5. 10 May - 30 June: Plant northern maize and wet-season sorghum trials.

6. 15 June - 31 July: Plant rice trials throughout country.

7. 15 June - 31 August: First rainy season maize harvested in forest zones.

8. 30 June - 30 October: Long-season maize harvested in Highlands.

9. 15 August - 15 September: Second rainy season maize planted.

10. 10 September - 15 November: Rainy season sorghum and northern maize harvest

11. 15 September - 1 November: Sorghums are transplanted.

12. 1 October - 15 December: Rice harvested.

13. 15 October - 1 December: Second rainy season maize harvested.

14. 1 November - 1 January: Transplanted sorghums harvested.

15. 1 December - 15 January: Evaluation of results.

16. January: Cropping conferences held.

17. January: Detailed research experiments planned.

E. Implementation Schedule

The implementation schedule set forth below permits full-scale research on the stations and a limited number of farmer field trials during the 1980 rainy season.

1. Project Paper approval: AID/W should approve the project by 30 June 1979.

2. Project Agreement signed: Since the GURC are familiar with the project, we expect prompt signature of the project grant agreement by August 15, 1979. The PIO/T for the institutional contract will be issued concurrently with Project Agreement signature.

3. Order vehicles, appliances and farm equipment: USAID/Y will order vehicles, appliances and farm equipment from the U.S. PIO/C should be issued by 30 August 1979.

4. First-year participants selected: 30 August 1979.

5. Request for Expressions of Interest: AID/W issues requests for expressions of interest to institutions eligible for Title XII funds. 15 September 1979.

6. First-year academic participants depart to begin language training (if necessary). September 1979 - January 1980.

7. Contract signed for construction: Contracts signed with contractor/Genie Rural for construction of field sheds and office buildings at Njombe and Bambui. 15 November 1980.

8. Institutional contractor proposals due: 15 November 1979.

9. Construction begins on buildings: 15 November 1979.

10. Contractor selected: Contractor selected in AID/W. IRAF and USAID/Y personnel involved in selection process. 15 December 1979.

11. Institutional contract signed: Negotiation of institutional contract by AID/W with participation of IRAF and USAID/Y personnel. 30 January 1980.

12. TDY personnel: Maize, rice, and agronomy specialists of contractor begin month-long consultancies (if appropriate) to help Cameroonians plan 1980 cropping season experiments. February - March 1980.

13. Arrival of Administrative Officer and Extension Agronomist: The first long-term contract personnel to arrive in Cameroon should be the Extension Agronomist assigned to the Testing and Liaison Unit (Chief of Party) and the Administrative Officer. February 1980.

14. Furniture ordered and housing leased: The Administrative Officer will order local furniture and lease housing for long-term contract personnel arriving in FY 1980. March 1980.

15. 1980 research program planned: Contractor and IRAF agree on 1980 research activities (see research cycle schedule above for details on the phasing of research activities with the cropping year). 30 March 1980.

16. Obligation of FY 1980 funds: FY 1980 funds should be obligated by 31 March 1980.

17. Long-term contract personnel arrive: The Agricultural Economist, the Maize Agronomist at Bambui and Maroua, Rice Agronomist and Rice Breeder arrive at post. June 1980.

18. Field shed construction completed: Field sheds at Bambui and Njombe are completed. June 1980.

19. Contract amendment signed: FY 1980 funds added to contract June 30 1980.

20. Participants selected: Second-year academic training and short-term participants selected and PIO/Ps signed. 30 May 1980.

21. Construction completed: Construction of laboratory/office buildings completed: 31 July 1980.

22. Participants depart: Second-year participants depart for academic training. June-August 1980.

23. Cropping conference: First annual cropping conference held to analyze research results and problem areas as well as make suggestions for further research. January 1981.

24. Evaluation: In-house project evaluation held. January 1981.

25. Contractor arrives: The Sorghum Agronomist based in Maroua arrives at post. January 1981.

26. Funds obligated: FY 1981 funds obligated. March 1981.

27. Participants selected: PIO/Ps signed for participants due to depart in September 1981. 30 April 1981.

28. Contract amended: Institutional contract amended to include FY 1981 funds. 30 April 1981.

29. PIO/T signed: PIO/T and scope of work prepared and signed for consultants to participate in the in-depth evaluation. September 1981.

30. Participants return: First M.Sc.-level participants return after completing their M.Sc. September 1981.

31. Participants depart: Third group of degree participants depart for

training. August 1981.

32. Evaluation: In-depth evaluation made of project. January 1982.

33. Cropping conference: Second annual cropping conference held. January 1982.

34. Obligation of funds: Project Grant Agreement amended to include FY 1982 funds. March 1982.

35. Participants selected: PIO/Ps signed for the last group of M.Sc. degree participants under Phase I. 30 April 1982.

36. Contract amended: Institutional contract amended to include FY 1982 funds. 30 April 1982.

37. Participants depart: The last M.Sc. candidates depart. The first returnee for the Ph.D. research arrives. September 1982.

38. Participants return: Second-year M.Sc. participants return. September 1982.

39. Contractor departs: Bambui Maize Agronomist and Administrative Officer depart. December 1982.

40. Cropping Conference: Third annual cropping conference held. January 1983.

41. Funds obligated: FY 1983 funds (last year of project funding) obligated in Project Agreement Amendment. January 1983.

42. Contracts signed: Institutional contract amended and consultant's contract for in-depth evaluation/phase II planning signed. March 15, 1983.

43. PIO/Ps signed: PIO/Ps for continuing M.Sc. and Ph.D. candidates signed. 30 April 1983.

44. Evaluation: In-depth evaluation held (including design of Phase II requirements to complete institution building). May 1983.

45. Participant departures and returns: Last Ph.D.-level participant leaves. M.Sc.- and B.Sc.-level participants return. August 1983.

46. Contract personnel depart: Maize Agronomist at Maroua and Agricultural Economist depart. December 1983.

47. Cropping Conference: Fourth annual cropping conference held. January 1984.

48. Evaluation: An in-house evaluation will be held to measure progress to date and transition to Phase II.

49. Phase II project approved and obligations of funds. May 1984.

50. Ph.D. candidate returns: First Ph.D. participant returns to begin work on Ph.D. dissertation on Cameroonian subject. September 1984.

51. Contractor departs: Long-term advisor on rice agronomy (extension) departs. This leaves the sorghum agronomist, rice breeder, and extension agronomist positions as the only continuing long-term contract advisors under Phase II. September 1984.

52. Phaseout of Phase I: September 1984.

53. Ex-post evaluation: September 1989.

PROCUREMENT SCHEDULES

A. APPLIANCES

1. PIO/C. PIO/C signed by GURC for household appliances for seven technicians September 1979.
2. Orders Placed. USAID/Y orders household appliances from U.S. September 1979.
3. Commodities Shipped. Appliances shipped from U.S. not later than December 1979.
4. Commodities Arrive. Appliances arrive in Douala February 1980.
5. Delivered at Project Site. The appliances are delivered at project site and installed in contract advisors' houses. GURC and Contractor April 1980.
6. PIO/C. PIO/C for last technician's household appliances signed 30 April 1980.
7. Order Placed. Appliances ordered from U.S. by USAID/Y 15 May 1980.
8. Commodities Shipped. Appliances shipped by U.S. supplier 30 September 1980.
10. Delivery at Site. Appliances delivered to Maroua, and installed at Maroua by GURC and Contractor 28 February 1981.

B. VEHICLES

1. Obligation of funds. Project Grant Agreement signed obligating funds for vehicles August 1979.
2. Subobligation of funds. PIO/C's U.S. vehicles issued September 1979.
3. Orders Placed. USAID, in accordance with vehicle standardization and support program, places orders for U.S. vehicles (4 small station wagons, 5 ton truck, 4 wheel drive vehicles) with spare parts and tools October 1979.
4. Shipment from U.S. Vehicles shipped from U.S. port March 1980.
5. Arrival at Port. Passenger and four-wheel drive vehicles arrive in Douala June 1980.
6. Delivery of Vehicles. Contract team and IRAF receive delivery of vehicles July 1980.

C. LABORATORY EQUIPMENT

1. Obligation of funds. FY 1979 funds obligated in Project Grant Agreement August 1979.

2. Subobligation of funds. PIO/C signed, with detailed specifications for laboratory and related equipment worked out by USAID, IRAF and Contractors advance team March 1980.

3. Orders Placed. AAPC places orders for laboratory equipment, following detailed instructions April 1980.

4. Equipment Shipped. Laboratory equipment shipped from the U.S. The more delicate items are shipped by air freight July 1980.

5. Equipment Arrives. Laboratory equipment arrives in Cameroon August 1980.

6. Equipment Installed. Laboratory equipment installed by contract team and IRAF at project sites 15 December 1980.

D. FARM EQUIPMENT

1. Obligation of funds. FY 1979 funds obligated in Project Grant Agreement August 1979.

2. Subobligation of funds. PIO/C farm equipment from U.S. (Proprietory procurement of Massey-Fergusson 265 tractors from U.S. - same model as 165 currently used here and parts available through Hamelle Afrique), USAID/Y authorized agent September 1979.

3. Order Placed. Order placed by USAID/Y for farm equipment from U.S. October 1979.

4. Final Shipping Date. All farm equipment will be shipped from the U.S. by March 1980.

5. Equipment in Cameroon. The farm equipment will reach Douala by June 1980.

6. Equipment Delivered. Equipment will be at the research stations by August 1980. (IRAF and Contract Team).

E. FURNITURE FOR LONG-TERM TECHNICIANS

1. Obligation of funds. Funds for locally purchased furniture (seven sets) will be obligated in the Project Grant Agreement August 1979.

2. Subobligation of funds. PIO/C issued for local purchase of 7 sets furniture. (Suggested vendor WUM Furniture, Bamenda/Wum), October 1979.

3. Furniture Ordered. Furniture ordered for 7 technicians' families. USAID/Y, with assistance of Administrative Officer under institutional contract, November 1979.

4. Furniture delivered to houses. Furniture delivered to technicians' houses at project sites, 15 March 1980.

5. Funds Obligated. Funds for last technicians' furniture obligated in FY-1980 Project Grant Agreement 30 April 1980.

6. Subobligation of Funds. PIO/C issued for last set of furniture 30 September 1980.

7. Furniture Ordered. Last set of furniture ordered locally 31 December 1980.

8. Furniture Delivered. Furniture delivered at project site 31 January 1981.

Project: National Cereals Research and Extension

Project Number: 631-0013

Date: May 1979

LOGICAL FRAMEWORK MATRIX

ANNEX A

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Goal: Increasing agricultural production and rural development.	Measures of Goal Achievement: 1. Increases in food crop production. 2. Increased rural income.	Goal: 1. GURC statistics. 2. Field surveys of household income.	Goal Assumptions: 1. GURC developmental and budget priorities stress agricultural production/rural development. 2. Precipitation remains normal. 3. Implementing agencies coordinate efforts to maximize effectiveness.
Subgoal: Building an institutional capacity for applied agricultural research.	Measures of subgoal achievement: 1. Agricultural research institutions conduct research programs. 2. Institutions staffed with trained Cameroonians.	Subgoal: 1. Research Institution reports. 2. GURC records.	Subgoal Assumptions: 1. That adequate human and financial sources be provided to agricultural research. 2. That other donors provide sufficient assistance to other aspects of agricultural research.
Project purpose: To develop Cameroonian institutional capacity to provide quality research on maize, rice, millet and sorghum, and to facilitate utilization of research results by farmers. Cereals research will be integrated into a cropping systems approach to food production and be aimed at the problems of small farmers.	Conditions that will indicate purpose has been achieved EOPS. 1. Cereals research program implemented with limited external assistance at the end of Phase I.	Purpose 1. Research institution records. 2. Research institution records.	Purpose Assumptions: 1. That sufficient number of Cameroonians are trained. 2. That GURC places very high priority on cereals research.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Project Purpose: (continued)	EOPS: (continued) 2. Produces research results on cereals relevant to problems faced by small food crop producers. 3. Meshing cereals research with research on other food and perennial crops to develop cropping systems recommendations for each region. 4. Establishment of linkages: a. With other national and international agricultural research organizations. b. With implementing agencies/institutions in Cameroon. 5. Establishment of adequate physical facilities for cereals research.	Purpose: (continued) 3. Research institution records. 4. Research institution and GURC records. 5. GURC records and site surveys. 6. Evaluations (PES I & II) every 18 months.	Purpose Assumptions: (continued) 3. That socio-economic analyses closely tied in with agronomic research and are taken into account in designing research programs. 4. That results of field tests go back to researchers and are taken into account in designing future research. 5. That various Ministries and institutions will coordinate research and work together on design and testing of extension practices. 6. That land be made available for research. 7. That spare parts are available for equipment.
Outputs 1. Development of Cameroonian staffed institutional capacity for national cereals.	Magnitude of Outputs 1. Staffing 2 Ph.D., 11 M.Sc. and 3 B.Sc. by FY-1984.	1. GURC records.	Assumptions of Outputs: 1. Personnel can be released for training and once trained, stay.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Outputs: (continued) 2. Development and implementation of research programs for maize and rice including field trial demonstrations on farmers' field. 3. Development and operation of liaison and testing unit (CTU): to transmit agronomic research results to extension agencies and farmers problems to the researchers and to determine economic and social consequences of agronomic research. 4. Establish and maintain an exchange of information with international, African and Cameroonian institutions conducting agronomic and socio-economic research. 5. Adequate physical facilities and equipment for carrying out the cereals research program.	Magnitude of Outputs: (continued) 2. Research Programs: a. Long-term integrated maize and rice research plan 1979. b. Begin implementation of research programs on stations. Maize FY-1980, Rice FY-1980, Sorghum/Millet FY-1981. c. Farmer field trials FY-80 FY-82 FY-84 Maize 300 1,680 1,800 Rice 60 750 1,020 Sorghum/Millet - 360 840 d. Research results released, Maize FY-1980, Rice FY-1981, Sorghum/Millet FY-1983. 3. Liaison and Testing Unit: a. Establish unit 1980. b. Begin designing field tests 1980. c. Analyse results 1981. d. Prepare research results for extension: Maize 1980, Rice 1981, Sorghum/Millet 1983.	Purpose: (continued) 2. GURC and research institutions records. 3. GURC, research institution records, field surveys. 4. GURC, USAID records. 5. GURC records site inspection.	Assumptions on Outputs: (continued) 2. Coordination between agencies formulating research programs; sufficient staff available; and funds available for operations. 3. IRAF obtains authority to establish CTU activities coordinated with extension/rural development authorities; willingness of social scientists to participate in, designing methodology and agronomists to use results of social science research. 4. Working level personnel actually coordinate and exchange information between institutions. 5. GURC makes land and buildings available.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
	Magnitude of Outputs: (continued) 4. Continuous contact with institutions by FY-1981. Adequate facilities for research in all four ecological zones: a. land b. buildings c. farm equipment d. laboratory equipment		
Inputs: 1. **AID** a. Personnel long-term contract advisor; consultant services. b. Participant training c. Commodities d. Construction e. Other Costs	Magnitude of Inputs: ($14.3 million) 1. AID ($7.7 million) a. Personnel ($4,142,000) Long-term advisor 32.5 work years; Consultants 38 work months b. Participants ($480,800) c. Commodities ($537,000) d. Construction ($200,000) e. Other Costs & inflation/Contingencies ($2,337,200)	1. USAID records, evaluations.	Inputs Assumptions: 1. That adequate funds made available promptly.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs: (continued) 2. Host Country a. Personnel b. Land c. Equipment d. Buildings e. Other Costs	Magnitude of Inputs: (continued) 2. Host Country ($6.6 million) a. Personnel (salary) ($1,143,400) b. Fixed Assets ($4,228,600) c. Other Costs ($192,000) d. Contingencies & Inflation ($514,500)	Purpose: (continued) 2. GURC records and project evaluations.	Inputs Assumptions: (continued) 2. That GURC makes funds available on timely basis. That land is made available at Njombe.

