

ACTION MEMORANDUM FOR THE DIRECTOR, USAID/MADAGASCAR

FROM:  John R. Thomas, USAID/Madagascar Agricultural Development Officer

SUBJECT: Madagascar - IRRI Rice Research Project, Phase III  
Project No. 687-0105

PROBLEM: Your approval is requested to authorize a grant of U.S. \$5,000,000 from the Development Fund for Africa appropriation to Madagascar for the Madagascar - IRRI Rice Research Project No. 687-0105.

BACKGROUND: The International Rice Research Institute (IRRI) Rice Research activity in Madagascar originated from an unsolicited proposal received by A.I.D. in 1983. The program initiated a series of activities in Madagascar which involved IRRI scientists in a systematic procedure for evaluating and purifying the national rice collection, introducing improved germplasm into the country's rice breeding program, and developing improved cultural practices. The goal was to improve rice production on farms in Madagascar, and the purpose was to develop an institutional mechanism for the exchange of information and materials between IRRI and the Government of the Democratic Republic of Madagascar (GDRM) rice research institution. The first grant was signed in February 1984, and was followed by a Phase II grant in June 1986. Phase II essentially continued the work begun under Phase I, but also introduced research station work with a rice-based cropping systems perspective. The Phase II grant terminated on December 31, 1989. A total of \$3,480,000 has been granted to IRRI for Phases I and II.

To date, the project has successfully put in place the foundation of a system for introducing, developing and testing improved technology and its eventual transfer to farmers. This includes an improvement in the focus and organization of rice research activities within FOFIFA (the Government's agricultural research institution), and the development of a country rice research strategy plan. A new central rice research station at Mahitsy has been constructed and equipped, and rehabilitation work has been undertaken at regional stations. A farming systems approach to research has been introduced whereby farmers are testing improved varieties and cropping systems on their farms using their own management practices.

A long-term program for increasing the research capabilities and qualifications of FOFIFA scientists has been initiated with more than 34 FOFIFA scientists receiving short-term training at IRRI in such areas as variety improvement, integrated pest management, soil fertility, weed science, agricultural mechanization, cropping systems and technology transfer. Four FOFIFA scientists have initiated either MS or PhD degree training in the U.S. and Philippines. More than 62 Madagascar scientists, technicians and administrators have participated in international conferences and training workshops in Africa, Asia and the US. In addition, more than 25 IRRI scientists have visited Madagascar to provide technical assistance and to conduct in-country training programs in such areas as agricultural economics, agricultural engineering, breeding, cropping and farming systems, plant pathology, soil fertility and management, research station development and azolla research.

Approximately 1400 rice varieties have been introduced into the country since 1984 and are now at different stages of testing. At least 38 of these varieties have demonstrated potential for iron toxicity, cold tolerance and phosphorous response. FOFIFA has released three of these varieties for certain regions of the High Plateau, and two others in Lac Alaotra.

DISCUSSION: The Phase III 5-year grant to IRRI represents a continuation and enlargement of the second phase of activities. Activities initiated during the second phase which will be continued include 1) a rice hybridization program which greatly enriches the variety improvement program by crossing improved local and introduced germplasm to create better adapted varieties; 2) completion of diagnostic surveys in major rice production regions by multidisciplinary farming systems teams; 3) intensification of efforts to identify and disseminate farmer-acceptable technologies; 4) more intensive research on soil fertility problems, particularly on the High Plateau; and 5) a mechanization research/development program to evaluate simple machines to remove production and economic constraints in wetland and upland ecologies.

The third phase will build on progress made during the second phase, strengthen those areas which require strengthening, and address factors which impeded progress towards achieving the project goal. Phase III will expand and accelerate on-farm trials and research extension linkages begun in Phase II in order to institute improved mechanisms for technology development and dissemination.

A.I.D. FINANCED INPUTS:

Technical Assistance:

Long-term:

1. Agro-economist/Technology Transfer Specialist (4.5 years)
2. Plant Breeder (5.0 years)
3. Cropping Systems Agronomist (5.0 years)
4. Soils Scientist (2.5 years)

Short-term consultants (29.5 person months) for durations of 2 weeks to 6 months in the areas of pest management, socio-economics, agricultural engineering, breeding, farming systems/technology transfer and training/communication.

Short-term training courses for approximately 34 Malagasy scientists/administrators and 12 extension trainers and supervisors.

MS and PhD training for approximately 10 Malagasy scientists.

Participation of 56 FOIFA rice scientists in conferences and workshops.

Procurement of commodities such as vehicles, materials, laboratory, field and office equipment, and scientific literature.

GDRM INPUTS:

The GDRM will provide local currency for professional salaries, equipment, operating costs for office, station and field level technicians. Other GDRM support for the rice research program will include construction of research facilities at the central rice research station at Mahitsy as well as the regional stations, and rehabilitation and improvement of experimental fields at the research stations. Local currency will also be used for all local costs associated with the IRRI expatriate staff.

Total cost of the proposed 5 year rice research program is U.S. \$11,390,040, of which \$5,600,000 will be provided in foreign exchange as a grant from A.I.D. to IRRI, \$370,340 as IRRI's contribution, and the local currency equivalent of \$5,419,700 (FMG 8,129,500,000) to be provided by the GDRM.

The original goal "to improve rice production on farms in Madagascar" remains unchanged. Improvement of rice production will be achieved primarily by increasing yields, but also by increasing yield stability and cropping intensity, or by developing varieties having less grain shattering or higher milling recovery. The Phase II purpose - to develop an institutional mechanism for the exchange of information and materials between IRRI and FOFIFA - has already been put in place. Therefore the Phase III purpose will be to strengthen the GDRM's capabilities to carry out effective rice research in the context of a rice-based cropping system and to develop appropriate farmer technologies.

The expected outputs of the third phase are:

- 1) Regularized and strengthened rice research using a farming systems context to identify: a) more profitable cropping systems; b) higher yielding and better adapted varieties; c) low cost, farmer acceptable soil fertility management and pest management practices as well as cultural practices; and d) appropriate machinery to facilitate production operations, reduce drudgery and reduce costs of production.
- 2) Identification of improved varieties for irrigated, rainfed and upland ecologies by: a) introduction of germplasm for irrigated, rainfed and upland ecologies; b) development of a hybridization program targeted for irrigated and rainfed ecologies; and c) purification and characterization of Malagasy varieties within the existing collection of germplasm material adaptable to irrigated, rainfed and upland conditions.
- 3) Trained personnel for the rice research program.
- 4) Implementation and review of the country rice research strategies and activities for the long-term development of the rice program and the Department of Rice Research.
- 5) Continued exchange of information between IRRI, other organizations that work on rice, and the GDRM rice research program.
- 6) Improved capacity to undertake research through up-graded physical facilities and transport.