ANNEX B

A.I.D. PROJECT STATUTORY CHECKLIST

1. Country Checklist

The Country Checklist was prepared for, and submitted with, the Cameroon Agricultural Management and Planning project, number 631-0008. The PAF II for that project was signed on 2 January 1979 by the Assistant Administrator for Africa.

2. Standard Item Checklist

There are no items in the Standard Item Checklist that require or warrant special treatment or concern. Pursuant to AID procedures (HB 3, App. 5C, p. 5C-1), this checklist has not been included in this Project Paper.

3. Project Checklist

The Project Checklist is attached, see following page.

ANNEX B

STATUTORY CRITERIA CHECKLIST

Project Checklist

I. GENERAL CRITERIA FOR PROJECT

1. App. Unnumbered: FAA Sec. (653(b) (a) Describe how Committee on Appropriations of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that figure plus 10%?)	A Congressional Notification will be submitted because of increased funding requirements.
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?	A statement on engineering and financial requirements of construction will be cabled and incorporated as an annex to this Project Paper prior to project approval.
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.	Legislation not required.
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 the Principles and Standards for Planning Water and Related Land Resources dated October 25, 1973?	Not applicable.
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?	Project is not a capital assistance activity. Construction component is not expected to exceed $200,000 for LOP.

6. FAA Sec. 209, 619. Is project susceptible of execution as part of regional or multilateral project? if so why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. If assistance is for newly independent country, is it furnished through multilateral organizations or plans to the maximum extent appropriate?

This project has been planned to develop a Cameroonian national research capability for adoption and development of improved cereals varieties and agronomic practices. Therefore, it is not suitable for regional funding and bilateral funding facilitates project operations. The NCRE draws upon work done in regional and multilateral projects and it was developed in conjunction with the Cameroonian Government and IITA in Nigeria. One output will be strengthened ties between Cameroonian cereals research and programs implemented by other national regional and international research institutions.

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 saving and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

The project will improve the technical efficiency of agriculture by developing institutionalized research capabilities for improved varieties of maize, rice and sorghum, thus permitting farmers to increase cereals crops yields. At present labor and other requirements limit acreage that small producer can farm, thus restricting total production until technological change occurs. The increased production will, indirectly, foster the development and use of cooperatives and savings and loan institutions.

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 enterprises).

A U.S. Title XII institution will receive the major institutional contract. IITA and ICRISAT (international research institutions receiving substantial U.S. Government and private support) will also provide contract services and training. Non-expendable commodities will be of U.S. origin, with the exception of some spare parts for farm equipment, purchase of locally made furniture. Some supplies will be purchased locally.

9. FAA Sec. 612(b); Sec. 636(h). 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.

GURC is making a substantial local currency contribution to this project for local personnel cost, buildings, office space and land. It is expected that this amount will be about 46% of total LOP costs. However, expatriate technical assistance costs will be project funded.

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 PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(c); Sec. 111; Sec. 281a. 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?

Once research results are extended to the population as a whole, significant numbers of small farmers will benefit. Taking the lag into account, we expect that at least 500,000 families should improve variety and/or agronomic practice developed under the project by 1990. Research will concentrate upon agronomic problems of small farmers in producing cereals with high protein content, thus improving their quality of life.

b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available?

(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.

The project is designed to increase the quantity and quality of agricultural research in cereals and food production. The project specifically benefits small producers of food crops by research into problems of maize and rice and sorghum production within the content of local cropping systems.

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 assurance 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 requirements been waived for a "relatively least-developed" country)?	The Cameroonian contribution to the project is approximately 46 percent. In addition, GURC recurrent budget needs for personnel will run $294,000 a year when project is fully staffed.
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, or is the recipient country "relatively" least developed?	Yes, see Congressional Presentation. No.
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 economics, 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.	This project builds the basis for appropriate research on maize, rice and sorghum which is necessary for Cameroon to meet its long term food needs. It trains researchers as well as provides technical services. More than half the eventual beneficiaries of the research will be women food crop farmers. Nearly all the maize in Southern Cameroon, and roughly half of the cereals production in Northern Cameroon is grown by women. Women participate in rice production, but grow little independently of their menfolk.

f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resource 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 recognizes the parcular needs of the recipient country in agriculture research activities and will help strengthen research in food crop production. The project provides long-term degree training and short-term practical training. Also, technicians working on the job training to employees of Cameroonian Research Institutions and extension agencies participating in the farmer field trial program.
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?	Yes. The project is specifically designed to do so. The PP provides information and conclusions on the activity's economic and technical soundness.
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 safguarding the U.S. balance-of-payment position.	The technical services will be provided primarily by a U.S. institution eligible for Title XII financing, assisted by international agricultural research institutions (which receive more than half their operational budgets from U.S. public and private sources), U.S. source origin commodities will be used to the greatest extent possible consistent with maintenance and sound management practices. Some local procurement will be used, for expendable materials, some parts and locally manufactured items.

REPUBLIQUE UNIE DU CAMEROUN
Paix — Travail — I

Ministère de l'Economie et du Plan

DIRECTION DE LA PROGRAMMATION

N° 313 /MINEP /PROG/CE

ANNEX C

UNITED REPUBLIC OF CAMEROON
Peace — Work — Fatherland

Ministry of Economic Affairs and Planning

DIRECTION OF PROGRAMMING

631-0013

Yaoundé, le / Yaounde, the 13 AVRIL 1978 19

Réf. : V/L du 10/12/77
V/L du 17/03/78.

Le Ministre de l'Economie et du Plan
The Minister of Economic Affairs and Planning

Objet : Recherche et production
Subject : en matière de maïs et de riz.-

à M. / to Mr. MONSIEUR LE DIRECTEUR DU BUREAU REGIONAL DE L'US AID POUR L'AFRIQUE CENTRALE
B.P. 817 - YAOUNDE -

ACTION: SrAGR
No cc: RDO/DRDO
No cc: FRM
No cc: FRM/B

CHRON

Comme suite à vos lettres rappelées en référence et relatives à l'objet susvisé, j'ai l'honneur de vous marquer mon accord pour la préparation d'un projet visant à l'augmentation de la capacité de recherche et de production en matière de riz et de maïs, à la formation de chercheurs et au renforcement des services de vulgarisation.

Je me permets de vous rappeler que la préparation d'un tel projet et son éventuelle exécution devront se faire en étroite collaboration avec tous les services gouvernementaux intéressés, afin de garantir le succès de l'opération envisagée.

Veuillez agréer, Monsieur le Directeur, les assurances de ma considération distinguée./-

20 APR 1978
ACTION COPY
RDO/PRDO

INFO
AMB
DCM/RF
CHRON

TELEGRAM

ANNEX D

631-0013

P 220131Z NOV 77 UNCLASSIFIED NOV 22, 1977 - 1030
FM SECSTATE WASHDC
TO AMEMBASSY YAOUNDE PRIORITY 2359 ACTION:AgEc
BT
UNCLAS STATE 279169
AIDAC
SUBJECT: NATIONAL CEREALS RESEARCH 631-0013 PID

Classification

cc:DRDO
cc:PRM
CHRON

1. PROJECT COMMITTEE REVIEWED SUBJECT PID AND APPROVED PROJECT FOR FURTHER DEVELOPMENT. THE ABS REVIEW AGREED THAT THE 1980S IS APPROPRIATE TIME TO EXPAND U.S. ROLE IN CAMEROON AGRICULTURE NATIONWIDE FROM ITS CURRENT NORTH CAMEROON EMPHASIS, ASSUMING THIS APPROACH WILL BE CONFIRMED BY SECTOR ASSESSMENTS AND DAP UPDATE IN 1978. THE BASE FOR SUCH EFFORT--A SOLID INFRASTRUCTURE OF ADMINISTRATION AND PLANNING; APPLIED RESEARCH; LAND RESOURCE DATA; AND DISTRIBUTION, MARKETING, INPUTS-TO-FARMERS AND CREDIT ORGANIZATIONS--WAS PERCEIVED AS DECISION PACKAGE OF INTERRELATED PROJECTS: AGRICULTURAL MANAGEMENT AND PLANNING, CEREALS IMPROVEMENT, CAMSAT, COOPERATIVE DEVELOPMENT. COMPETITION WITH THE SAHEL FOR SCARCE FRANCOPHONE MANPOWER WILL BE A CONSTRAINT IN AGRICULTURE SECTOR DESIGN AND IMPLEENTATION.

2. POLICY ISSUE. COMMITTEE CONCENSUS WAS THAT FOOD CROPS RESEARCH GENERALLY, AND THIS PROJECT PARTICULARLY, SHOULD BE VERY HIGH PRIORITY OF U.S. ASSISTANCE TO CAMEROON. CAMEROON'S DEVELOPMENT LEVEL IS NOW SINGULARLY READY TO SUPPRT AN EXPANDED RESEARCH SYSTEM. COMMITTEE PROPOSES TO SHIFT PROJECT GOAL FROM PRODUCTION TO INSTITUTION-BUILDING. THE PURPOSE WOULD REMAIN THE RESEARCH PROCESS ITSELF, BUT SO STRUCTURED AS TO LEAVE BEHIND A FRAMEWORK WHICH WOULD ENSURE CONTINUING RESEARCH CAPABILITY GEARED TOWARD CONTINUING RURAL DEVELOPMENT IMPACT FOLLOWING DEPARTURE OF AID. VARIOUS PROJECT EXPERIENCES, E.G., TANZANIA, INDONESIA, BRAZIL, WERE CITED BY COMMITTEE MEMBERS TO ILLUSTRATE NEED TO LINK SPECIFIC INSTITUTIONS INTO BROADER SYSTEMS OF SERVICES. 77

3. PRIORITY. PROJECT RELATIONSHIP TO THE DAP STRATEGY AND THE PROJECT'S PLACE IN CAMEROON PRIORITIES WERE UNCLEAR AND SHOULD BE ARTICULATED IN THE PP.

A. DAP. NO SERIOUS FOOD SHORTAGE EXISTS IN CAMEROON, EXCEPT OCCASIONAL URBAN SHORTAGES ATTRIBUTABLE TO DISTRIBUTION PROBLEMS RATHER THANINADEQUATE PRODUCTION, ACCORDING TO DAP. THE PID OFFERS NO EVIDENCE THAT LACK OF IMPROVED VARIETIES OF MAIZE AND RICE IS MORE SERIOUS CONSTRAINT ON INCREASING PRODUCTION THAN OTHER PROBLEMS SUCH AS MARKETING, TRANSPORT, STORAGE AND CULTURAL PRAC-

NO.

Classification

Amended Dec. 12 MAF Cable

TELEGRAM

TICES CITED IN DAP AS COLLECTIVELY MORE IMPORTANT. GIVEN CAMEROON'S STAGE OF DEVELOPMENT, PERHAPS THE PP TEAM'S MOST IMPORTANT TASK WILL BE TO ESTABLISH THE PRIORITY NEED FOR A HIGHLY TECHNICAL UNDERTAKING IN PLANT BREEDING, WITH A DEFERRED PAYOFF, OVER OTHER PROJECTS FOCUSING ON MORE IMMEDIATE CONSTRAINTS THAT LIKELY WOULD YIELD FASTER RETURNS.

B. GURC. OPENING PARA OF PID PROVIDES SUBJECTIVE, UNDOCUMENTED AND UNWEIGHTED STATEMENT OF GURC PRIORITY: QUOTE GROWING DOMESTIC REQUIREMENTS UNQUOTE. PP SHOULD SUBSTANTIATE WITH DATA ON FOOD CROP PRODUCTION, FOOD IMPORTS, STORAGE LOSSES, NUTRITIONAL DEFICIENCIES (CURRENT UCLA SURVEY), ETC.

4. PROJECT COOPERATION. CLOSE COORDINATION WITH THE EXPANDED FY 1979 AGRICULTURAL MANAGEMENT AND PLANNING PROJECT 0008 IS IMPERATIVE. IT WAS SUGGESTED THAT THIS PROJECT AND PROJECT 0008 BE DESIGNED TOGETHER, IN ORDER THAT PID GAPS AND ALL AGRICULTURE SECTOR ELEMENTS SUCH AS INFRASTRUCTURE, TRANSPORT, ETC., BE COVERED IN PROJECT PLANNING.

5. CONGRESSIONAL CONCERNS. REGULATIONS REQUIRE THAT PIDS CONTAIN AN IEE AND SECTIONS WHICH DEMONSTRATE HOW AID POLICY OBJECTIVES RELATING TO BENEFICIARIES, ENVIRONMENT, HUMAN RIGHTS AND ROLE OF WOMEN ARE ADDRESSED BY THIS PROJECT. CARE MUST BE TAKEN TO FULLY DEVELOP THESE IN THE PP, PARTICULARLY HOW WOMEN ARE CONTRIBUTING TO THE DESIGN AND IMPLEMENTATION OF, AS WELL AS BENEFITTING FROM, THE PROJECT.

6. ABSORPTIVE CAPACITY. COMMITTEE DISCUSSION CENTERED ON APPROPRIATE PROGRAM DURATION (10-15 YEARS), CROPS (AT LEAST FOUR) REQUIRED TO ACHIEVE ONGOING AGRICULTURAL RESEARCH CAPACITY. THE PREMIER CONSTRAINT TO ENVISAGED EXPANSION WAS PERCEIVED AS GURC ABSORPTIVE CAPACITY. THE DOLS 1 MILLION ANNUAL RECURRENT GURC AGRICULTURE RESEARCH BUDGET (OF WHICH FAC CONTRIBUTES DOLS 400,000) SHOULD BE INCREASED SUBSTANTIALLY IF THE NEW SYSTEM IS TO BE SUSTAINED. WHILE AID MIGHT CONTRIBUTE UP TO DOLS 1 MILLION TO MINAG RESEARCH OPERATION FUNDS, THE REMAINDER MUST COME FROM OTHER DONORS AND, BY PROJECT END, ENTIRELY FROM THE GURC.

7. CROPS. WHILE THE ULTIMATE SYSTEM SHOULD ACCOMMODATE ALL CROPS, COMMITTEE RECOMMENDS ONLY FEW CROPS BE SELECTED FOR PROJECT EMPHASIS. CRITERIA SHOULD BE CROPS WHICH ARE (A) REQUIRED TO MEET NUTRITIONAL REQUIREMENTS OF THE POOR MAJORITY, (B) LIKELY TO HAVE SIGNIFICANT PAYOFF IN NEAR TERM, (C) PERCEIVED AS MOST NEEDED BY CAMEROONIAN-S IN

OPTIONAL FORM 161 (Formerly FS-412) January 1975 Dept. of State
0151-101

TELEGRAM

7. CROPS. WHILE THE ULTIMATE SYSTEM SHOULD ACCOMMODATE ALL CROPS, COMMITTEE RECOMMENDS ONLY FEW CROPS BE SELECTED FOR PROJECT EMPHASIS. CRITERIA SHOULD BE CROPS WHICH ARE (A) REQUIRED TO MEET NUTRITIONAL REQUIREMENTS OF THE POOR MAJORITY, (B) LIKELY TO HAVE SIGNIFICANT PAYOFF IN NEAR TERM, (C) PERCEIVED AS MOST NEEDED BY CAMEROONIANS. IN ADDITION TO MAIZE AND RICE OTHER CROPS SUCH AS SORGHUM, MILLET, COWPEAS, AND ROOT CROPS WERE SUGGESTED. AS PROMISING NEW VARIETIES AND ASSOCIATED CULTURAL PRACTICES ARE IDENTIFIED, FARMER FIELD TRIALS SHOULD BE CONDUCTED TO DETERMINE (1) WHAT IMPACT THEY WILL HAVE ON TRADITIONAL FARMING SYSTEMS AND (2) THEIR SOCIAL FEASIBILITY. TECHNICAL INNOVATIONS WHICH COULD BE INTEGRATED AND TESTED AT FARM LEVEL INCLUDE COMBINATIONS OF METHODS OF CULTIVATING AND PLANTING NEW VARIETIES, NEW CROPS, WEED AND PEST CONTROL, NEW HARVESTING AND STORAGE METHODS, USE OF VARIOUS IMPLEMENTS, CROP ROTATIONS. PP TEAM SHOULD ASSURE THAT DESIGN OF THIS PROJECT IS FULLY COORDINATED WITH (A) NORTH CAMEROON AID PROJECTS SEED MULTILICATION 681-0001 AND SEMI-ARID FOOD GRAINS RESEARCH (SAFGRAD) 698-3393, (B) CANADIAN/BELGIUM/IITA TUBER AND ROOT CROP RESEARCH PROGRAM, AND (C) OTHER DONOR PROGRAMS IN THE AGRICULTURE/RURAL DEVELOPMENT SECTOR.

8. EXTENSION. PID APPEARS TO ACCENT PLANT BREEDING RATHER THAN EDUCATING PEOPLE TO DISSEMINATE THE PACKAGE OF PRODUCTION PRACTICES AND INPUTS NEEDED TO INCREASE PRODUCTION. PP TEAM SHOULD PAY PARTICULAR ATTENTION TO THE EXTENSION ISSUE, INCLUDING CONSIDERATION OF AN EXTENSION SERVICE PROJECT IN FY 1980 OR LATER. COULD IITA'S IMPROVED MAIZE VARIETIES BE USED TO IMPLEMENT IMMEDIATELY A DISTRIBUTION PROGRAM AND RELATED EXTENSION SERVICES IN CULTURAL PRACTICES?

9. TECHNICAL ASSISTANCE. COMMITTEE DOUBTED THE INSTITUTION-BUILDING CAPABILITY OF ANY OF THE RELATIVELY NEW INTERNATIONAL RESEARCH CENTERS, SINCE THIS WORK IS BROADER THAN THEIR SPECIALIZATION IN CROPS RESEARCH AND FARMING SYSTEMS, AND FELT THAT ONE OR MORE U.S. UNIVERSITIES SHOULD UNDERTAKE THE DEVELOPMENT OF A REALISTIC (FOR CAMEROON) CROP RESEARCH CAPABILITY AND INSTITUTIONAL FRAMEWORK.

A. TITLE XII. THE BOARD FOR INTERNATIONAL FOOD AND AGRICULTURE DEVELOPMENT (BIFAD) AND AFR BELIEVE THIS PROPOSAL TO BE PRIME CANDIDATE FOR IMPLEMENTATION AS TITLE XII PROJECT AND RECOMMEND SERIOUS CONSIDERATION BE GIVEN

TELEGRAM

Classification

USE OF COLLABORATIVE ASSISTANCE MODE TO ENGAGE APPROPRIATE U.S. UNIVERSITY EXPERTISE IN DETAILED COLLABORATIVE PLANNING AND CONDUCT OF PROJECT. BIFAD/AFR MECHANISMS ARE IN PLACE TO ASSIST IDENTIFICATION/SELECTION OF SUPERIOR CONTRACTOR, AS REQUESTED.

B. SKILLS. IN KEEPING WITH ADVANCES IN RESEARCH MANAGEMENT, CROP RESEARCH SHOULD ADDRESS THE ANALYSIS OF ECONOMIC JUSTIFICATIONS, SOCIAL DEMANDS, AND INSTITUTIONAL PREPAREDNESS FOR ACTION PROGRAMS, ALONG WITH CROP TECHNOLOGY.

10. LEVELS. COMMITTEE AGREED THAT AMBITIOUS GOALS CITED ABOVE REQUIRE MORE THAN THREE-YEAR U.S. INPUTS OF DOLS 1.4 MILLION. ACCORDINGLY AID/W WOULD ENTERTAIN A FULLY-JUSTIFIED PP RECOMMENDATION THAT (A) THIS PROJECT BE THE FIRST PHASE OF A SEQUENCED PROGRAM AND (B) DURATION OF AND U.S. INPUTS INTO THIS PROJECT BE INCREASED. ILLUSTRATIVELY IF PROJECT WERE INCREASED TO FIVE YEARS WITH UP TO DOLS 3.8 MILLION ORDER-OF-MAGNITUDE LOP FUNDING, TAB ESTIMATES FOR MISSION CONSIERATION A ROUGH BUDGET BY COMPONENT AS FOLLOWS: TECHNICAL ASSISTANCE (15 PERSON YEARS) DOLS 1.5 MILLION; COMMODITIES DOLS 800,000; TRAINING DOLS 500,000; MINAG RESEARCH OPERATING FUNDS DOLS 1 MILLION. ANNUAL OBLIGATIONS FOR SUCH PROGRAM CONCEIVABLY COULD BREAK DOWN AS FOLLOWS:

FY 79	FY 80	FY 81	FY 82	FY 83	LOP
875	825	700	700	700	3800

11. DESIGN. COMMITTEE BELIEVES PROPOSED PRP TEAM IS INADEQUATE FOR PURPOSES EXPANDED PP. DESIGN TEAM EXPERTISE SHOULD INCLUDE NUTRITION, MANAGEMENT, RURAL INSTITUTIONS AND OTHER SKILLS OTHER THAN NARROWLY-DISCIPLINED AGRONOMISTS, PLANT BREEDERS AND AGRICULTURAL ECONOMISTS, IF SYSTEM-BUILDING, APPLIED RESEARCH AND EXTENSION ARE TO BE STRENGTHENED AS PROJECT OBJECTIVES. TA/AGR/RESEARCH, AND BIFAD IF REQUESTED, PREPARED TO ASSIST IN LOCATING RESOURCES FOR PROJECT DEVELOPMENT. FOLLOWING RDO CONSIDERATION OF ABOVE SUGGESTIONS, REQUEST RDO SUBMIT COMMENTS AND SUGGESTED MAKE-UP AND COSTS REQUIRED FOR PP TEAM. HABIB

Classification

ANNEX D

Issues Raised in PID Approval Cable

1. **Should the Sector Goal of the project reflect institution-building as opposed to agricultural production objective?**

The institutional capability in agricultural research is a necessary requirement for substantial increases in agricultural production. Therefore, we have set up a subsector goal objective of establishing the institutional framework for research which contributes to a goal of increased agricultural production.

2. **The Priority which the GURC gives to the Project**

Cameroon does not have an absolute food deficit at present in non-drought years. With the shift of population to the cities, a relatively smaller percentage of the labor force must produce food for an increased population a decade or so in the future. Cameroon has, however, shortages of particular crops in various regions.

Except for commercial rice production in Northern Cameroon, production of rice and maize has barely kept pace with population increases, but the annual rate of increase in demand is higher due to changing tastes and consumption patterns. Sorghum and millet are often in short supply, particularly in the far North, and the Mandara Mountains, or during a dry year.

The GURC gives a high priority to this project. The maize program is sufficiently advanced to start farmer field trial/demonstrations almost immediately. It has obtained additional land for food crop research. Two senior Cameroonian scientists are working at Bambui and are being joined by a third. A young plant pathologist has joined the IRAF staff at Njombé.
(See Sections II/B/1 and III/A/2)

3. **Project Coordination**

A key to success will be coordination between AID projects, and between NCRE and other donor projects, particularly the big IBRD financed rural development projects. Please see Section II A/1/b, B/1 and B/3 as well as Annexes G and I for further discussions.

4. Congressional Concerns

Women will be among the major secondary beneficiaries of the project. See Sections II/A/3 and III/C of the PP.

The training of women agronomists is discussed in Section II/C and Section III/C. Women participated in the project design process.

5. Absorbtive Capacity

One of the reasons behind the decision to limit the project to maize, rice and sorghum is the problem of absorbtive capacity. More crops would increase recurrent costs and require additional highly trained human resources. The pool of trained agricultural research manpower is limited. The French are not filling rapidly the numerous vacant line positions in the research establishment, despite the high levels projected in program proposals. The IBRD, FED and several other donors finance projects with important agricultural research components.

Our contribution to operating funds is primarily for field testing and the Testing and Liaison Unit.

The GURC Operating Budget implications of this project were reviewed closely by IRAF and staffing revisions were made in light of future funding requirements. An inflation factor has been built into the budget. (See Annex F and Part IV of the Project Paper).

6. The Crops

Although sorghum is the staple crop of the rural poor in northern Cameroon, it is also the one with the most intractable biological and sociological problems and the cereal upon which the least progress has been made in applied research. SAFGRAD gives very high priority to sorghum, but there are peculiar ecological conditions in the Lake Chad Basin which necessitate intensive sorghum breeding efforts in the region. The French were scheduled to finance an Accelerated Crop Production Officer at IRAF-North, but by February 1979 no one had arrived. At present, the ACPO originally assigned to Chad is being transferred to Maroua. The CRSP for grain sorghum/pearl millet research "of applied research of a strategic nature" is designed to solve problems of sorghum in a large part of the developing world. Both these projects are barely beginning implementation. The IBRD Center North Rural Development Project gives a high priority to sorghum, but the project appraisal will now take place in August 1979, and implementation will be delayed a year.

In May 1978 the project team and the Mission decided against inclusion of sorghum after considerable debate. The Project Review Meeting in February 1979 recommended that the PP be revised to include sorghum and millet.

Other donors are already providing assistance on root and tuber crops, and, to a lesser extent, on legumes (See Annex G and Section III/C). We also felt that including too many crops in this project would strain the GURC's absorbtive capacity, and our ability to provide administrative support.

7. Funding Levels

We felt that in order to adequately cover the TLU and the four major ecological zones of Cameroon where these crops are grown, the project needed more than three contract advisors for five years each (15 work years) as proposed in PID cable. We have strengthened the agricultural economics and crop agronomy (extension) component, thus necessitating 32,5 workyears over five years for phase I. Three of these work years are for an administrator, since USAID's logistic capability is limited. The increased personnel costs, increased overhead when Title XII institution is used, together with additional training requirements, particularly for sorghum increased the pre-inflation AID costs to $7,697,000.

8. Design

The project design was done by Jacob Ayuk-Takem, GURC maize breeder; Isidore Timti, GURC plant pathologist; and Vishnu Asnami, IITA, using a joint IITA-GURC project proposal developed during 1977 as the starting point. Marlin O. Johnson, a crop and soil extension expert of the University of Minnesota, was a consultant under a USDA RSSA. The Project Paper was prepared by Abbe Fessenden, Program Officer (Bangui). Marion Ford was the USAID/Y Agriculture Division Project Officer involved in the initial design phase, and Richard Goldman, Agricultural Economist/Project Manager, supervised the final preparation of the document. Ray Riffenburg reviewed the document and arranged for logistic support as Mission Design and Environmental Officer.

ANNEX E

Threshold Decision Based on Initial Environmental Examination

Project Location:	Cameroon
Project Title:	National Cereals Research and Extension
Project Number:	631-0013
Funding:	$7.7 million
Life of Project:	FY 1979 -- FY 1983
IIE Prepared by:	Abbe Fessenden Date: 19 April 1979
Environmental Action Recommended:	Negative Determination

Concurrence: _____
James E. Williams, Director

Bureau for Africa Decision:

Approved: _____

Disapproved: _____

Date: 8/17/79

Initial Environmental Examination

Narrative Discussion

Project Location:	Cameroon
Project Title:	National Cereals Research & Extension (631-0013)
Initial Project Funding:	FY 1979
Life of Project:	Phase I: FY 1979 - 1983
IEE Prepared by:	Abbe Fessenden, USAID Cameroon
Action Recommended:	Negative Determination

Project Description

The National Cereals Research and Extension project's purpose is to develop Cameroonian institutional capacity to provide high quality research on cereals crops, particularly maize, rice, millet and sorghum, and to facilitate transmission of research results to farmers. The cereals research will be integrated into a cropping systems approach to food production and aimed at solving the problems of small farmers.

The research programs undertaken will, inter alia, have the objective of increasing yields through development of improved seeds and agronomic practices (crop rotation, intercropping, land preparation) which improve the soils, reduce erosion and require minimal or nil quantities of hard-to-obtain chemical inputs (fertilizer, herbicides, pesticides).

Research on rice will concentrate on upland rice and irrigated rice grown by smallholders. Maize research concentrates on the needs of smallholders, particularly women. Sorghum and millet research concentrates upon improved varieties and agronomic practices. The project has several major sites. Forest zone research will be carried out first at Njombe research station; and eventually, at Yaounde as well. Maize research for the highland zone will be done primarily at Bambui, but the rice research may be transferred to Dschang. The major site for research in the North will be Maroua.

Outputs include:

-- Trained Cameroonian staff working on maize, rice, and sorghum research.

-- Implementation of research on maize and rice, including field test/demonstration of farmer's fields.

-- Establishment of a Liaison and Testing Unit to plan and evaluate field tests; analyze the socio-economic impact of proposed agronomic recommendations; and translate the research results into practical extension recommendations.

-- Establishment and operation of linkages with other international and national research organizations as well as Cameroonian organizations engaging in research, extension and agricultural production programs.

-- Development of adequate physical facilities.

Environmental Setting

Cameroon is roughly the size of California and has 7.6 million people. It is distinguished by its ecological and ethnological diversity. The southern and coastal areas have a high rainfall-low altitude tropical rainforest, which is next to a moderate rainfall lowland forest zone. A short dry season in July-August splits the rainy season. The Western Highlands have soils of volcanic origin and receive heavy precipitation during a single long rainy season. The northern savanna grades into true semi-arid conditions near Lake Chad and in the Mandara Mountains (for more information see Section IIA of this project paper).

Identification and Evaluation of Environmental Impact

A. Land Use

The project will have a negligible primary impact on land use. Research stations or substations involved in the project already exist at Bambui, Dschang/Mbo plain, Ekona, Njombe and Maroua.

The Bambui and Njombe building sites pose no environmental problems. The research activities are aimed at improving soil fertility and reducing erosion while using a minimum of manufactured fertilizer and similar practices.