Project inputs will include technical assistance, training, and commodities provided through the A.I.D. grant, and GDRM support for construction, operational and other costs as summarized below:



The proposed project is fully consistent with the concept paper for Madagascar approved in February 1988, whose strategy statement is to "assist Madagascar to increase rural incomes while improving nutritional levels and maintaining the country's natural resource base". IRRI estimates a modest average increase of production of 20% per hectare, or approximately \$40 per hectare in targeted rice ecologies. Improved cropping systems using leguminous fallows during the counter season, and improved soil management techniques developed by the project will improve soil fertility and reduce soil runoff.

The technical design and cost estimates are reasonable and adequately planned, thereby satisfying the requirements of Section 611(a) of the Foreign Assistance Act of 1961, as amended. Non-A.I.D. contributions to the project exceed 25% of the project costs. Adequate provisions have been made for reporting and evaluation. The environmental analysis resulted in a negative determination. There are no human rights concerns having an impact on this project.

SPECIAL PROVISIONS: The Phase III 5-year grant will include a number of Special Provisions designed to facilitate Grantee compliance with A.I.D. environmental, reporting, evaluation and audit requirements. The Grantee will be required to: a) obtain approval from the Regional Pesticide Advisor on the use of agricultural chemicals financed by the project; b) obtain prior concurrence from USAID and FOFIFA of the selection of new long-term technical advisors; c) pay salaries of IRRI Core Staff assigned to Madagascar for the first week of such short-term technical assistance assignment per scientist per year; d) obtain prior concurrence from USAID for the selection of an outside individual financed under the grant for the mid-term evaluation and the Scope of Work for project audits; e) submit to USAID copies of annual audits of dollar funds; and f) submit semi-annual summaries of the value of procurement of commodities financed under the project by A.I.D. Geographic Source/Origin Codes.

AUDIT AND EVALUATION: An annual audit of dollar funds for the project will be conducted by IRRI in conjunction with its annual organizational audit. In addition, two audits of PL 480 counterpart funds will be carried out by FOFIFA at the midway and end points of the project. Two evaluations will be conducted under the Phase III program. A mid-term evaluation will be held 12-18 months after the program begins, and a final evaluation will be held at the beginning of the fourth year of implementation. In addition to assessing the success of the project in meeting its objectives and the need for possible readjustment of program inputs and outputs, both evaluations will assess cumulative impact since the start of Phase I on strengthening FOFIFA's capabilities to carry out effective rice research, improving research and extension linkages, accelerating farmer adoption of new technologies, and improving rice yields.

PREREQUISITES TO SIGNATURE OF THE GRANT AGREEMENT: A.I.D. has received written concurrence from the Director General of FOFIFA for A.I.D. to award a Phase III grant to IRRI. A Memorandum of Understanding specifying the actions required by IRRI and FOFIFA with regard to implementation of the project has been signed by IRRI and the Ministry of Scientific Research and Technological Development (MRSTD).

AUTHORITY: Pursuant to Delegation of Authority 551, the principal officers of Schedule B posts have the authority, with the prior concurrence of the REDSO Director, to authorize projects if the project does not exceed U.S. \$ 20 million over the life of project, does not present significant policy issues, does not require issuance of waivers that may only be approved by the Assistant Administrator for Africa or the Administrator, and does not have a life of project in excess of ten years. You therefore have the authority to authorize the Madagascar - IRRI Rice Research Project. REDSO/ESA has been intimately involved in the technical review of this project, and State (89) 276654 specifically authorizes you to authorize this project in the field subject to REDSO concurrence.

JUSTIFICATION TO CONGRESS: A Congressional Notification was sent to Congress on January 11, 1991. The 15 day waiting period expired on January 25, 1990 without objection.

RECOMMENDATION: That you approve the requested grant for the Madagascar - IRRI Rice Research Project by signing the attached Project Paper Face Sheet, Project Authorization, and PIO/T.

Attachments:

1. Project Authorization
2. Project Paper Face Sheet
3. Project Paper
4. Project Checklists
5. Grantee and GDRM Request Letters
6. IEE
7. MOU signed by authorized representative of IRRI and the GDRM
8. PIO/T

Clearances:

USAID/E/PDO: EStauffer:	<u>[Signature]</u>	Date: <u>3/7/90</u>
USAID/E/PROG: JJohnson:	<u>[Signature]</u>	Date: <u>3/7/90</u>
REDSO/RCC: [Signature]:	<u>[Signature]</u>	Date: <u>3/13/90</u>
REDSO/IDA: SSpelman:	<u>[Signature]</u>	Date: <u>3/20/90</u>
RFMC: Mhullung:	<u>[Signature]</u>	Date: <u>3/19/90</u>
REDSO/DIR: SShah:	<u>[Signature]</u>	Date: <u>3/20/90</u>

Drafted: USAID/E/ADO: JThomas: 1/2/90  
[Signature]

## PROJECT AUTHORIZATION

Name of Country: Madagascar  
Name of Project: Madagascar - IRRI Rice Research Project  
Number of Project: 687-0105

1. Pursuant to Title II of the Foreign Operations, Export Financing, and Related Programs Appropriations Act of 1990 (Sub-Saharan Africa, Development Assistance), I hereby authorize the Madagascar - IRRI Rice Research Project for the Democratic Republic of Madagascar (GDRM) involving planned obligations of not to exceed Five Million Six Hundred Thousand U.S. Dollars (\$5,600,000) in grant funds (Grant), over a five year period from the date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/Allotment process, to help in financing foreign exchange and local currency costs of the project. The planned life of the project is five years from the date of initial obligation.

2. The purpose of the project is to finance technical assistance, commodities, training and other costs to strengthen the GDRM's capabilities to carry out rice research in the context of a rice-based cropping system and to develop appropriate farmer technologies. This project will be implemented through a grant to the International Rice Research Institute (IRRI) working in collaboration with the Government of Madagascar's National Agricultural Research Organization (FOFIFA) under the Ministry of Scientific Research and Technological Development (MRSTD).

3. The Grant Agreement, which may be negotiated and executed by the office to whom such authority is delegated in accordance with A.I.D. Regulations and Delegations of Authority, shall be subject to the following essential terms and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate:

(A) Source and Origin of Commodities, Nationality of Services

Except as A.I.D. may otherwise agree in writing:

(1) Commodities financed by A.I.D. under the Project shall have their source and origin in countries included in A.I.D. Geographic Code 935. All reasonable efforts shall be used to maximize U.S. procurement whenever practical.

(2) The suppliers of commodities or services financed by A.I.D. under the Project shall have countries included in A.I.D. Geographic Code 935 as their place of nationality.

(3) Ocean shipping financed by A.I.D. under the Project shall be financed only on flag vessels of the countries included in A.I.D. Geographic Code 935, subject to the 50/50 shipping requirements under the Cargo Preference Act and the regulations promulgated thereunder.