The demonstration testing programs themselves will cover very limited areas, only about .04 hectare per participating family. They will have no negative impact on the environment, and, since agronomic practices which reduce soil erosion and increase soil fertility are to be developed under the project, the overall impact on the environment should be favorable.

As far as secondary impact is concerned, maize production using the research project's recommendations should reduce erosion and increase soil fertility. Regarding rice production, the river bottom drainage and irrigation activities may well increase, although the project's bias is towards smallholder production and upland rice. The Cameroon Government intends to continue work on the development of irrigation perimeters for production of rice under irrigation.

B. Water Quality

Primary impact of the research stations and farmer field trials on water quality should be negligible. The project's research activities will stress increased yields but with minimal use of expensive chemical inputs which may affect water quality.

C. Atmospheric Pollution

The project will have no impact on air pollution.

D. Natural Resources

The project may have a slight secondary impact on altered use of water in that the Government and local inhabitants who grow rice may drain bottom-lands and set up irrigation systems.

E. Cultural and Socio-Economic

The project may have the secondary impact of recommending changed agricultural cropping practices which are different than the traditional ones. However, the Liaison and Testing Unit will evaluate all proposed agronomic recommendations to determine their socio-economic and cultural impact. By using the practices resulting from the project, the socio-economic secondary impact should result in improved standard of living among small producers rather than the reverse.

F. Health

In Cameroon, water-borne diseases are endemic. People bathe and launder in streams and rivers, as well as drink contaminated water. Consequently, it is difficult to determine where and through what activity people contract many of these diseases.

As far as the primary ecological impact of the research stations, the GURC normally grows irrigated rice only once a year on the same land, thus letting the paddies and canals dry out for several months. If this is not done, water and soil borne plant disease infestations cause intolerable losses. As an added safety precaution, research workers will wear boots when working in flooded rice paddies.

G. General and Other Possible Impacts

Not applicable in the case of this project.

IMPACT IDENTIFICATION AND EVALUATION FORM

Impact Areas and Sub-areas	Impact Identification and Evaluation 1/
A. LAND USE	
1. Changing the character of the land through:	
a. Increasing the population	N
b. Extracting natural resources	N
c. Land clearing	N
d. Changing soil character	N
2. Altering natural defenses	N
3. Foreclosing important uses	N
4. Jeopardizing man or his works	N
B. WATER QUALITY	
1. Physical state of water	N
2. Chemical and biological states	L
3. Ecological balance	L
C. ATMOSPHERIC	
1. Air additives	N
2. Air pollution	N
3. Noise pollution	N
D. NATURAL RESOURCES	
1. Diversion, altered use of water	L
2. Irreversible, inefficient commitments	N
E. CULTURAL	
1. Altering physical symbols	N
2. Dilution of cultural traditions	L
F. SOCIO-ECONOMIC	
1. Changes in economic/employment patterns	L
2. Changes in population	N
3. Changes in cultural patterns	N
G. HEALTH	
1. Changing a natural environment	N
2. Eliminating an ecosystem element	N
3. Other factors:	
Spread of Disease Vectors	N
H. GENERAL	
1. International impacts	N
2. Controversial impacts	N

1/ N - No environmental impact
L - Little environmental impact
M - Moderate environmental impact
H - High environmental impact
U - Unknown environmental impact

ANNEX F

Table 1

TECHNICIANS

Work Months Funded During Fiscal Year

FY:	1979	1980	1981	1982	1983	Totals
Long-Term Contract Advisors:						
Maize Agronomist, Bambui	24	12				36
Rice Breeder, Dschang	24	12	12	12		60
Rice Agronomist, Dschang	24	12	12	12		60
Maize Agronomist, Maroua	24	12	12			48
Sorghum Agronomist, Maroua	12	12	12	12		48
Extension Agronomist, Buea	24	12	12	12		60
Agricultural Economist, Buea	24	12	6			42
Administrative Officer, Buea	24	12				36
Subtotal:	180	96	66	48		390
Short-term advisors under institutional contract	14	6	6	6		32
Independent consultants for evaluation			3		3	6
TOTAL:	194	102	75	54	3	428

revised 19 April 79

Annex F Table 2

Long and Short Term Participants

OBligation of Funds ($1.00)

Fiscal Year	PHASE I					PHASE II		
	1979	1980	1981	1982	1983	1984	1985	1986
M. Sc. and Ph. D.								
Rice Breeder (Pathology minor)	26.4			26.4	13.2		6●	
Extension Agronomist(LTU)		26.4				13.2		6●
M. Sc. (U.S.)								
Maize Agronomist(Extn) Bambui	26.4							
Rice Agronomist(Extn) Dschang		26.4						
Maize Breeder(Pathology Minor) Maroua	26.4							
Rice Agronomist(Extn) Maroua				26.4				
Sorghum Agronomist(Extn) Maroua			26.4					
Sorghum Agronomist(Pathology Minor Maroua				26.4				
Maize Agronomist(Extn) Njombé			26.4					
Cereals Pathologist Yaoundé			26.4					
Agricultural Economist Buea		26.4						
Sub-Total	79.2	79.2	79.2	79.2	13.2	13.2	6	6
B. Sc. (Third Country)+M.Sc.(U.S)								
Cereals Agronomy(Extn) Yaoundé	6	6	6			26.4		
Sub-Total	6	6	6			26.4		
B. Sc.(Third Country)								
Maize Agronomist, Maroua	6	6	6					
Cereals Agronomist, Njombé	6	6	6					
Sub-Total	12	12	12					
Short Term Training at International Institutes								
4 trainees a year, 5 month course	12.6	12.6	12.6	12.6	12.6			
3 trainees a year, 3 month short course		6.7	6.7	6.7	6.7			
1 trainer of extension agents (9 month course)			7.0					
Sub-Total	12.6	19.3	26.3	19.3	19.3			

● Defense of dissertation in U.S.

ANNEX F

Table 3
Vehicles and Spare Parts

	FY Obligations ($000)				
	1979	1980	1981	1982	1983
1 Five-ton truck	30				
4 Small Stationwagons	40				
3 Four-wheel drive pickup vehicles	39				
1 Four-wheel drive passenger vehicles	14				
Spare parts	20		8	25	25
TOTAL	143		8	25	25
Furniture and Appliances					
8 sets locally made furniture	63	7			
8 sets appliances	24.5	3.5			
TOTAL	87.5	10.5			
Field Equipment					
3 Tractors & implements (plows, etc.)	105				
6 Corn Shellers	14				
2 Seed Driers	6				
4 Power Tillers	24				
3 Farm Wagons and Water Tanks	15				
3 Irrigation Pumps & Pipe	24				
6 Paddy Threshers	12				
4 Scales (Field Balances)	1				
4 Moisture Testers	4				
4 Winnowers	4				
Spare Parts	16		7	15	15
	225		7	15	15

ANNEX F

Table 4

Laboratory Equipment

	FY Obligations ($000)				
	1979	1980	1981	1982	1983
3 Compound Microscopes	6				
3 Binocular Microscopes	3				
2 Autoclaves	4				
1 Camera for Microscope	2				
2 Field Cameras	1				
3 pH Meters	1				
2 Incubators	4				
3 sets Refrigerators, freezers, ovens and dehumidifiers	9				
1 Low Speed Centrifuge	4				
1 High Speed Centrifuge	4				
3 Shakers	3				
Glassware, Balances, Media	9				
Miscellaneous Chemicals	6				
Seed Cleaning Equipment	2				
Pathology Field Kits	2				
Spare Parts	3		2	5	4
	63		2	5	4

ANNEX F

Table 5

GURC PERSONNEL EXPENDITURES

($000)

	1979	1980	1981	1982	1983	One year at full strength
Senior Personnel:						
Bambui	31.2	28.2	31.0	37.0	39.0	41.0
Dschang	3	3		6	6	17.0
Maroua	3		3	12	10	30
Njambe			3	4	4	11
Yaounde			4		4	13
TLU - Buea		12	8	8	19	27
Administrative Officer			4	4	5	5
Subtotal:	37.2	43.2	53.0	71.0	87.0	144.0
Research Assistants(BSc.)	13.8	13.8	27.6	27.6	30.0	30.0
Intermediate Assistants	20.0	20.0	30.0	30.0	36.0	36.0
Laboratory Assistants	5.8	5.8	10.0	10.0	16.0	16.0
Subtotal:	39.6	39.6	67.6	67.6	82.0	82.0
General Field Workers	60.0	60.0	62.0	62.0	64.0	68.0
TOTAL:	136.8	142.8	182.6	200.6	233.0	294.0

ANNEX F

Table 6

CAPITAL, EQUIPMENT, AND OTHER COSTS

GURC Contribution

	1979	1980	1981	1982	1983	Total
Capital Assets:						
Land, Bambui - 70 ha	1,428.6					1,428.6
Land, Maroua - 50 ha	1,000.0					1,000.0
Land, Ekona/Njombe - 70 ha	1,400.0					1,400.0
Land, Yaounde - 10 ha	400.0					400.0
Buildings, Type A	81.6			82.0	82.0	245.6
Buildings, 1 office	40.8					40.8
Buildings, 1 guest house	12.0					12.0
Vehicles, farm equipment, Bambui, & upkeep	188.6					188.6
Farm equipment, Maroua, & upkeep	10.0					10.0
Vehicles, farm equipment, Njombe, & upkeep	40.5					40.5
Total Capital Assets:	4,602.1			82.0	82.0	4,766.1
Other Costs:						
Fuel & utilities for Stations	8.0	15.0	25.0	30.0	35.0	113.0
Local supplies & chemicals	3.0	5.0	7.0	9.0	10.0	34.0
Total Other Costs:	11.0	20.0	32.0	39.0	45.0	147.0

ANNEX G

AID and Other Donor Projects Related to Cereals Research and Extension

A. A.I.D. Bilateral Projects

1. North Cameroon Seed Multiplication (631-0001)

Although the project's purpose is to establish and institutionalize a self sustaining system for the production, distribution and use of imported peanut and sorghum seed, the lessons learned from it will be applicable to improved maize and rice seed distribution and multiplication in Cameroon. Its distribution program will involve both the Ministry of Agriculture and the Young Farm Families Training Centers. The project began in FY 1976 and its last year of funding is FY 1980.

2. National Seed Service (631-0023)

The purpose of this project beginning in FY 1980 will be to establish a Cameroonian National Seed Service within the Ministry of Agriculture, which would, in turn, create and operate seed production facilities in each province. This project will take improved maize and rice varieties resulting from the Cereals research project and multiply them, thus reducing a major constraint limiting increased food crop production.

3. North Cameroon Livestock and Agricultural Development (631-0004)

The project's purpose is to demonstrate in a large pilot area south and east of Maroua the effectiveness of a number of integrated actions for improving livestock and agricultural production. It includes measures to reduce and eventually reverse the degradation of natural resources. Although many of the farmer practices concern livestock, the project also incorporates measures for the use of crop residues to feed livestock, use of animal power, improved seeds, pesticides and improved water control practices. The project thus provides a suitable framework for farmer field tests/extension demonstrations under NCRE, as well as a project which will benefit from the improved varieties and agronomic practices developed under NCRE.

4. Centers for Training Young Farm Families (631-0002)

Under this project, AID has a grant agreement with a voluntary agency which provides assistance in establishing a region-wide network of agricultural innovators in the northernmost departments of Cameroon. The Centers train young farmers (and their wives) in agriculture, including the use of oxen and improved varieties. The families go back to their villages where they act as innovators/extension agents. The farmers are visited periodically in a follow-up program. The graduates of the program should be used as participants in the field test/demonstration program under this

project, particularly to introduce maize into parts of the North where it is not yet a common crop. More complex tests/demonstrations might be run at the training centers themselves.

5. Agricultural Management and Planning (631-0008)

This project, which begins in FY 1979, will institutionalize a fully functioning planning unit within the Ministry of Agriculture to plan, design, and evaluate projects in the rural sector. The NCRE will benefit from the increased analytical, design and evaluation capacity in several ways:

-- It will facilitate identification of problems and decision-making on the types of research which the NCRE will carry out.

-- It will provide a capability for doing the macro-economic and marketing analysis to complement the micro-economic and agronomic work done under NCRE.

-- It will develop information on farm-gate prices, cost of living and income which will permit analysis of the economic benefits of improved varieties and agronomic techniques, thus determining the probability of quick farmer adoption of the "package."

-- It will provide statistical and survey design expertise to backstop the extension liaison unit personnel, when necessary.

6. Cooperative Development (631-0014)

The purpose of this project, beginning in FY 1980, will be to upgrade the managerial capacity of the agricultural cooperatives in Cameroon in order that they will meet more effectively the marketing, credit and production needs of small farmers. Cooperatives provide a key link in the spread of improved agricultural technologies. Where the cooperatives are strong, as in the Western provinces, they provide a means of implementing advanced farmer field trial/demonstrations of improved varieties and/or technologies. Strengthening the cooperatives in the rest of the country will facilitate the spread of agricultural innovations, as well as make practical seed and input distribution, while the research will enable cooperative members to increase production and net income. The cooperatives can be cooperating agencies for implementing the farmer field trial/ demonstration programs.

7. Social Science Research and Training (631-0007)

The purpose of this project, for which funds were first obligated in FY 1978, is (1) to develop a center for economic and social science research in Cameroon, and (2) to carry out socio-economic research, collect data and disseminate information for development programs in North Cameroon. Since IRAF's mandate is essentially limited to the natural sciences, it must be able to borrow personnel from ONAREST's Social Sciences Institute, ISH, for carrying out the necessary parallel socio-economic studies to facilitate the transfer of agricultural innovations. The three specific studies in North Cameroon will be:

a. The effects of directed development. A comparative socio-economic analysis of two areas undergoing agricultural development, one of which is experiencing directed development under the auspices of a quasi-governmental development corporation, and the other of which has no central "outside" direction.

b. Baseline socio-economic structure of three northern arrondissements, which includes emphasis on specific development issues.

c. New Lands and Resettlement. A study of socio-economic impact of two resettlement schemes which involve economic adaptation, and analyze factors required for optimal project effectiveness.

8. Higher Education for Development (631-0031).

The purpose of this project beginning in FY 1980 is to support university programs in training, research and extension for agriculture. The project includes development of a new University Center for Agriculture with a projected enrollment of 1,000 students. The Center will train middle and higher level technicians and managers for Cameroon's public and private agricultural enterprises and institutions. It will provide support to the Government's agricultural extension services, including development of a 200 hectare experimental farm devoted to food crop research. The Center for Agriculture, which will be located at Dschang in Western Province, will be able to help supervise the farmer field test/demonstration program as well as execute more sophisticated cropping systems.

B. Regional and Centrally Funded AID Research Projects

1. Major Cereals (625-0305) otherwise known as JP-26.

AID sponsored the regional major cereals project which began in FY 1963 and is currently being phased out. Its purpose was to strengthen the applied agricultural research capabilities of 16 West African countries within a regional framework established by the Scientific and Technical Research Committee of the Organization of African Unity. Its objective was to develop, disseminate and multiply high yielding, disease-resistant, protein-rich varieties of staple cereals such as corn, millet and sorghum. Among the research results relevant to the National Cereals program were:

-- Maize has the highest yield potential of any cereal crop in the guinea savanna.

-- The limiting factor on yield is soil fertility, but the extensive use of legumes in rotation/intercropping systems will go a long way to maintain soil fertility, particularly when combined with light doses of phosphatic fertilizers/phosphate rock.