(B) Grant Covenants and Special Provisions

(1) Prior to the procurement or use of chemical pesticides and insecticides financed under the grant, the grantee will be required to obtain written concurrence from the A.I.D. Regional Pesticide Advisor of (a) the use of these chemicals, and (b) the steps for safe handling and storage of these chemicals by project personnel.

(2) IRRI will obtain concurrence from USAID and FOFIFA of the selection of individuals to fill the long-term technical assistance positions of the Soil Scientist and Agricultural Economist/Team Leader prior to their appointment.

(3) Salaries of IRRI core staff assigned to the project for short-term technical assistance assignments to Madagascar shall not be charged to the A.I.D. grant for the first week of such work per scientist per year.

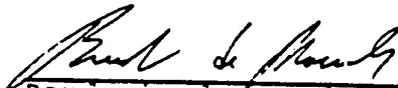
(4) IRRI will obtain the concurrence from USAID to the selection of the outside individual financed under this Grant for the scheduled mid-term evaluation, and to the Scope of Work (SOW) for the Project audits of dollar funds.

(5) IRRI will submit to USAID copies of annual audits of dollar funds for the Project.

(6) IRRI will submit semi-annual summaries of the value of procurement of commodities financed under the Grant by A.I.D. Geographic Source/Origin Codes along with every other quarterly financial report.

(C) IRRI CONTRIBUTION

The IRRI contribution to this Project, including in-kind costs, shall not be less than \$370,340.

  
Baudouin de Marcken  
Mission Director

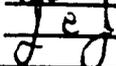
March 21, 1990

Date

Concurrence: REDSO/DIR:SShah \_\_\_\_\_ Date: \_\_\_\_\_

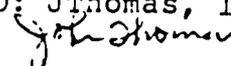
Clearances:

USAID/M/PDO: DStauffer:  \_\_\_\_\_ Date: 5/8/90

USAID/M/PROG: JJohnson:  \_\_\_\_\_ Date: 3/7/90

RFMC: AHulliang: \_\_\_\_\_ Date: \_\_\_\_\_

REDSO/RLA: SSpielman: \_\_\_\_\_ Date: \_\_\_\_\_

Drafted: USAID/M/ADO: JThomas, 1/04/90  


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\_\_\_\_\_  
Baudouin de Marcken  
Mission Director

\_\_\_\_\_  
Date

Concurrence: REDSO/DIR:SShah       *Ums*       Date:       3/20/90      

Clearances:

USAID/M/PDO: DStauffer:       *DS*       Date:       3/8/90      

USAID/M/PROG: JJohnson:       *JJ*       Date:       3/8/90      

RFMC: AHullung:       *AS*       Date:       3/19/90      

REDSO/RLA: SSPielman:       *SS*       Date:       3/20/90      

Drafted: USAID/M/ADO: JThomas, 1/04/90

*Joh Thomas*

MADAGASCAR-IRRI RICE RESEARCH PROJECT

PHASE III

A proposal  
submitted to the  
United States Agency for International Development

by  
the International Rice Research Institute

January, 1990

## TABLE OF CONTENTS

<b>Abbreviations and Acronyms Used In This Document</b>	7
<b>Background</b> .....	7
FOFIFA's Accomplishments .....	7
IRRI's Accomplishments .....	9
Future Challenges .....	10
<b>FOFIFA's National Rice Research Program (1989-1994)</b> ....	12
Research Themes .....	12
Target Areas .....	15
Modality of Intervention .....	15
Human Resource Development .....	15
Physical Resource Development .....	16
Financing .....	16
<b>Department of Rice Research</b> .....	16
<b>Third Phase of the Madagascar-IRRI Rice Research Project</b>	17
Goal .....	18
Purpose .....	18
Outputs .....	18
IRRI Inputs .....	20
GDRM Inputs .....	20
Activity Description .....	21
General overview .....	21
Technical Assistance .....	22
Training .....	23
Conferences, workshops, monitoring tours .....	24
Commodity Procurement .....	24
Research Program .....	25
o Variety improvement sub-program .....	25
o Cropping systems sub-program .....	27
o Soils research sub-program .....	28
o Agro-economics sub-program .....	29
o Pest management sub-program .....	29
Plant pathology .....	30
Entomology .....	30
o Agricultural engineering sub-program ....	30
Technologies to be developed .....	31
Review of Research Priorities, Strategies and Activities .....	31
Other Organizations Conducting Rice Research .	32
Research-Extension Linkages .....	34
<b>Social-economic Aspects of Rice Research and Improvement</b>	35
Gender Issues .....	35
Equity Issues .....	36
Land Tenure .....	37
Credit Issues .....	38
Researcher Awareness .....	38
<b>Beneficiaries/Benefits</b> .....	39
<b>Implementation Schedule</b> .....	41
<b>Implementation Arrangements</b> .....	46
IRRI Technical Assistance Team .....	46
Training .....	47
Germplasm Procurement .....	47

Commodity Procurement .....	47
Financial Plan .....	49
Reporting Requirements .....	50
Financial Reports .....	51
Status Reports .....	51
Commodity Procurement Reports .....	51
Project Completion Report .....	51
Evaluation .....	51
Audit .....	53
Environmental Impacts of Project Activities .....	53
D.R.R. Organization chart	

#### APPENDICES

##### Appendix A:

Table 1. Plan for recruitment and training of FOFIFA rice scientists.
Table 2. Number of short-term trainees for the Third Phase.
Table 3. Long-term training for the Third Phase.
Table 4. Intended consultancies for the Third Phase.
Table 5. Construction and improvement program.
Table 6. Financial plan of investments and improvements.
Table 7. Estimate expenditures in FMG.
Table 8. Total estimate of expenditures in FMG.
Table 9. Approximate number of Malagasy scientists participating in symposia, conferences, workshops/monitoring tours during Phase III.
Table 10. Logical framework.
Table 11. Provisional commodity procurement plan, 1990-1994.
Table 12. Summary procurement plan.
Table 13. Proposed budget for USAID/IRRI Malagasy Rice Research Project (Phase III) for a five-year period from January 1, 1990 to December 31, 1994 (in US \$).
Table 14. Madagascar-IRRI research project financial plan.
Table 15. Overall Project costs Phase I and II.

##### Appendix B:

Table 1. Terms of reference and qualifications of the Rice Breeder.
Table 2. Terms of reference and qualifications of the Cropping Systems Agronomist.
Table 3. Terms of reference and qualifications of the Soils Scientist.
Table 4. Terms of reference and qualification of Agro-economist/Technology Transfer Specialist.
Table 5. Terms of reference for IRRI Team Leader.
Table 6. Regions, sites and ecologies with approximate impact areas where FOFIFA plans to conduct applied research in a cropping systems context and types of research to be conducted.
Table 7. Provisional number of technologies to be developed by ecology and region during the Phase III.