-- Broad based maize composite varieties were developed in the Nigerian program, which are used in Cameroon today.

-- The project helped develop rust and leaf blight resistant maize varieties.

-- The West African uniform trials on maize were implemented in order to compare varieties in different areas.

2. SAFGRAD (Semi-Arid Food Grain Research and Development)(698-0393), also known as JP-31.

This project, beginning in FY 1977, is the successor to major cereals research. It is designed to develop and strengthen regional research and testing programs for cereals (particularly sorghum and millet, but also maize), grain legumes (cowpea and peanut) and related cropping systems for the sudanian savanna and sahelian zones. The major research stations are at Samaru, Nigeria and Kamboine Saria, Upper Volta. The French Government had agreed to finance the posting of an Accelerated Crop Production Officer to Maroua as part of their contribution, but no one had been assigned there by February 1979. Following the evacuation of AID personnel from Chad, it was decided that the CHAD ACPO would be assigned to the Maroua position. He will work closely with the NCRE agronomists (extension) advisors, and he will concentrate on testing legumes, particularly cowpeas, as well as sorghum and millet. His work complements the farmer field trial program in sorghum and provides additional depth in cropping systems involving legumes.

3. Sahel Food Crop Protection (625-0916.3).

This ongoing regional project's purpose is (1) to strengthen or establish the ability of plant protection units to combat plant pests within national boundaries with an additional capacity to demonstrate, train and assist local farmers in pest management; and (2) to extend to farmers information on pest management practices which they will use to reduce pre and post harvest food losses. The Cameroonian component of the project is being strengthened. The food crop protection project is linked with the NCRE project in that improved varieties and agronomic practices must also be tested for resistance to diseases and pests before being released for general use, and the expertise developed under this project will aid the cereals researchers. One of the objectives of NCRE is to breed in resistance to disease and insects. The crop protection service will also provide a means of verifying research results.

4. Collaborative Research Support Program (CRSP) for Grain Sorhum/ Pearl Millet

The purpose of the CRSP for sorghum and millet is to facilitate collaboration among selected U.S. universities, international centers and developing country institutions in a common research and development effort benefitting poor populations. It will provide long-term collaborative research to improve sorghum/millet production, distribution, storage, market-

ing and consumption. Both technical assistance and longer term training would be made available under the program. USAID/Yaounde has recommended that CRSP assistance in Cameroon, particularly in agronomy/plant breeding, will strengthen the effectiveness of NCRE and permit it to use varieties and agronomic practices financed by CRSP in the farmer field trials/demonstration program.

5. Collaborative Research Support Program (CRSP) for Common Beans and Cowpeas.

A similar CRSP has been established for beans/cowpeas. It would provide requesting countries with technical and limited services related to improving beans and cowpea research, production and utilization. This project would contribute to NCRE in that beans and cowpeas are key elements in successive and intercropping rotation systems for maize and sorghum cultivation in that they contribute to maintenance of soil fertility and good farming practices.

6. The West African Rice Development Association (WARDA) (693-0382).

WARDA is a multinational program, supported by an FY 1975-80 AID project, which concentrates on the testing and introduction of new varieties of rice into West Africa. It conducts initial evaluation tests from which promising materials are used in a large number of coordinated trials. The AID supported elements include mangrove rice research at Rokupr, Sierra Leone, deepwater floating rice at Mopti, Mali and irrigated rice in Ivory Coast. The national cereals project should obtain materials for testing of both irrigated and upland rice through this program.

C. Other Donor Projects

1. SEMRY I and II (Societe d'Expansion et de Modernisation de la Riziculture de Yagoua).

SEMRY I and II are World Bank and French Government supported irrigated rice production projects near Yagoua on the Logone River in Northern Cameroon. SEMRY I includes 5,300 hectares of irrigated riceland and production in 1976/77 was 24,500 MT of double-cropped transplated paddy. Yields are higher than originally expected at appraisal. The project involves about 3,400 families with heavy technical assistance inputs and the imposition of rigid requirements for cropping operations. Serious health problems have arisen since much of the land is double cropped in rice and thus does not dry out. The new SEMRY II project involves 7,000 hectares of gravity-fed irrigation for double cropped rice and 8,000 hectares of rainfed traditional crops. Total project costs are estimated at U.S. $55.5 million, including $14.5 million in 20 year IBRD loan, $14.5 million in IDA credit, and $12.4 million of combined French loans and grants. In addition to the irrigation

works and a public health program, the project finances research on irrigated rice at the Voulaoun experimental station near Yagoua. Activities include varietal testing experiments on planting time, fertilizer trials and studies of soil preparation methods and water regimes as well as seed multiplication. Varietal trials for sorghum would select appropriate local strains, the cultivation of which would demand less of the farmer's time during transplanting and weeding operations for rice. The research would be done under a contract between ONAREST and SEMRY. It is expected that SEMRY will benefit from a limited amount of the research done under NCRE, whose research objectives are aimed at small farmers who do upland and irrigated rice production in Northern Cameroon rather than agro-industrial production. However, exchange of information and results should be encouraged.

SEMRY II contains some provision for supporting applied research on sorghum, since SEMRY's farmers also grow dryland crops. We expect that the two programs will benefit from an exchange of information and plant materials. SEMRY might be willing to participate in farmer field trials program for sorghum

2. Western Highlands Rural Development Project.

This large IDA regional development project ($13 million) to increase agricultural production of coffee and foodcrops in Western Province includes assistance to cooperatives, credit, development of bottomlands, seed production (including improved varieties of maize) extension training and research. The coffee cooperative (UCCAO) will contract with IRAF for applied agronomic research into minimum tillage, rotation and crop combinations, and production of breeder and foundation seed. A field trials and demonstration unit will be based at Dschang. Trials will concentrate on eco-farming models, integration of productive trees, shrubs and crops to achieve an ecologically stable farming system as a defense against the effects of over-cultivation and excessive rainfall on soil fertility in the highlands. The field trial and demonstration unit will be able to supervise and undertake a major program of farmer testing/demonstration of improved seeds and technologies developed at Bambui.

3. ZAPI-Est

The newly approved ZAPI[1/] Est project (financed by an IDA loan of $8 million) is an integrated rural development project in Eastern Province. It concentrates on developing small farmer run cooperatives as well as strengthening agricultural advisory services and crop production facilities. The ZAPI's began more than a decade ago. Despite initial setbacks, particularly in extension, they have since developed a number of highly innovative approaches to problems of low income small farmers living in an underdeveloped and isolated area. The aspects of the project which concern NCRE are:

1/ Zones d'Actions Prioritaires Integrees.

-- A joint ONAREST-IITA food crops research program (with one resident staff member) which would describe, quantify and analyze food crop farming systems and develop more productive systems which are within the resources of the small holders;

-- A monitoring and evaluation unit which gathers data and carries out surveys;

-- Agricultural services centers staffed by two male and one female agricultural extension workers, and one female social extension worker; and

-- A small scale swamp rice development program which, using techniques developed by the Dutch volunteers, involves farming by groups of 6-12 farmers with one-half hectare or more apiece.

The ZAPI-Est project offers an ideal opportunity for field trial/demonstration of both maize and rice in one of the poorest areas of Cameroon. Through it, both extension supervision and evaluation can be provided, as well as the use of the IRAF substation for rice and maize, and cropping systems trials.

4. IDA - Center North Rural Development Project.

The proposed IBRD Center North Rural Development project could include a number of elements. Project appraisal is now scheduled for August 1979 and implementation would not begin before the following year. It will include support of the IRAF center at Maroua and substations for an applied research program of agriculture and forestry. It will involve intensive and extensive work on agricultural research and extension. The project will include study of the entire farm complex, including cropping calendar, rotations and maintenance of soil fertility along with limited labor availability and ultimately the integration of crop and animal research. Among other high priorities are the supply of a sorghum breeder, advanced field trials officer (within SAFGRAD framework--see above), rainfed rice agronomist, maize and sorghum agronomists (National Cereals) and an agro-economist strong in agricultural systems. The center north project will also include field equipment and construction of buildings for research. The project will probably provide a means of supervising field trials in the North.

5. IDA Lekie Rural Development Project.

The IBRD is also considering the possibility for a similar integrated rural development project in the Lekie region north of Yaounde. This project is still at least a year away from approval.

6. Canadian Root Crops Research.

This Canadian-financed project includes two advisors under a contract with IITA who conduct research on improving yields, disease resistance,

nutrition, and agronomic practices of root crops, including yams, cocoa yams (taro) and cassava. The first experiments were planted this spring at Bambui plain, Ekona (mile 17) and Njombe. The project's headquarters is at Njombe. The first root crop advisor arrived at post last summer. Its importance for NCRE is that "operational research" must include consideration of all crops grown by the farmer. Root crops are often interplanted with maize in the forest areas.

7. West German-European Development Fund (FED) Rural Development Project for Northwestern Province.

This proposed project will resemble the parallel IBRD integrated development project in Western Province in that it will include upgrading of physical infrastructure as well as cash and food crop production. The first phase of the project will be feeder road construction. We do not expect that an agreement on the first phase of the project will be signed before early 1979. When well underway, it should provide a framework for the implementation and supervision of farmer field trials under NCRE.

8. French Technical Assistance.

The French Government provides technicians to IRAF North for cotton and foodcrop research, SEMRY's agricultural research and extension activities, advisors on legumes and other crops at Dschang (Western Province) agricultural research station, the Upper Noun Valley Development Corporation (Northwestern Province) and the Mbos Plain Rice Cultivation Corporation (Western Province). France will provide an Accelerated Crop Production Officer to SAFGRAD. They should all be of assistance to NCRE in terms of facilitating field trial/demonstrations.

9. UNDP/FAO Soils Research.

The FAO finances three Dutch soils scientists at Ekona, who are engaged in improving the capability of IRAF to conduct soils testing and research, particularly as applied to increasing agricultural production. Much of the work of the FAO financed scientists and their Cameroonian colleagues has been done under contract to the Cameroonian Development Corporation for their tree crop plantations and various smallholder production schemes. They will be able to process the soil tests on fields of farmers participating in the field trial/demonstration program as well as provide general expertise in soil science to NCRE.

10. Upper Benoue Valley

The MEAVSB (Development Agency for the Upper Benoue Valley) has research activities into crop trial work and the socio-economic studies to determine, inter alia, the potential for settlement of this sparsely inhabited area.

The European Development Fund and French Capital Assistance is financing the research, and the agronomic research executed to date probably provides some of the most reliable information on varieties and crop agronomy under field conditions in Northern Cameroon. We would hope that they would be willing to help supervise maize and rice and sorghum field trials.

ANNEX H

ECONOMIC ANALYSES

SUMMARY OF LITERATURE ON THE RATE OF RETURN TO AGRICULTURAL RESEARCH.

In a recent article, Piedad Flores-Maya, Robert E. Evenson and Yujiro Hagami examined the case of rice research in the Philippines. Using various elasticities of demand and supply, the internal rate of return to research was a consistent 26-27 percent in a closed economy. The figure increases slightly with additional application of nitrogenous fertilizer. If the consumers are the sole beneficiaries of research in the closed Philippines model of research, the producers are worse off because of the low price elasticity of demand. However, households of producers are also consumers. In an open economy, the producers are better off while the consumers continue to enjoy the same level of economic welfare. In reality, in the Philippines, the consumer's welfare may not have been secured due to the absence of a substantial shift in domestic rice supply primarily because constraints on foreign exchange may not have permitted large additional rice import. The article had several other conclusions regarding the Philippines research. These were:

-- Returns to extension were not nearly as high as to research; and

-- The shift in the production function through use of modern varieties and technologies is much greater under experimental conditions due to high level of management.

Evenson and Kislav were able to obtain internationally comparable data, and included a research capital variable. They reported estimated marginal rates of return of 42 percent to technologically oriented agricultural research in developing countries and 21 percent in developed countries. An indirect rate of return to related scientific research was 60 percent for developing countries and 36 percent for developed countries.

Another developing country research system which is particularly relevant is that of India. Various state systems had significantly different approaches. Increments to the State research capital stock of 1,000 rupees was associated with a direct increase in the value of agricultural product of 6,600 rupees. An additional contribution of 1,300 rupees was forthcoming through interaction when extension activity (at the mean level) is undertaken. The 7,900 rupees could be viewed as the level at which the generated income stream grows after the distributed lag period. It represents a 46 percent rate of return. The same increment to research capital stock is associated with an additional 800 rupee income stream owing to the acceleration of knowledge transfer. A 1,000 rupee increment to investment in extension capital generates an income stream of 175 to 200 rupees. With a short time between investment and realized income stream this indicates a relatively normal rate of return of 12 to 15 percent. In a related study on agricultural productivity in the intensive Agricultural Districts Program, the return on the resource devoted to extension and general development was approximately 15 percent.

ANNEX H

Table 1

CAMEROON
Rice Supply and Distribution
(in metric tons)

	Domestic Production In Rice	Imports	Exports	Consumption	Kg/Cap
1970	12,080	7,760	-	19,840	3.0
1971	9,260	31,880	-	41,140	6.1
1972	10,310	28,010	-	38,320	
1973	8,240	23,720	-	31,960	
1974	10,750	17,280	-	22,030**	
1975	16,080	1,710*	-	23,790**	3.2
1976	22,680	14,720	8,800	28,600	3.8
1977	26,450	14,620	10,350	30,720	
1978	32,160	13,370	12,540	32,990	
1979	34,980	13,630	13,180	35,400	
1980	41,780	13,260	16,990	38,050	4.7
1981	52,690	11,310	23,130	40,870	
1982	63,970	9,740	29,160	44,550	
1983	76,000	8,710	36,150	48,560	
1984	80,960	10,190	38,220	52,930	
1985	82,970	12,210	37,490	57,690	6.3
1986	84,600	14,740	36,460	62,880	
1987	86,240	17,470	35,170	68,540	
1988	87,870	20,640	33,800	74,710	
1989	88,330	25,320	32,210	81,440	
1990	88,790	30,440	30,460	88,770	8.7

* GURC import restrictions applied.
** 6,000 tons imported in mid 1974 not sold until early 1975.

NOTE: The export figure is bas[illegible] that 15 percent of Northern Cameroon's [illegible]ed will go to the south. The rema[illegible] Eastern Nigeria.