## ABBREVIATIONS AND ACRONYMS USED IN THIS DOCUMENT

<b>ARFSN</b>	Asian Rice Farming Systems Network
<b>CALA</b>	Complexe Agricole du Lac Alaotra (Agricultural Complex of Lac Alaotra)
<b>CIAT</b>	Centro Internacional de Agricultura Tropical, Colombia (International Center for Tropical Agriculture)
<b>CIRAD</b>	Centre de Cooperation Internationale en Recherche Agronomique pour le Developpement (International Center for Agronomic Research for Development)
<b>DRAAE</b>	Departement de Recherches Agronomique et Agro-economique (Department of Agronomic Research and Agro-economy, FOFIFA)
<b>DRD</b>	Departement de Recherches-Developpement (Department of Research Development, FOFIFA)
<b>DRR</b>	Departement de Recherches Rizicoles (Department of Rice Research, FOFIFA)
<b>DRT</b>	Departement de Recherches Technologie (Department of Technology Research, FOFIFA)
<b>FIFABE</b>	Fikambanana Fampanandrosoana ny Lemak'i Betsiboka (Association for the Development of the Plain of Betsiboka)
<b>FMG</b>	Malagasy Francs (US\$1.00 = FMG 1,500 in January, 1989)
<b>FOFIFA</b>	Foibe Fikarohana Ampiharina amin'ny Fampanandrosoana ny Ambanivohitra (National Center for Applied Research on Rural Development)
<b>GDRM</b>	Government of the Democratic Republic of Madagascar
<b>GEU</b>	Genetic Evaluation and Utilization
<b>GTZ</b>	Deutsche Gesellschaft fur Technische Zusammenarbeit (The West German Bilateral Aid Program)
<b>IBPGR</b>	International Board for Plant Genetic Resources
<b>ICARDA</b>	International Center for Agricultural Research in the Dry Areas
<b>ICRISAT</b>	International Crop Research Institute for the Semi-Arid Tropics

IITA International Institute of Tropical Agriculture

INRA Institut National de la Recherche Agronomique (National Agronomic Research Institute)

INSURF International Network on Soil and Sustainable Rice Farming Systems

IRAT Institut de la Recherche Agronomique Tropicale (Institute of Research on Tropical Agronomy)

IRRI International Rice Research Institute

IRTP International Rice Testing Program

MINAGRI Ministere de la Production Agricole et du Patrimoine Foncier (Ministry of Agriculture)

MRSTD Ministere de la Recherche Scientifique et Technologique pour le Developpement (Ministry of Scientific and Technological Research)

NGO Non-government organization

ODAI Operation de Developpement Agricole Integre (Operation for Integrated Agricultural Development)

ODASE Operation de Developpement Agricole du Sud-Est (Project for the Agricultural Development of the South-east Region)

ODEMO Operation de Developpement du Moyen-Ouest (Project for the Development of the Middle-West)

ODR Operation de Developpement Rizicole (Project for Rice Development)

ORSTOM Office de la Recherche Scientifique et Technique d'Outre-Mer (Bureau of Scientific and Technical Overseas Research)

PDRA Plan Directeur de la Recherche Agricole (Agricultural research strategies)

PEM Programme Engrais Malagasy (Malagasy Fertilizer Program)

IITA	International Institute of Tropical Agriculture
INRA	Institut National de la Recherche Agronomique (National Agronomic Research Institute)
INSURF	International Network on Soil and Sustainable Rice Farming Systems
IRAT	Institut de la Recherche Agronomique Tropicale (Institute of Research on Tropical Agronomy)
IRRI	International Rice Research Institute
IRTP	International Rice Testing Program
MINAGRI	Ministere de la Production Agricole et du Patrimoine Foncier (Ministry of Agriculture)
MRSTD	Ministere de la Recherche Scientifique et Technologique pour le Developpement (Ministry of Scientific and Technological Research)
NGO	Non-government organization
ODAI	Operation de Developpement Agricole Integre (Operation for Integrated Agricultural Development)
ODASE	Operation de Developpement Agricole du Sud-Est (Project for the Agricultural Development of the South-east Region)
ODEMO	Operation de Developpement du Moyen-Ouest (Project for the Development of the Middle-West)
ODR	Operation de Developpement Rizicole (Project for Rice Development)
ORSTOM	Office de la Recherche Scientifique et Technique d'Outre-Mer (Bureau of Scientific and Technical Overseas Research)
PDRA	Plan Directeur de la Recherche Agricole (Agricultural research strategies)
PEM	Programme Engrais Malagasy (Malagasy Fertilizer Program)

SOAMA Societe d'Andapa Mamokatra (Society for the Development of Andapa Region)

SOD3MO Societe de Developpement de la Plaine de Morondava (Society for the Development of the Plain of Morondava)

SOMALAC Societe d'Amenagement du Lac Alaotra (Regional development authority for the Lake Alaotra region)

SPV Service Protection Vegetale (Plant Protection Service, MINAGRI)

UNDP United Nations Development Program

## BACKGROUND

On February 24, 1984 a grant agreement was signed between the United States Agency for International Development (USAID) and the International Rice Research Institute (IRRI) to initiate a series of activities in Madagascar which involved IRRI scientists in a systematic procedure for evaluating and purifying the national rice collection, introducing improved germplasm into the country's rice breeding program and for developing improved cultural practices. The goal of the program was "to improve rice production on farms in Madagascar", and the purpose was "to develop an institutional mechanism for the exchange of information and materials between IRRI and the GDRM rice research institution". To this end USAID provided 1.2 million in US dollars and the Government of Madagascar FMG 603 million equivalent to 1.207 million dollars for a period of 30 months. Although the grant agreement was signed in February 1984, implementation began in August 1984 with the arrival of IRRI resident scientists.

At the request of FOFIFA, IRRI solicited for a continuation of the USAID project assistance for another 24 months, that is, from August 20, 1986 to August 20, 1988. The goal of this second phase remained the same as that of the first phase. The original purpose of the project was retained, but it was recognized that the project purpose was no longer limited to information and material exchange, but was also to carry out effective rice research in the context of a rice-based cropping system. USAID provided 2.28 million in dollar funds and the Government of Madagascar FMG 1.8 billion equivalent to 2.4 million dollars for a period of 24 months. The second phase was extended an additional 16 months until December 31, 1989, to use the remaining grant funds.

## FOFIFA's Accomplishments

Over the past 5 years, IRRI has worked with FOFIFA to put in place the foundation of a system for introducing, developing and testing improved technology and its eventual transfer to farmers. Among the major accomplishments has been the improvement in the focus and organization of rice research activities. Every year since 1985, an annual meeting of the National Rice Team composed of the major research and development organizations has been held to communicate research results for the past year and to coordinate research activities for the coming years. The rice program now cooperates with at least six development programs (ODAI, ODASE, ODR, SOMALAC, FIFABE, ODEMO, PEM) in the development and evaluation of new technologies.

Physical facilities and human resources available to the rice program have been greatly strengthened. A rice station at Mahitsy has been constructed and equipment and materials procured to provide support for the research scientists; basic rehabilitation work has been initiated at regional stations; new scientists have been recruited for the rice program and many scientists have received specialized training. In addition research monitors and research assistants have undergone in-country training.

A farming systems approach to research has been introduced. Multi-disciplinary farming systems teams have been created which have completed diagnostic surveys at Marovoay and in the Middle-West. On-farm research with a cropping system perspective has been carried out since 1985 focusing on fertilizer management, improved cultural practices, the use of Azolla and Sesbania, double cropping, and testing of small machinery. Non-rice crops have been introduced and are being evaluated as part of the program to improve farmers' cropping patterns and increase their incomes. In addition to non-rice food crops, the rice program is also testing green manure and forage crops in different rice based systems. Farmer-managed technology verification rice trials are being conducted by FOFIFA's Department of Research Development (DRD) in Lac Alaotra and the Middle West and will be initiated in Marovoay next season. The cropping systems program of DRR has initiated farmer-managed technology verification trials in Manjakandriana and Mahitsy with more than 100 farmers participating. Ninety of these farmers are testing 3 to 4 new varieties and their local variety using their own management practices. Ten farmers will compare their variety and cultural practice with the FOFIFA recommendation of improved variety, applying fertilizer by root dipping and transplanting at a shallow depth. Other farmers are comparing the advantages of using selected seed versus non-selected seed.

The screening of local varieties and introduction of improved varieties from the international germplasm collection and national programs has made considerable progress. Approximately 1400 rice varieties have been introduced into the country since 1984 and are now at different stages of testing. From the introduced and local collections several promising varieties have already been identified and are being used in a crossing program. FOFIFA's research efforts have resulted in the development and release of new varieties. Over the past 5 years, FOFIFA has released 3 varieties for certain regions of the High Plateau, 2 varieties in Lac Alaotra and 2 varieties for the west coast. There is a sincere commitment on the part of the National Rice Research Team to demonstrate that it is capable of generating useful and adoptable technologies for rice farmers of Madagascar.

### IRRI Project's Accomplishments

IRRI has contributed in many ways to the accomplishments outlined above. In no area has this contribution been greater than in the area of training. Approximately 42 FOFIFA scientists have received short-term training at IRRI in the Philippines in the areas of variety improvement, integrated pest management, soil fertility, weed science, basic rice production, azolla research, agro-climatology, agricultural mechanization, farming systems, cropping systems and technology transfer. Three researchers have completed research management training in the U.S. Despite its very limited man-power, FOFIFA has released 4 experienced scientists to pursue their MS or PhD degrees. Thus, a long-term program for increasing the research capabilities and qualifications of FOFIFA scientists has been initiated.

Approximately 26 FOFIFA scientists have participated in conferences, workshops and monitoring tours in Africa and Asia.

Project funded commodities have been essential in the conduct of field work. The IRRI project has provided a number of vehicles to both the central and regional stations to permit researchers to visit trials and permit more timely delivery of research inputs. Other commodities procured include field and laboratory equipment and scientific literature for the different stations.

In 1987 linkages between FOFIFA and IRRI were reinforced with the visit to Madagascar of Dr. Swaminathan, the then Director General of IRRI, for the inauguration of the Rice Research Department at Mahitsy. During his visit Dr. Swaminathan had discussions with the Prime Minister, the Chief Agricultural Advisor to the President, the Minister of MRSTD, the Director General of FOFIFA, as well as numerous other officials involved in rice research. He also presented a paper "Biotechnology and Rice Development" at an international rice conference organized by the Malagasy Academy of Sciences.

In 1988 the ministers of MRSTD and MINAGRI and the Conseil Suprême de la Revolution member responsible for agriculture policy visited Indonesia, the Philippines and India to learn how these countries have achieved self-sufficiency in rice production. They also visited IRRI and met with its administrators and senior scientists. The Director General and Scientific Director of FOFIFA have also visited IRRI to discuss research progress, training needs, etc. These visits have markedly improved the exchange of information between IRRI and GDRM rice researchers.

IRRI's resident scientists have been catalysts in the improvement of the planning and conduct of research work. The rice breeder has worked closely with Malagasy colleagues in the screening of local varieties, testing introduced germplasm from three international centers and 23 national programs, and in the initiation of a crossing program. The agronomist has worked with his colleagues to introduce a cropping systems approach to research in Madagascar, move research trials off-station to farmers' fields and introduce non-rice crops for testing in different cropping systems.

In addition special expertise has been provided through approximately 25 short-term consultancies in such areas as agricultural economics, agricultural engineering, breeding, cropping and farming systems, plant pathology, soil fertility and management, research station development, and azolla research. A noteworthy achievement has been the formation of multi-disciplinary teams for diagnostic surveys. IRRI consultants have provided in-country training for FOFIFA rice researchers in statistics and computer applications in agronomy and agro-economics. One IRRI consultant has finalized an agro-climatic map defining different rice ecologies in Madagascar. The map and ecology descriptions will help identify major rice environments, an essential step in appropriately focusing national rice research efforts.

Three important books on rice production and technology have been translated, two into Malagasy and one into French, for distribution at low cost. The International Rice Research Newsletter is also received by all FOFIFA rice researchers and some extension officers keeping GDRM rice scientists abreast of research developments around the world.

### Future Challenges

Despite the substantial progress that has been made over the past 5 years, much remains to be done to fully institutionalize rice research using a cropping systems approach in Madagascar and to realize the contribution that research can make to increasing rice yields and achieving rice self-sufficiency. Specific challenges are:

1. Over the past 20 years average rice yields have remained stagnant at about 1.8 t/ha while they could be at 2.1-2.2 t/ha.

2. While facilities at the Mahitsy station have been constructed and basic rehabilitation work has been done at regional stations, these facilities are still inadequate and require more equipment. The regional stations, in particular, require additional or improved facilities.
3. Certain rice research disciplines are understaffed. More agricultural scientists and research assistants need to be recruited and trained especially for agronomy/cropping systems. There is a need for additional short-term training, especially in the area of farming/cropping systems, in view of FOFIFA's emphasis on strengthening capabilities to develop appropriate farming technologies.
4. Degree training has lagged. It is through degree training that scientists can develop in-depth capabilities to conduct relevant and quality research. Additional long-term training is critical for developing the level and quality of research which FOFIFA seeks.
5. Soils problems are a major constraint to increasing rice yields, especially on the High Plateau. Although good progress has been made in identifying improved fertilizer practices for some soils, more intensive and in-depth research is needed.
6. There is a need to increase research on farmers' fields and emphasize farmer testing of appropriate technologies and the transfer of technologies to farmers. In short, there is a need to continually improve on the methodologies and mechanisms for developing and quickly disseminating new technologies to farmers.
7. While a good start has been made in introducing and evaluating germplasm, many of these materials are still in different stages of testing (multiplication, screening, on-station evaluation, on-farm evaluation); much work remains to advance the materials to the point of farmer recommendation, seed multiplication and release.
8. A hybridization program was begun two years ago and progeny are still in the  $F_1$  and  $F_2$  stages. More work will be required to advance these to the on-farm testing, release and dissemination stages