ANNEX H

Table 2

Domestic Production of Rice in Cameroon in metric tons of rice equivalent 1976-1980

	Semry	Other Northern (Modern)	Highlands	Other Traditional	TOTAL
1976	14,680		1,500	6,500	22,650
1977	17,070		2,420	6,960	26,450
1978	20,190		4,550	7,420	32,160
1979	21,300	200	5,600	7,880	34,980
1980	26,170	390	6,870	8,350	41,780
1981	33,970	650	9,260	8,810	52,690
1982	41,610	970	12,120	9,270	63,970
1983	49,730	1,950	14,590	9,730	76,000
1984	53,060	1,950	15,760	10,190	80,960
1985	53,440	1,950	16,930	10,650	82,970
1986	53,440	1,950	18,100	11,110	84,600
1987	53,440	1,950	19,270	11,580	86,240
1988	53,440	1,950	20,440	12,040	87,870
1989	53,440	1,950	20,440	12,500	88,330
1990	53,440	1,950	20,440	12,960	88,790

From IBRD SEMRY Project Appraisal

ANNEX H

Table 3

Maize Production in Cameroon,
Ministry of Agriculture Statistics

PROVINCES	AREA (ha).		PRODUCTION (tons)		YIELD (Kg/ha)	
	74/75	75/76	74/75	75/76	74/75	75/76
North	21,978	50,100	23,360	37,120	1,063	741
Center South	59,682	120,300	157,710	77,580	964	645
West	166,500	148,000	230,800	184,140	1,386	1,244
Littoral	44,762	39,000	36,589	34,320	817	880
South West	1,365	35,600	7,350	22,260	5,385	625
North West	-	110,000	-	274,560	-	2,496
East	17,686	34,800	21,038	30,640	1,190	880
TOTAL CAMEROON	312,153	537,800	376,847	660,620	1,207	1,228

It should be noted that these yield figures are questionable. The omission of Northwestern Province statistics for 1974/75 is particularly glaring, as is the 5 ton per hectare yield for Southwestern Province. These data are contradicted in other GURC documents. Reasonable yields, when planted in pure stands are estimated at 1,000 kg/ha for Northwestern and Western Provinces 700 kg/ha for Northern Province, 800 kg/ha for Southwestern and Littoral Provinces and 700 kg/ha for Center South and Eastern Provinces.

ANNEX H

Table 4

FARM BUDGET SUMMARY

MAIZE

	Cost of production CFA	Yield kg/ha pure stand	Farmgate price CFA/kg	Gross Income CFA	Net Income CFA
Garoua Region:					
Unimproved maize	34,500	750	46	34,500	-12,970
Improved maize (moderate inputs) breakeven point	51,740	1,293.5	40	51,740	-0-
Improved maize (moderate inputs) anticipated yield	51,740	2,000	40	80,000	+28,260
Highlands:					
Unimproved maize	35,560	1,000	35	35,000	- 560
Improved maize (moderate inputs) breakeven point	43,300	1,237.3	35	43,300	-0-
Improved maize (moderate inputs (anticipated yield	43,300	2,000	35	70,000	+26,700
Eastern Province:					
Unimproved maize	44,915	700	35	24,500	-20,415
Improved maize (moderate inputs) breakeven point	50,800	1,451.4	35	50,800	-0-
Improved maize (moderate inputs) anticipated yield	50,800	1,700	35	59,500	+ 7,300
Center South Province:					
Unimproved maize	44,405	700	45	31,500	-12,905
Improved maize (moderate inputs) breakeven point	50,360	1,119.1	45	50,360	-0-
Improved maize (moderate inputs) anticipated yield	50,360	1,700	45	76,500	+26,140

ANNEX H

Table 5

FARM BUDGETS SUMMARY

RICE

	Cost of production CFA	Yield kg/ha (paddy)	Paddy Farmgate price CFA/kg	Gross Income CFA	Net Income CFA
Northern Cameroon:					
Unimproved	43,800	800	40	32,000	-11,800
Moderate inputs, breakeven	49,700	1,242.6	40	49,700	-0-
Moderate inputs, anticipated yields	49,700	1,600	40	64,000	+14,300
High inputs, breakeven	57,800	1,445	40	57,800	-0-
High inputs, anticipated yields	57,800	2,400	40	96,000	+38,200
Highlands:					
Unimproved	42,050	700	45	31,500	-10,450
Moderate inputs, breakeven	51,300	1,140	45	51,300	-0-
Moderate inputs, anticipated yields	51,300	1,700	45	76,500	+25,200
High inputs, breakeven	69,500	1,544.4	45	69,500	-0-
High inputs, anticipated yields	69,500	2,200	45	99,000	+29,500
Eastern Forest:					
Unimproved	64,600	800	45	36,000	-26,600
ZAPI swamp rice full labor cost on land clearance					
Year 1	105,000	1,500	45	67,500	-37,500
Year 2	120,000	2,200	45	99,000	-21,500
Year 3	104,000	3,000	45	135,000	+31,000
Year 4	39,000	3,000	45	135,000	+96,000

ANNEX H

Table 6

FARM BUDGET SUMMARY

SORGHUM/MILLET

	Cost of production CFA	Yield kg/ha pure stand	Farmgate price CFA/kg	Gross Income CFA	Net Income CFA
Garoua Area Sorghum:					
Unimproved	47,470	750	46	34,500	-12,970
Middle-level technology breakeven point	55,800	1,213.1	46	55,800	-0-
Middle-level technology anticipated yields	55,800	1,900	46	87,400	+31,600
Maroua Area Sorghum:					
Unimproved	47,440	600	40	24,000	-23,440
Middle-level technology breakeven point	55,800	1,395	40	55,800	-0-
Middle-level technology anticipated yields	55,800	1,700	40	68,000	+12,700
Mandara Mountains Sorghum:					
Unimproved	26,440	450	40	18,000	- 8,440
Middle-level technology breakeven point	33,800	845	40	33,800	-0-
Middle-level technology anticipated yields	33,800	1,100	40	44,000	+10,200

ANNEX I

CONSIDERATIONS REGARDING EXTENSION AND FARMER FIELD TRIALS/DEMONSTRATIONS

1. Organization engaged in agricultural extension activities.

The GURC has many different, sometimes competing, organizations engaged in agricultural extension. Their effectiveness varies.

Public sector agricultural extension activities (including livestock and fisheries) are often carried out by the Directorate of Agriculture within the Ministry of Agriculture. The Directorate also multiplies and distributes seed and planting materials, provides technical support of agricultural staff and trains farmers. The Directorate of Agriculture has delegations at the provincial and departmental level. Services to farmers are provided by technical officers and extension personnel organized by district.

The lack of qualified extension personnel is a major constraint in increasing agricultural production, especially small farmer crop production. Most extension staff have no training in extension techniques and do not communicate effectively with farmers. Support materials are lacking, as is transportation, thus further reducing contacts. Links with research relevant to the farmers' needs exist only rarely. In addition, the extension staff have virtually no chance to upgrade skills through in-service training. Supervision of extension agents is weak. Extension workers assigned to agricultural posts sometimes merely carry out their administrative duties. The North suffers particularly severely from the lack of well trained extension personnel.

The MINAGRI also has a Directorate of Community Development Services, which is particularly heavily engaged in providing agricultural extension information of food production to women in West Cameroon. The program grew out of the Corn Mill Societies and the Women's Institute activities started in the 1950's in the Bamenda highlands. The program is much newer and weaker in the francophone areas of Cameroon. A lack of trained personnel, particularly at the supervisory level in West Cameroon, hampers the program.

A number of organizations and entites outside the Ministry of Agriculture are engaged in agricultural extension activities. These include special organizations such as the staff of the ZAPI's, the various regional rural development project's personnel and the development corporations' extension services. Voluntary organization programs such as the Young Farmer Family Training Centers Program and those run by FEMEC and the Catholic Church also engage heavily in agricultural extension. The extension staffs of these organizations vary greatly, but for the most part there are insufficient personnel with inadequate training.

The GURC has not yet decided how to approach the problem of upgrading the extension systems. Consequently, it is important for the NCRE to avoid cutting off any ministerial, parastatal or private entity engaged in extension activities relating to increased food production from extension information or participation in the field test demonstration program. In terms of developing integrated agricultural production projects in the future, both the GURC and AID should obtain more information regarding the most effective approach to agricultural extension in the various parts of the country.

In most developing countries roughly 80 percent of the spread of high yielding varieties occurs through informal channels outside the extension service. We do not yet know which approach has the greatest chance for success for setting in motion the informal system in the various parts of the country. We expect that different approaches will have to be devised for each region. For example, what works among the Tikar near Bamenda may not be at all appropriate to the Fulani near Maroua.

2. Organizing and supervising field trial/demonstrations.

The extension agronomist of the Testing and Liaison Unit designs the test for a particular crop in a certain ecological region. He is aided by the agricultural economist, the agronomist (extension) for that crop as well as the plant breeder. In the case of maize, he will consult with the staff of the root and tuber crops program and IRAF's legume researchers concerning interplanting and succession planting cropping systems with maize. In the case of sorghum, the advice of the SAFGRAD Accelerated Crop Production Officer and the personnel of the Central Research Study Program for Grain Sorghum/Pearl Millet and Bean/Cowpea will be used.

The tests of farmer's fields will be a key element in the development of "packages" of cultural and management practices for optimum maintenance of farm productivity and economic returns. The tests should be designed to permit comparisons of biological and agronomic results, and also analysis of socio-economic implications of the varities, cultivation techniques and recommended cropping patterns used in carrying out the tests. We also hope that some information can be gathered regarding the effectiveness of various extension approaches, particularly the rapidity with which farmers start picking up the innovations.

IRAF's role in the field tests is that of conducting operational research under field conditions. It is not itself involved in direct extension work with farmers. The participating extension agency's own field employees and their immediate supervisors have continuing direct contact with the participating farmers. The IRAF personnel do not.

The TLU personnel and the crop agronomist also prepare instructions for the extension assistants and for selection of participating farmers. The crop agronomist works with the supervising extension service officer to select the extension assistants. Each extension assistant will supervise five to ten participating farmers, all within bicycling distance.

The TLU personnel, the Cameroonian Senior Training Officer and crop agronomist run a brief training program for the personnel participating in the programs. Subjects covered include: the cultivation methods used for the test packages, how to keep records for the test, how to select participating farmers, and when they should be visited. The workload on an individual extension agent should be kept light.

a. The North

The North Cameroon Seed Multiplication Project provides an extension advisor in Garoua. This technician should be involved in setting up the testing program for maize, sorghum and rice. The SAFGRAD Accelerated Crop Production Officer should be involved in planning sorghum and maize trials.

The only well staffed extension organization throughout the northern plains which reaches the village level is run by the parastatal cotton production company, SODECOTON. SODECOTON is broadening its extension activities to include food production and distribution of seed for food crops as well. We would like to see SODECOTON participate in the testing program (it is likely that the Corporation will be involved in similar extension activities under the IBRD Center North project).

Some of the most interesting agricultural experimental work in Cameroon, both on and off research stations, has been done under the Northwest Benoue project of the European Development Fund and French Technical Assistance. The NCRE staff should develop a joint testing program with the Benoue project despite its limited geographical spread. Particular areas of joint concern are: successive and interplanted cropping systems; socio-economic consequences of technical change; and varietal trials on sorghum, maize and rice.

The Young Farm Familities Training Center Program offers a unique opportunity in that the graduates of the program to back to their home villages where they act as innovators and demonstrators of improved agricultural technologies and methods. We expect that most of these graduates would be willing to take on the field tests, particularly for maize (which is not yet a really widespread crop) and, they would be able to carry out other agronomy experiments for the project. Follow up

visits are paid to the graduates by extension personnel for a few years after they complete the course so supervision of the tests should not be difficult. In addition, the training centers themselves would be ideal places to have more elaborate field trials.

b. The Highlands

The maize agronomists working out of Bambui and the rice agronomist (proposed at Dschang) will have to cover the two forest zones as well as the highlands until a sufficient number of Cameroonians have returned from training to fill positions at Ekona and Yaounde. In the highlands the field trial/demonstrations should be implemented with a number of organizations besides the regular extension service.

The Women's Community Development program is particularly well organized in Northwestern Province; agricultural production being the area of highest priority. Two Peace Corps Volunteers are already working with the program. We strongly recommend that the Women's Community Development program be an agency involved in implementing farmer field trials.

Cooperatives are strong in Western and Northwestern provinces. Although the Bamenda Coffeegrower's Association and the UCCAO have in the past been involved primarily in Arabica coffee production and marketing, they are beginning to diversity their programs. Under the IBRD-financed Western Highlands Rural Development Project, UCCAO will contract with IRAF for applied agronomic research into certain selected topics, including minimum tillage, rotations and crops combinations, as well as production of breeder and foundation seed. A Field Trials and Demonstration Unit will be established under the project and concentrate on eco-farming models as a defense against over-cultivation. The project also includes a Project Monitoring Unit engaged in gathering baseline data and evaluation of the program and Bottomlands Cultivation Unit, under which rice cultivation will expand and milling capacity be increased. We recommend that very close cooperation be developed between Bambui station (where maize and rice varieties are developed and tried at first) and Dschang station (the Western Highlands project), under which tests/demonstrations in farmer fields can easily be run and supervised. In addition, the Western Highlands project personnel will be able to work with the Maize and Rice Agronomists in analyzing and recommending farming systems incorporating interplanting systems and crop rotations.

For the rice testing/demonstration program, the Upper Noun Valley Development Authority and the similar organization for the Mbo Plain should be used. They have some extension staff of their own. The Noun Valley in particular has had problems with rice blast disease and badly needs more resistant varieties than the rather old improved varieties of irrigated rice that they have previously used.

c. Lowland Forest Zones

In addition to the MINAGRI's Agriculture and Community Development programs, the most important linkage for field trials will probably be ZAPI-Est, supported by a new IDA loan.

The ZAPI's induce and train farmers to participate in and eventually take charge of local development actions. The complex socio-economic structure of Eastern and Central South Cameroon does not lend itself to the top down planning approach. In theory ZAPI's eventially will work themselves out of existence leaving the line agencies to provide the services. Each ZAPI branch will have a small agricultural services center staffed with two male and one female agricultural extension worker as well as one female social extension worker. The extension team would communicate regularly with selected "contact farmers" who pass on skills to other farmers. These "contact farmers" would be ideal choices as participants in the field trial/demonstration program.

A small food crops research program would be supported by IITA and IRAF under the ZAPI project. It includes description/analysis of existing food crop farming systems; development of more profitable systems; and emphasis on low input management systems. It will include socio-economic analysis.

ZAPI also includes a pilot, small scale swamp rice development program using the traditional workgroup organization and techniques developed by Dutch volunteers.

The ZAPI-Est program offers an ideal opportunity for conducting farmer field trials/demonstrations in one of the poorest areas of Cameroon.

Other possibilities for implementation of field trials programs include:

(1) The extension training program of ENSA, the faculty of agriculture of the University of Yaounde, whose rural sociology department conducts fieldwork in the Lekie north of Yaounde.

(2) The Cameroonian Development Corporation Plantations. Concern exists that in some of the areas the amount of land (and foodcrop production) is being restricted by the substantial tree crop plantations. It might prove possible to conduct field trials/demonstrations near the villages inhabited by CDC workers. We expect that the spread effect will be rapid due to pressure on foodcrop land.

3. The Field Trials/Demonstrations: Criteria and Approaches

There are a number of approaches to implementing the farmer field trial'demonstrations. One idea is that a number on-sites should be set up (perhaps 25 to 35 in an ecological zone) for 1.5-2.5 hectare field trials closely approximating the local farm size and conditions. The individual crop trials would be combined when possible so that a site might have 0.5 ha. of other intercropping or soil fertility tests. While such an approach might be useful, we prefer that farmers participate directly because the conditions of the test will more accurately reflect what happens when the farmer implements the extension package. The farmer demonstrator approach will have a larger impact on neighbors than occasional viewing of a site cultivated by a GURC or parastatal organization employee.

Criteria for choosing the farmer/demonstrator should include:

--Community participation in deciding who should be the demonstrator;

--The farmer should not be the wealthiest man in the community, nor should he be so close to the margin that working on a .08 ha. test plot imposes an intolerable risk;

--The farmer or family members should do all the work on the plot and be willing to help keep records. (One member of the family should be literate).