### FOFIFA'S NATIONAL RICE RESEARCH PROGRAM (1990-1994)

Over the past 15 months, the FOFIFA has been reviewing its research strategies and plans for the next 7 years. The strategy planning has involved internal reviews and the inputs of expatriate scientists, development organizations and most recently those of a World Bank-led, multi-donor team. The result is a preliminary document entitled "Plan Directeur de la Recherche Agricole" (PDRA). The rice portion of the PDRA was based on the document Projet de Recherche Rizicole, Troisieme Phase: 1989-1994 (Rice Research Project, Third Phase: 1989-1994) developed in 1987, although personnel recruitment, construction and training aspects were revised in 1988. This document outlines FOFIFA's plans for rice research for the next 5 years which are summarized below.

FOFIFA's Projet de Recherche Rizicole is based on the government's national policy of achieving self-sufficiency in food production. Considering an increase in population of 2.8% per year, Madagascar will require an increase in rice production of 4.4% per year, an ambitious target indeed. This increase in production will come from both expanding areas under rice and increases in rice yields. Rice production will be intensified on 370,000 ha in Morondava, High Plateau, Port-Berge, Lac Alaotra, Middle West, Marovoay, Andapa, Mangoky, Moramanga, Itasy, Southeast and Fianarantsoa. SODEMO, ODR, ODAI, ODEMO, SOMALAC, FIFABE, SOAMA, SAMANGOKY and ODASE are externally and internally financed development programs working in some of these areas. GDRM plans that the projected increases in rice production will be realized by improvement in irrigation facilities and management, better rice production practices, greater availability of improved seeds and inputs, and credit to purchase them, all assuming favorable rice prices for the farmer producer.

#### Research Themes

In support of the above, FOFIFA has identified its rice research priorities and laid out a strategy that is both multidisciplinary and regional in approach. The proposed activities include:

1. Variety improvement: for irrigated, rainfed and upland ecologies. Components of variety improvement include tolerance to soil problems, low temperature, salinity, drought, major pests; suitability to the cropping patterns of the farmers (maturity, plant height and ratoonnability); and having acceptable grain quality.

2. Soil management - determining fertilizer recommendations for different soil types and cropping systems, nutrient efficiency, use of green manure and farm by-products.
3. Cropping systems research for increasing cropping intensity (double rice cropping, ratooning, rice-fish culture, use of sequential upland food, green manure or forage crops); improving cultural techniques; and selecting varieties of rice and non-rice crops in the cropping systems.
4. Soil conservation and establishing permanent agriculture in shifting cultivation systems. Upland rice is recognized as only one of many crops (food, industrial, tree, etc.) in this research effort.
5. Development of small machinery. Research emphasis is on the small farmer with limited financial resources. The priority is on machines which can be manufactured (and repaired) locally and do not require engines.
6. Exploiting unfavorable soils. Research on management and utilization of peat, saline and ferralitic soils.
7. Plant-environment relations. Characterization of varieties for tolerance to major stresses, primarily iron and aluminum toxicity, P deficiency, cold-induced spikelet sterility, drought and deep water. Research will include plant nutrition and mechanisms of tolerance.
8. Crop protection. An integrated approach to pest management will be developed for the principal diseases, insects and weeds; evaluation of the epidemiology of principal parasites; evaluation of yield losses due to rice pests and where necessary, a re-prioritizing of research direction; developing a "pest alert" system.
9. Rice grain quality. Although grain quality is not as important as grain quantity at this time, it is still important to determine the rice preferences for different regions and to release varieties which have the required grain qualities. Grain quality has precedence over rice nutritional value for Malagasy farmers.

10. Post harvest grain losses. An FAO/UNDP study has estimated that post-harvest grain losses in Lac Alaotra total 35-45% from which 10% is lost between cutting and threshing and 5-7% by manual milling. To reduce post-harvest losses, research will continue on developing varieties having lodging tolerance, uniform maturity, acceptable threshability and shattering tolerance; research will continue to be conducted on harvesting and threshing machines. It may be necessary to look at grain drying, milling, grain storage and the control of grain storage pests.
11. Transfer of results to development. The fundamental objective of FOFIFA is to find solutions to farmers' problems. One must therefore first identify the problems, find appropriate solutions and transfer them to the end users. The following three factors are critical in assuring the adaptability of results:
  - a. knowledge of the economic profitability of the results obtained;
  - b. understanding of the factors which result in technology adoption by farmers;
  - c. integration of rice into existing cropping systems.

Thus, FOFIFA intends to devote increased attention to:

  - 1) analysis and study of different rice-based cropping systems to identify physical, agronomic and socio-economic constraints;
  - 2) agro-economic analysis of rice production;
  - 3) on-farm testing of new rice cropping and production systems;
  - 4) follow-up and evaluation of the appropriateness of the new technology adopted by farmers and its socio-economic impacts on the region. The Department of Research Development, in conjunction with the Department of Rice Research and development organizations, is primarily responsible for follow-up and evaluation.
12. Seed Production. FOFIFA will assure sufficient production of quality breeder seed to provide the needs of seed multiplication centers of MINAGRI.

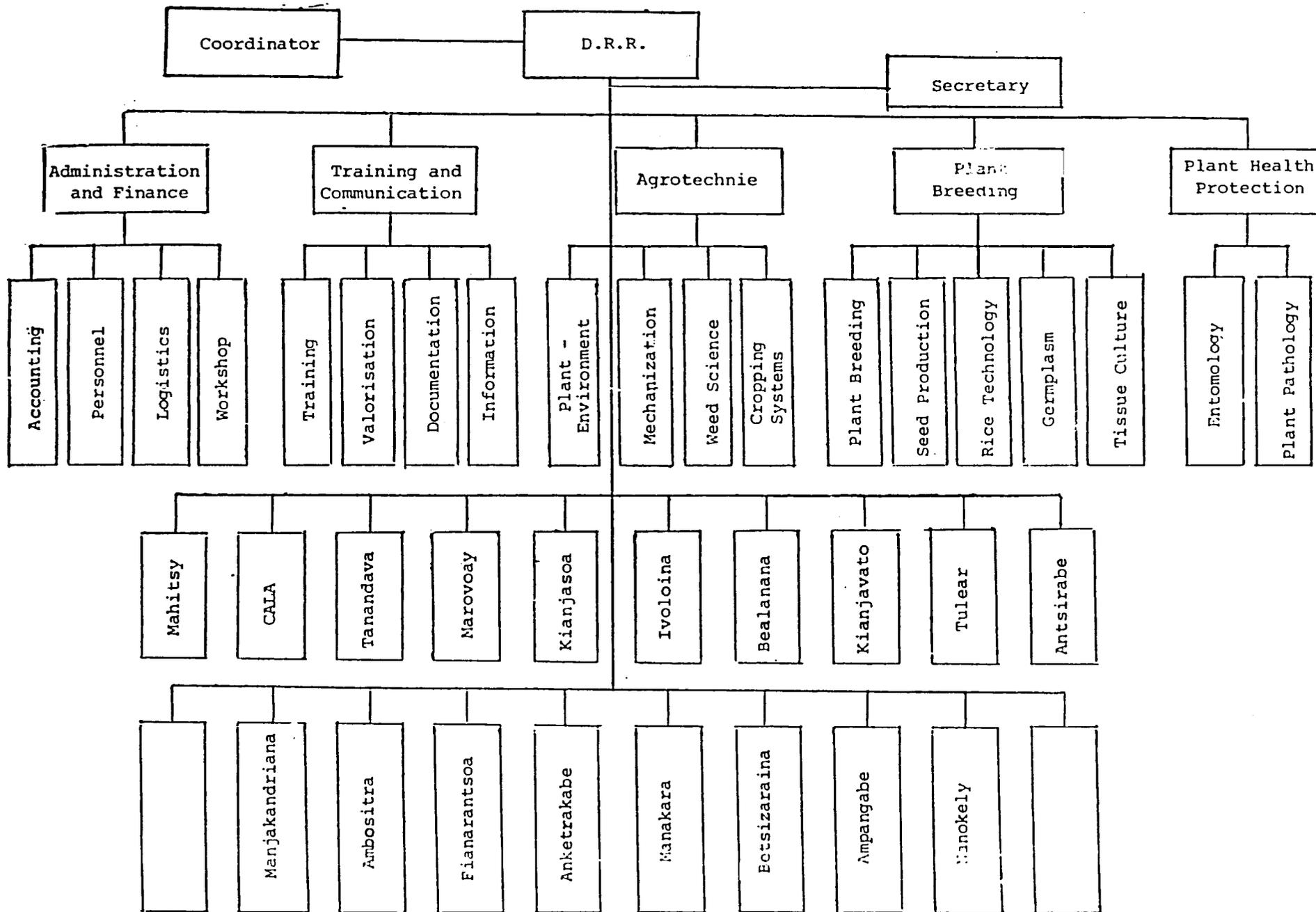
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D.R.R. ORGANIZATION CHART

DIVISIONS

STATIONS

FIELD SITES



120

### Target Areas

The High Plateau (Antananarivo and Fianarantsoa), the Middle West, Lac Alaotra, the Northwest (Marovoay and Amboromalandy), the Southwest (Mangoky area) and the east coast (Ivoloina) will continue to be target areas.

Additionally, the rice program will assist those regions in which MINAGRI has intensification projects. These are:

North: Andapa, Port-Berge, Bealanana  
 West coast: Morondava  
 High Plateau: Itasy, Moramanga  
 Southeast coast: Manakara, Mananjary  
 Southwest coast: Bezaha, Belamoty (Tulear)

### Modality of Intervention

As previously mentioned, FOFIFA's research policy is based on both multidisciplinary and regional approaches. Thus, interdisciplinary collaboration within the Department of Rice Research and interdepartmental collaboration at the FOFIFA level are being developed. Relations with development organizations will be strengthened at the level of applying research results. International assistance programs will be coordinated to avoid duplication and promote complementarity of resources. In the area of rice research, FOFIFA has programs with IBPGR, IRRI, IITA, Swiss Cooperation, IRAT, INRA, UCL (Louvain-Belgium), University of Avignon (France) and ORSTOM. The DRR will continue to participate in certain international research networks such as IRTP, INSURF and ARFSN.

Diverse methods of publicizing research results to the extension service and farmers will be used including audio-visual communication, brochures, publications, seminars, conferences and field days. Specialists will be trained in this area of information dissemination.

### Human Resource Development

FOFIFA has prepared a schedule for the recruitment and training of rice scientists. DRR plans to have 22 researchers and 15 research assistants (collaborateurs techniques) by 1994 as compared to the present 8 researchers and 18 research assistants. The increase in researchers will be accomplished by recruitment and by the up-grading of research assistants. Nine scientists will be trained at the DEA or MS level, 7 at the Doctorat 3eme cycle or PhD level and one at the Doctorat d'Etat. Short-term training needs have also been identified. Appendix A, Tables 1-3 taken from FOFIFA's Rice Research Project Third Phase proposal summarizes intended staffing, staff quality and training requirements.

The Division of Training and Communication will organize and co-ordinate in-country training of rice technicians. DRR research staff would participate in the training of extension personnel and pilot farmers.

Short-term IRRI consultants will be used to help train rice scientists in specific areas. Past experience has shown that missions of 1-4 months are more profitable for this on-the-job training than those of only several days. Therefore, consultancies identified for the next 5 years will, in most cases, be of longer duration than past consultancies.

### Physical Resource Development

During the first two phases of the project some new facilities of the Department of Rice Research have been constructed and materials and laboratory equipment acquired. Plans for the Third Phase are as follows:

- to complete the construction of the facilities for the Department of Rice Research;
- to complete the support buildings on the stations outside of Antananarivo;
- to complete procurement of laboratory and field equipment and vehicles;
- to acquire and lay out supplementary experimentation fields.

### Financing

Planned construction of facilities, short and long term training requirements and expatriate technical assistance requirements are taken from FOFIFA's Rice Research Project Third Phase proposal and presented in Appendix A, Tables 1-8. A total of FMG 8,129,650,000 is requested in local currency to meet the research, operating and construction costs for Phase III (Table 8). This is equivalent to USD 5,419,700 (Table 14, Appendix A).

### DEPARTMENT OF RICE RESEARCH

The creation of the Department of Rice Research (DRR) located at Mahitry and its functioning on 18 September, 1989 reflects the GDRM's priority for rice and rice-based cropping systems research. The creation of the DRR will enhance communication and coordination among members of the National Rice Team and will provide opportunities for greater concentration of human and material resources. The rice program will have its own research facilities as well as its own staff to work exclusively on rice and rice-based systems rather than on several crops on a part-time basis. The resident IRRI scientists also have their

offices at the DRR. The intent to have a Division of Training and Communication underscores the desire to enhance the skill capabilities of its research staff and to disseminate rice information to DRR's clients. Figure 1 on the following page shows the proposed organization diagram of the DRR.

Due to its being located at Mahitsy, 35 km from Antananarivo, DRR is conscious of the danger of its being isolated from other commodity programs and research activities which impact directly or indirectly on "rice farmer-based research". Thus, DRR will seek ways for its researchers to maintain close and meaningful communication and interaction with other FOFIFA research programs.