--The farmer's field should be located so that the local people can see it easily;

--Site should be close enough to trails which 4-wheel drive vehicles can negotiate to permit visits by local extension personnel's supervisor and other specialists working out of the research centers.

The package for the field/trial demonstrations would be precisely that. They might include the inputs for planting .04 ha. (10 x 5 meters x 4 varities x 2 replications) when monocropped, as well as instructions. In the case of maize cropping systems involving intercropping should be used. In this case .08 ha. plots will be used. Kits would be set up for both a high level and a low level of planting density and availability of inputs such as fertilizer (even when as a residue). Kits should also be prepared for interplanted combinations and tested, particularly in the highland and forest areas. In this case, the density of planting would be less and the area covered would be larger. The farmer would be expected to use the most successful/acceptable variety for planting next year.

About 10 farmers within the bicycle range would be supervised and receive periodic visits from the local extension assistant. The assistant would gather samples from each site for a soils test before the crop was planted and this would be processed at IRAF North or Ekona (to verify that soil fertility or acidity may be the cause of a typical result). At the time of two of three key cropping operations, the extension assistant and the farmer's neighbors would gather to observe and discuss. Section II/C contains a case study.

A participating agency in the program should probably run 30 tests/demonstrations for rice and 60 tests for maize and sorghum grouped in an area with similar ecology and physical characteristics.

Maize Trials
Minimum Number of Participating Farmers by FY

	80	81	82	83	84
Forest high rainfall		180	360	360	360
Forest low rainfall	60	180	300	360	360
Highlands	120	420	540	540	540
North	120	300	480	540	540
Total	300	1,080	1,680	1,800	1,800

We assume that 60 farmers test one set of packages, and that large number of tests necessary in highlands because of altitude changes and in the North because of rainfall differences.

Rice Trials
Minimum Number of Participating Farmers by FY

	80	81	82	83	84
Forest, high rainfall		30	120	150	150
Forest, medium rainfall		30	120	180	180
Highlands	60	180	240	330	330
North	—	90	270	360	360
Total	60	330	750	1,020	1,020

We assume that 30 farmers test one set of packages, N.B. FY 1980 rice tests in highlands are a special case in that varieties tolerant to *Pyricularia oryza* must be found very promptly.

Sorghum Trials
Minimum Number of Participating Farmers by FY

	80	81	82	83	84
Maroua-Yagoua		60	180	300	300
Logone and Chari			60	120	180
Garoua-Benoue			60	180	240
Mandara		—	60	120	120
Total		60	360	720	840

We assume that 60 farmers test one set of packages. Although tests will be conducted in Northern Province only, the variations in latitude, rainfall, local tastes and the use of "transplanted" and rainfed sorghums necessitate high numbers of tests and alternative packages.

Annex J

Proprietary Procurement Waiver

Project Title: National Cereals Research and Extension

Project Number: 631-0013

Country : Cameroon

Commodity : Three Massey Fergusson Model 265 Tractors, With Implements

Cost : $105,000

Problem:

USAID/Yaounde requests a waiver from normal competitive procurement procedures to allow proprietary procurement of three Massey Fergusson tractors and implements.

Discussio

In order for project tractors to be compatible with current and future equipment purchases of Cameroon's Agricultural and Forestry Research Institute (IRAF), the purchase of U.S. manufactured Massey-Fergusson (MF) tractors is desired.

IRAF currently uses United Kingdom (UK) and Canadian manufactured MF 185 tractors and allied equipment. We have learned that the UK 185 is equal to the U.S. made MF 275. They both have the same Perkins 240-cubic inch engine and all the high mortality parts in the drive train, i.e., engine, transmission and axels, are inter-changeable. Thus, benefits will be achieved not only through compatibility with equipment on hand but through standardization as well. These benefits will include economies of maintenance of spare parts, inventories, and greater technical familiarity by operating personnel. In addition, there is a local supplier of spare parts, Hamelle Afrique, located in Douala, which will facilitate equipment repair.

Recommendation:

That you approve a proprietary procurement waiver for three Massey-Fergusson tractors and implements for the Cameroon National Cereals Research and Extension Project.

ACTION: AID
AMB DCM RF
CHRON

TELEGRAM

631-0013

ANNEX K

UNCLASSIFIED MAR 17,1979-1100
R 161442Z MAR 79
FM SECSTATE WASHDC
TO AMEMBASSY YAOUNDE 7539-7541
BT
UNCLAS STATE 064788

AIDAC

E.O. 12065: N/A

TAGS:

SUBJECT: CAMEROON, NATIONAL CEREALS RESEARCH AND EXTENSION (NCRE) PROJECT (631-0013)

THIS CABLE SUMMARIZES ISSUES RAISED AT PROJECT COMMITTEE SUBJECT REVIEW AND OTHER MEETINGS HELD TO REVIEW THE NCRE PROJECT PAPER. IT ALSO RECORDS DECISIONS MADE IN THE MEETINGS. ONCE THE CHANGES SUGGESTED BELOW ARE MADE IN THE PP, IT WILL BE REVIEWED BY THE PROJECT COMMITTEE AND THEN SENT TO AN ECPR FOR REVIEW AND APPROVAL.

A. PROJECT DESIGN AND POLICY ISSUES:

1. SHOULD SORGHUM/MILLET RESEARCH BE INCLUDED IN THE PROJECT IN ADDITION TO RICE AND MAIZE?

THE PROJECT COMMITTEE AND PROJECT REVIEW MEETINGS CONCLUDED THAT THE MISSION SHOULD ADD SORGHUM/MILLET TO THE PROJECT. ALTHOUGH SAFGRAD AND THE CENTRALLY FUNDED CRSP PROJECT FOR SORGHUM/MILLET WILL DEVELOP PLANT MATERIALS AND CULTURAL PRACTICES, CONSIDERABLE TESTING AND ADAPTATION WILL BE NEEDED IN CAMEROON. INCLUDING THE CROPS NOW WILL AVOID THE DELAYS INHERENT IN PROCESSING A PP AMENDMENT AT A LATER

DATE.

RECOMMENDATION: THE PP SHOULD BE AMENDED TO ADD SORGHUM/MILLET.

2. SHOULD FARMER FIELD TESTING AND RESEARCH SECTIONS OF THE PP CONTAIN ADDITIONAL INFORMATION ON THE ROLE OF INTERPLANTING, CONSECUTIVE PLANTING AND THE MEANS OF MAINTAINING SOIL FERTILITY IN CONDUCTING THE RESEARCH ON SPECIFIC CROPS?

THE COMMITTEE FELT THAT THE PP WAS NOT CLEAR ON THE ISSUE OF INTERPLANTING AND RESEARCH. CONSEQUENTLY, THE LACK OF

Classification

OPTIONAL FORM 161
(Formerly FS-412
January 1975
Dept. of State

TELEGRAM

Classification

PRECISION MAY LEAD CONTRACTORS TO CONCENTRATE ON MONOCROPPING. WHILE THE INTENT OF THE PROJECT IS OTHERWISE.

RECOMMENDATION: THE PP SHOULD BE EDITED AND PARAGRAPHS ADDED TO AVOID THE AMBIGUITY.

... SHOULD OTHER CROPS BE ADDED TO THE PROJECT?

THE PID REVIEW CABLE SUGGESTED THAT SEVERAL OTHER CROPS, SUCH AS SORGHUM/MILLET, LEGUMES AND ROOT CROPS SHOULD BE INCLUDED IN THE PROJECT (SEE ABOVE FOR DISCUSSION ON SORGHUM/MILLET). OTHER DONORS ARE CONDUCTING RESEARCH IN CAMEROON ON THE OTHER CROPS, AND THE MISSION WANTS TO AVOID STRAINING CAMEROON'S LIMITED HUMAN AND FINANCIAL RESOURCES AVAILABLE FOR AGRICULTURAL RESEARCH AND EXTENSION. HOWEVER, THE PURPOSE OF THE FARMER FIELD TRIALS IS TO INTEGRATE THE APPLIED RESEARCH OF A TACTICAL NATURE INTO RESEARCH ON FARM OPERATIONS, WHICH INCLUDES ALL CROPS GROWN BY THE FARMER.

RECOMMENDATION: THAT THE PROJECT REMAIN LIMITED TO MAIZE/RICE AND SORGHUM/MILLET, AND THAT THE MISSION INCORPORATE A BRIEF DISCUSSION IN THE PP ON HOW IITA AND CAMEROON RESEARCH ON LEGUMES AND ROOTCROPS CAN BE INTEGRATED INTO THE FIELD TEST/DEMONSTRATION PROGRAM TO INCREASE TOTAL PRODUCTION AND FOOD QUALITY PER HECTARE WHILE MAINTAINING SOIL FERTILITY.

4. SHOULD A DISTINCTION BE MADE BETWEEN PRIMARY AND SECONDARY BENEFICIARIES?

THE PP, IN PHASE I, DID NOT CLEARLY DIFFERENTIATE BETWEEN PRIMARY BENEFICIARIES (PARTICIPANTS, RESEARCH STAFF TRAINED AND FARMERS CONDUCTING FIELD TESTS) AND SECONDARY BENEFICIARIES (INDIVIDUALS WHO WILL EVENTUALLY USE IMPROVED

VARIETIES AND TECHNOLOGIES RESULTING FROM RESEARCH CARRIED OUT UNDER THE PROJECT.)

RECOMMENDATION: THAT THE USAID EDIT THE PP ACCORDINGLY.

5. HOW DOES THE PROJECT AFFECT WOMEN?

THE PP'S ANALYSIS OF THE ROLE OF WOMEN IN PROJECT IMPLEMENTATION AND AS BENEFICIARIES IS WOVEN INTO THE GENERAL NARRATIVE DISCUSSION OF SOCIAL FEASIBILITY, ECONOMIC IMPLICATIONS AND PROJECT IMPLEMENTATION.

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TELEGRAM

Classification

RECOMMENDATION: WHILE THE ROLE OF WOMEN IS DISCUSSED IN DETAIL, IT WOULD BE HELPFUL TO HAVE A PARAGRAPH WHICH INDICATES WHERE THE MAIN ARGUMENTS AND ANALYSIS CAN BE FOUND.

6. SHOULD SECTOR GOAL INDICATORS BE QUANTIFIED?

IN PRACTICE, IT IS DIFFICULT TO ATTRIBUTE PRECISE PERCENTAGE INCREASES IN PRODUCTION RESULTING SPECIFICALLY FROM AGRICULTURAL RESEARCH AND INSTITUTIONAL DEVELOPMENT, BECAUSE MANY OTHER FACTORS AT SUBSECTOR AND SECTOR LEVEL DETERMINE WHETHER A CHANGE OCCURS. STATISTICS ON FOOD PRODUCTION ARE SUFFICIENTLY INEXACT TO RENDER NATIONAL QUANTITATIVE TARGETS FOR PERCENTAGE INCREASES MEANINGLESS.

RECOMMENDATION: THAT WE ACCEPT QUALITATIVE CHANGES IN REACHING THE PROJECT'S SECTOR GOAL RATHER THAN ESTABLISH PRECISE QUANTITATIVE CHANGES AT THIS TIME.

7. SHOULD ALL END OF PROJECT INDICATORS BE REACHED AT T'E END OF PHASE I?

SINCE IT TAKES EIGHT TO TEN YEARS FOR AN INSTITUTION TO REACH MATURITY (WITH A TRAINED HOST COUNTRY NATIONAL STAFF) WITH NO FURTHER NEED FOR EXTERNAL ASSISTANCE, AND THE PHASE I PROJECT LASTS FIVE YEARS, NOT ALL THE POSITIONS WILL BE FILLED BY CAMEROONIANS AT THE END OF PHASE I. ALL OTHER EOPS WILL BE MET BY THEM, HOWEVER.

RECOMMENDATION: THAT THE EOPS STATE THE NUMBER OF TRAINED CAMEROONIANS WORKING ON CEREALS AT IRAF AT THE END OF PHASE I, WITH THE ASSUMPTION THAT PHASE II WILL COVER COMPLETION OF A MATURE INSTITUTION WITH FULLY TRAINED CAMEROONIAN STAFF.

8. FUNDING ISSUES:

A. INCREASE IN THE LIFE OF PROJECT FUNDING OVER THE PID LEVELS.

THE PID PROPOSED LIFE OF PROJECT FUNDING TOTALLING 1.4 MILLION DOLS FOR AGRONOMIC RESEARCH ON RICE AND MAIZE. THE PID REVIEW SUGGESTED AN EXPANDED PROJECT LASTING FIVE RATHER THAN THREE YEARS, WITH A LARGER EXTENSION COMPONENT AND, POSSIBLY, CONDUCTING RESEARCH IN FOUR OR FIVE CROPS. THE TOTAL COST WAS THEN ESTIMATED AT 3.8 MILLION DOLS, WHICH INCLUDED 19 PERSON-YEARS OF TECHNICAL SERVICES, (THREE ADVISORS FOR THE LIFE OF THE PROJECT).

Classification

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TELEGRAM

IN WRITING THE PROJECT PAPER, IT WAS FOUND THAT THE EXTENSION COMPONENTS DOUBLED THE MANPOWER REQUIREMENT FOR RICE AND MAIZE BECAUSE OF CAMEROON'S ECOLOGICAL AND ETHNIC DIVERSITY, COMBINED WITH POOR TRANSPORTATION NETWORKS. THE PP PROPOSED LIFE OF PROJECT FUNDING FOR PHASE I IS 4.2 MILLION DOLS PLUS 1.1 MILLION DOLS FOR CONTINGENCIES AND INFLATION, THUS MAKING A TOTAL AID CONTRIBUTION OF 5.3 MILLION DOLS. WE EXPECT THAT THE ADDITION OF SORGHUM AND UNIVERSITY CONTRACTING WILL INCREASE THE LIFE OF PROJECT FUNDING REQUIREMENTS.

RECOMMENDATION: THAT THE PP ESTIMATES ARE ACCEPTED, AND THAT ADDING SORGHUM AND FINANCING FOR A U.S. UNIVERSITY CONTRACT MAY INCREASE THE ESTIMATES.

2. IS CONGRESSIONAL NOTIFICATION NECESSARY?

RECOMMENDATION: UNDER CURRENT GUIDELINES, NO CONGRESSIONAL NOTIFICATION IS NEEDED IF PP FUNDING REMAINS THE SAME AS THE FIRST YEAR LEVEL PROPOSED IN FY 1979 CP (875,000) DOLS AND DOES NOT EXCEED THE TOTAL LIFE OF PROJECT PRESENTED IN THE FY 1980 CP 6 MILLION DOLS.

3. SHOULD FORWARD FUNDING OF CONTRACT AND COMMODITY COMPONENTS BE INCREASED?

THE MISSION MIGHT INCREASE THE FY 1979 AND 1980 FUNDING TO COVER TWO FULL YEARS OF CONTRACT COSTS AND ALL COMMODITIES EXCEPT FOR THE CONTINUING SPARE PARTS REQUIREMENTS. USAID/YAOUNDE WOULD THEN HAVE TO RE-ALLOCATE FUNDS AMONG THE FOOD AND NUTRITION PROJECTS ACCORDING TO ITS PRIORITIES, SINCE IT IS UNLIKELY THAT FUNDS WILL BE MADE AVAILABLE IN ADDITION TO THOSE ALREADY ALLOCATED TO F AND N.

RECOMMENDATION: THIS IS AN ISSUE WHICH MUST ULTIMATELY BE SETTLED BY USAID/Y AND AFR/DP.

4. USE OF ANDP TO FINANCE PARTICIPANTS IF PROJECT OBLIGATIONS ARE DELAYED.

RECOMMENDATION: THE MISSION SHOULD EXPLORE THIS AND OTHER OPTIONS TO ACCELERATE PARTICIPANT TRAINING.

C. PROCEDURE AND IMPLEMENTATION:

1. ARE THE IMPLEMENTATION SCHEDULES REALISTIC?

THE PROJECT COMMITTEE FELT THAT THE IMPLEMENTATION SCHE- [redacted]

OPTIONAL FORM 161
(Formerly FS-412
January 1975
Dept. of State

TELEGRAM

Classification

THE PROJECT COMMITTEE FELT THAT THE IMPLEMENTATION SCHEDULES WERE OVERLY OPTIMISTIC GIVEN THE TIME REQUIRED FOR CONTRACTING AND COMMODITY PROCUREMENT.

RECOMMENDATION: THAT THE IMPLEMENTATION SCHEDULE BE REVISED.

2.. 611 RECOMMENDATION RE CONSTRUCTION.

YHE PROJECT HAS A VERY MODEST CONSTRUCTION COMPONENT SCHEDULED FOR FY 1981. THE CAMEROONIAN GOVERNMENT HAS NOT YET DECIDED WHERE THE LABORATORY/OFFICE BUILDING AND FIELD SHED SHOULD BE FOR THE FOREST ZONE RESEARCH. LEGALLY THE REQUIREMENTS FOR MEETING 611A CAN BE A CONDITION PRECEDENT, BUT THIS IS NOT THE PREFERRED PROCEDURE.

RECOMMENDATION: THE PP SHOULD BE REVISED TO INCLUDE REASONABLY FIRM COST ESTIMATES AND PRELIMINARY PLANS FOR CONSTRUCTION WITH AN ENGINEERING ASSESSMENT THAT THE COSTS AND PLANS ARE REASONABLE.

3. IS A WAIVER NEEDED FOR THE PROCUREMENT OF NON-U.S. VEICLES?

THE MISSION IS EXAMINING THE AUTOMOBILE PROCUREMENT AND SPARE PARTS SUPPLIES ISSUE FOR A NUMBER OF PROJECTS.

RECOMMENDATION: THAT THIS ISSUE BE RESOLVED AFTER THE MISSION COMPLETES ITS STUDY.

4. IS A WAIVER NEEDED FOR FARM EQUIPMENT PROCUREMENT?

THE PP RECOMMENDS THAT MASSEY FERGUSON TRACTORS AND RELATED FARM EQUIPMENT BE USED BECAUSE IRAF ALREADY HAS SOME AND THE SUPPLY OF PARTS WILL BE SIMPLIFIED.

RECOMMENDATION: THAT THE MISSION PREPARE A DRAFT PROPRI-TARY PROCUREMENT WAIVER AND INCLUDE IT WITH THE PP.

5. PREDOMINANT CAPABILITY JUSTIFICATION FOR NON-COMPETITIVE PROCUREMENT OF CONTRACT SERVICES FROM IITA.

THE CAMEROON GOVERNMENT AND THE USAID HAD STRONGLY PREFERRED THAT IITA BE THE CONTRACTOR FOR THE PROJECT. A PREDOMINANT CAPABILITY JUSTIFICATIION WOULD BE NEEDED. THE TECHNICAL PERSONNEL REVIEWING THE PROJECT FELT THAT IT WOULD BE DIFFICULT ~~TO ESTABLISH THE OVERWHELMING~~ PREDOMI-

Classification

TELEGRAM

Classification

MANT CAPABILITY JUSTIFICATION FOR IITA TO IMPLEMENT THE ENTIRE PROJECT.

RECOMMENDATION: THAT THE PP BE REVISED SO THAT COMPETITIVE PROCUREMENT BE USED TO -ELECT A TITLE XII INSTITUTION, WHICH WOULD BE URGED TO COLLABORATE WITH IITA (AND ICRASAT) IN IMPLEMENTING THE PROJECT. THE RFP WILL BE SO DRAWN UP THAT A MAJOR BASIS FOR AWARDING THE CONTRACT WILL BE WAY THE CONTRACTOR MAKES BEST USE OF IITA'S ONGOING RESEARCH AND BACKSTOPPING CAPABILITY IN FARMING SYSTEMS IN THE HUMID TROPICS, MAIZE AND RICE RESEARCH, AND TRAINING. THE PROCEDURE OUTLINED ABOVE SHOULD BE REVIEWED WITH IRAF BEFORE USAID MODIFIES THE PP TO INCLUDE THE APPROACH OUTLINED ABOVE.

6. PROCUREMENT SCHEDULES:

REVISED PP SHOULD INCLUDE A DETAILED PROCUREMENT SCHEDULE (WHO PURCHASES WHAT, WHERE, WHEN) AND A SCOPE OF WORK FOR TECHNICAL SERVICES.

7. . GURC RECURRENT COST REQUIREMENTS:

USAID SHOULD REVISE PP TO REFLECT GURC RECURRENT COST IMPLICATIONS. VANCE
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ANNEX L

Draft Scope of Work For Technical Services

A. Scope of Work

The overall objective towards which the Technical Services contribute is:

to develop a Cameroonian institutional capacity to provide high quality research on cereals crops (particularly maize, rice, sorghum and millet) and linkages to facilitate transmission of research results to the farmer. The cereals research will be integrated into a cropping systems approach to food production and be aimed at solving the problems of small farmers.

Description:

The project will be implemented within the Institute of Agricultural and Forestry Research (IRAF), a part of the Cameroonian Government's umbrella research organization, ONAREST. An institution eligible for Title XII funds will implement the project and establish a consortium or subcontracting arrangement with the Institute of Tropical Agriculture (IITA) and the International Research Center for the Semi-Arid Tropics (ICRISAT). IITA's special expertise and backstopping capabilities in West African farming systems, rice and maize in the humid tropics, and practical training in tropical agricultural research will be used in meeting the scope of work detailed below. In addition, ICRISAT's capabilities in sorghum research and farming systems will be used in the drier regions.

The project is divided into phases to meet the objective of institutionalizing a research capability. Phase 1, funded in FY 1979-83, brings IRAF's capacity to the point where it will need only limited external assistance to carry out its cereals research program.

The project concentrates on "applied research at a tactical level", i.e. the development of suitable varieties and agronomic practices for maize, rice and sorghum/millet cultivation in each of the ecological zones where these crops are grown. It also includes operational research or the integration of technologies pertaining to various crops and livestock into systems adapted to the local farm situation. Operational research involves testing varieties and agronomic practices on the farmers' fields.

The contractor's duties working with Cameroonian counterparts include:

1. Plan and implement research programs for maize, rice, millet and sorghum, including field trials/demonstrations.

a. Develop long term integrated national research plans for maize, rice, sorghum and millet.

b. Increase maize, rice, sorghum and millet yields through developing improved varieties with disease and insect resistance.

(1) Develop management practices which permit optimum performance of new varieties in terms of sustained yield and disease resistance with minimum inputs of chemicals and fertilizers.

(2) Develop maize, millet and sorghum management practices that include interplanting and succession planting using legumes to increase nitrogen fixation.

(3) Incorporate root and tuber crops into maize cropping systems.

(4) Develop packages of cultural and management practices for optimum maintenance of farm productivity and economic returns, and test packages at the farm level.

c. Develop joint testing programs with at least four agricultural extension agencies, development corporations, cooperatives, etc. in each ecological zone for on farm field tests/demonstrations:

(1) Plan and design program for crops trials in each ecological zone;

(2) Train supervisory personnel who work with extension agents and participating farmers in implementing the trials/demonstrations;

(3) Monitor the implementation of the program; and

(4) Evaluate results.

d. Recommend practices and varieties for research for general extension purposes.

2. Develop and operate a Liaison and Testing Unit to transmit agronomic research results to extension agencies and to transmit farmers' problems to the researchers. Determine economic and social consequences of agronomic research. This unit has a "horizontal" approach stressing cropping systems.

a. Analyze the social and economic consequences of agronomic research on the farmers.

b. Tailor the research results into a form that the extension agencies and development corporations can use:

(1) For relatively high levels of technology;

(2) For areas with few extension agents and scarce inputs.

3. Provide on-the-job training in technologies, methodology of research and administration for Cameroonian cereals researchers on IRAF's staff, with the objective of developing a self sustaining institutional capability to carry out cereals research.

4. Help establish and maintain links and exchange information on cereals research and cropping systems with:

a. International agricultural research organizations;

b. National research organizations in other African countries

c. Other Cameroonian institutions and development agencies engaged in the scientific and socio-economic aspects of agricultural and rural development.

5. Contribute towards rational planning and effective use of physical facilities adequate for carrying out the cereals research program.

B. Job Descriptions

1. Extension Agronomist at Buea (FSR-03 level)

a. The Extension Agronomist will establish and direct the Testing and Liaison Unit. He/She will design the field testing/demonstration program throughout Cameroon, help train supervisors and extension agents, and evaluate the test results for agronomic and socio-economic consequences. This work will use an operational research approach to the problems of the small farmer.

b. Play a leading role in the task of transforming the research results into recommendations for extension personnel to use.

c. Provide on-the-job training to TLU personnel.

d. Organize the exchange of research results with other Cameroonian, African and international institutions engaging in agricultural and rural development research.

e. He/She will probably be the head of the contract team.

Qualifications:

S-3, R-3 French at minimum.

Ph.D. in agricultural extension or related disciplines.

10 years' experience in tropical agriculture (four in sub-Saharan Africa).

Experience may be substituted for the advanced academic degree.

2. Agricultural Economist at Buea (FSR-04 level)

a. The Economist will work with the Extension Agronomist in the Testing and Liaison Unit and will concentrate on the economic consequences of proposed extension recommendations using the field test/demonstration program, using micro-economic analyses to determine maximization of economic return to the farm enterprise, while minimizing risk and chemical inputs.

b. Train supervisors and extension agents in gathering the necessary data for the micro-economic studies. Provide on-the-job training to the agricultural economists who will work part time with the NCRE at the regional research stations.

c. Analyze the labor requirements of various agronomic recommended packages and how they mesh with labor availabilities of family members during the growing season.

d. Analyze the marketing environment for the proposed cropping interventions.

Qualifications:

S-3 French.

M.Sc. in Agricultural Economics or related field.

Some academic background in sociology/anthropology.

Minimum of five years' experience in sub-Saharan-Africa.

Ability to do computer programming for the micro-economic analysis.

3. Maize Agronomist (Extension) at Bambui (FSR-5 level)

a. The Maize Agronomist will devise and conduct agronomic experiments in maize cultivation, working with the Senior Maize Breeder. Inter alia, focus on cropping associations, incorporating maize cultivation techniques and time of planting.

b. Conduct experiments on research stations in the forest zones and the highlands, working with Cameroonian research assistants.

c. Assist in the design and evaluation of results from the field trial demonstrations and help train extension supervisors and assistants for that program.

d. Provide on-the-job training to returning Cameroonian maize agronomists.

Qualifications:

S-2+ in French.

Equivalent of M.Sc. in Agronomy or related fields.

Three years of overseas experience in tropical agriculture.

4. Maize Agronomist (Extension) at Maroua (FSR-05 level)

a. The Maize Agronomist will devise and conduct agronomic experiments in maize cultivation, working with the Senior Maize Breeder based at Bambui. Inter alia, focus on cropping associations applicable to small farmers incorporating maize cultivation techniques and time of planting.

b. Conduct experiments on research stations in northern Cameroon, working with Cameroonian research assistants.

c. Assist in the design and evaluation of results from the field trial demonstrations and help train extension supervisors and assistants for that program.

d. Provide on-the-job training to returning Cameroonian maize agronomists.

Qualifications:

S-2+ in French.

Equivalent of M.Sc. in agronomy or related fields.

Three years of overseas experience in tropical agriculture.

5. Rice Breeder at Dschang (FSR-03 level)

a. The Rice Breeder will concentrate upon adaptation trials and breeding of suitable improved disease resistant varieties of rice for small farmers in all four ecological regions.

b. Recommend varieties for farmer field trials/demonstrations and assist in designing and evaluating the field trial program.

c. Provide information and assistance to the rice agronomists, as well as provide on-the-job training for Cameroonian staff.

Qualifications:

S-3 in French.

Ph.D. in agronomy (genetics).

Eight years' practical experience (half in sub-Saharan Africa).

Work experience may be substituted for the Ph.D. degree.

6. Rice Agronomist (Extension) at Dschang (FSR-05 level)

a. The Rice Agronomist will devise and conduct agronomic experiments working with the Rice Breeder. Will focus on cropping systems and techniques suitable for small farmers who have little access to chemical inputs, as well as devise packages for rice cultivation involving a higher level of technology.

b. Conduct experiments on research stations throughout Cameroon, working with Cameroonian research assistants.

c. Assist in the design and evaluation of results from the field trial demonstrations and help train extension supervisors and assistants for that program.

d. Provide on-the-job training to returning Cameroonian rice agronomists.

Qualifications:

S-2+ in French.

Equivalent of M.Sc. in Agronomy or related fields.

Three years of overseas experience in tropical agriculture.

Additional work experience may be substituted for the graduate degree.

7. Sorghum Agronomist (Extension) at Maroua (FSR-05 level)

a. The sorghum agronomist will devise and conduct agronomic experiments, working with the Accelerated Crop Production Officer of SAFGRAD and any advisors provided through the CRSP for grain sorghum/pearl millet. He/She will also follow the technical guidance of senior Cameroonian scientists with training in sorghum breeding. He/She will focus on cropping associations and techniques applicable to small farmers who have little access to chemical inputs.

b. Conduct experiments on research stations in Northern Cameroon, working with Cameroonian research assistants.

c. Assist in the design and evaluation of results from the field trial demonstrations and help train extension supervisors and assistants for that program.

d. Provide on-the-job training to returning Cameroonian sorghum agronomists.

Qualifications:

S-2+ in French.

Equivalent of M.Sc. in Agronomy or related fields.

Three years' of overseas experience in tropical agriculture (additional work experience may substitute for the graduate degree).

8. Administrator at Buea (FSR-05 level)

a. He/She will concentrate on project procurement, personnel administration and logistic matters.

b. He/She will train a Cameroonian replacement as soon as possible.

Qualifications:

S-2+ in French.

Two years of similar work experience in Sub-Saharan Africa.

ANNEX N

CAMEROON

FAA SECTION 611(a)(1) - CERTIFICATION

NATIONAL CEREALS RESEARCH AND EXTENSION

Project Number: 631-0013

I, James E. Williams, hereby certify that the engineering, financial, and other plans and cost estimates necessary to carry out the proposed A.I.D. assistance to the United Republic of Cameroon for National Cereals Research and Extension Project have been reviewed and approved by the appropriate A.I.D. officials.

Date:_____

_____

(FOR) James E. Williams
Director, USAID/Yaounde