### THIRD PHASE OF THE MADAGASCAR-IRRI RICE RESEARCH PROJECT

IRRI is in agreement with the third phase of activities as conceptualized by FOFIFA and, within its capabilities, will assist FOFIFA in developing its human and physical resources and collaborate in conducting research themes in priority rice ecologies and in disseminating research results.

IRRI proposes a continuation of the Madagascar-IRRI Rice Research Project for a further 5 years. This third phase represents a continuation and enlargement of the second phase of activities which involve IRRI scientists with FOFIFA in a systematic procedure for purifying and evaluating the national rice collection, introducing improved germplasm into the rice variety improvement program, and developing improved technologies based on a farming systems perspective. Other activities initiated during the second phase which will be continued include 1) a rice hybridization program which greatly enriches the variety improvement program by crossing improved local and introduced germplasm to create better adapted varieties; 2) completion of diagnostic surveys in major rice production regions by multidisciplinary farming systems teams; 3) intensification of efforts to identify and disseminate farmer-acceptable technologies; 4) more intensive research on soil fertility problems, particularly on the High Plateau; and 5) a mechanization research-development program to evaluate simple machines to remove production and economic constraints in wetland and upland ecologies.

The third phase will build on the progress and the gains made during the second phase, strengthen those areas which require strengthening and address some of those factors which impeded progress towards achieving the goal of the project. The Phase III will expand and accelerate on-farm trials and research extension linkages begun in Phase II in order to firmly put in place a mechanism for technology development and dissemination.

The original goal "to improve rice production on farms in Madagascar" remains unchanged. Improvement of rice production will be achieved primarily by increasing yields, but could also be achieved by increasing yield stability (through better varietal tolerance to stresses), increasing cropping intensity, or developing varieties having less grain shattering or higher milling recovery.

The purpose of the Phase I and II grants was "to develop an institutional mechanism for the exchange of information and materials between IRRI and the GDRM rice research institution". This institutional mechanism is now in place and is being used to initiate on-station and on-farm research to identify and resolve farmer constraints.

The purpose of this third phase project will be to strengthen GDRM's capabilities to carry out effective rice research in the context of a rice-based cropping system and to develop appropriate farmer technologies.

In descending order of priority, the expected outputs of the third phase are:

1. Strengthening of rice research using a farming systems context to identify 1) more profitable cropping systems, 2) higher yielding and better adapted varieties, 3) low cost, farmer-acceptable soil fertility management and pest management practices as well as cultural practices; and to identify appropriate machinery to facilitate production operations, reduce drudgery and reduce costs of production.
2. Identification of improved varieties for irrigated, rainfed and upland ecologies by:
  - a) introduction of germplasm for irrigated, rainfed and upland ecologies;
  - b) a hybridization program targeted for irrigated and rainfed ecologies;
  - c) purification and characterization of Malagasy varieties within the existing collection of germplasm material adaptable to irrigated, rainfed and upland conditions.
3. Trained personnel for the rice research program.
4. Implementation and review of the country rice research strategies and activities for the long term development of the rice program and the Department of Rice Research.

5. Continued exchange of information between IRRI, other organizations that work on rice and the GDRM rice research program.
6. Improved capacity to undertake research through up-graded physical facilities and transport.

IRRI is deeply committed to the project goal of improving rice production in Madagascar. IRRI recognizes that the adoptability of research is partly a function of the quality and relevance of the research which in turn is dependent on involving the farmer as a true partner in the research process in order to identify the most urgent researchable problems and to provide early and continual feedback of the appropriateness of the technological solutions being tested. Therefore, the third phase will emphasize applied research for developing technologies which could lead to production increases. Technologies will be tested for their adoptiveness and profitability through farmer-managed verification trials within major rice-growing areas, using levels of resources available to farmers.

Poor soil fertility is a major constraint to achieving increased rice production among resource poor farmers. Soil related problems such as iron toxicity, low nutrient status, and phosphorus fixation significantly affect the development of improved varieties, improved cropping patterns, fertilizer efficiency, fertilizer costs, and farmer acceptance of recommendations. This area of research will be given additional attention in the third phase of the project.

Adoptability of recommendations depends on the existence of viable mechanisms for communicating research findings and information from research to the extension service, and a mechanism for disseminating that information from the extension service to farmers. Annual meetings of rice researchers, development programs and the MPARA extension service will continue. Field days for the extension service at the national, provincial and village level and for farmers will continue. The rice program plans to conduct in-country training of extension personnel and farmer leaders. It also plans to disseminate rice information and research results directly to the extension service through newsletters and brochures and to the general public through newspapers, radio and television broadcasts. IRRI will provide the equipment, materials and training to assist FOFIFA to realize their plans.

IRRI recognizes that the availability of technology alone is not sufficient to assure adoption. Adoption will depend on the existence of a well-conceived national rice policy for increasing rice production and on proper implementation of that policy. It

will also depend on ready access to seeds and other inputs, at reasonable prices, and on the availability of markets and credit. To the extent possible, IRRI experts will enter into a dialogue with GDRM officials on the policy issues affecting rice research.

Project inputs include technical assistance, training, and commodities provided through the USAID grant and GDRM support for construction, operational and other costs as summarized below:

#### IRRI inputs

- a. Technical assistance:
  - o Long term
    - 1. Agro-economist/Technology Transfer Specialist
    - 2. Plant Breeder
    - 3. Cropping Systems Agronomist
    - 4. Soils Scientist
  - o Short term consultants for durations of 2 weeks to 6 months in the areas of, among others, pest management, socio-economics, agricultural engineering, breeding pest management and training/communication.
- b. Short-term training courses for approximately 34 Malagasy scientists/administrators and 12 extension trainers and supervisors.
- c. MS and PhD training for approximately 10 Malagasy scientists.
- d. Participation of 57 FOFIFA rice scientists in conferences and workshops.
- e. Procurement of commodities such as vehicles, materials, laboratory, field and office equipment, and scientific literature.

#### GDRM inputs

Local currency for professional salaries, equipment, operating costs for office, station and field level technicians will be provided.

Other GDRM support for the rice research program will include construction of research and training facilities and staff housing at the central station at Mahitsy and at 6 regional stations, and rehabilitation and improvement of experimental fields at the research stations (see Table 5, Appendix A). Local currency will also be used for all local costs associated with the IRRI expatriate staff.

A project logical framework is presented in Appendix A, Table 10.

### Activity Description

#### General Overview

In comparison with Phase II, Phase III will be more focused on the development of practical and readily available research results intended for farmer adoption. This will be accomplished through applied cropping systems research with a farming systems perspective, one of the 8 research sub-programs in Phase III designed to identify and recommend more productive and profitable cropping patterns and/or component technologies. The very nature of cropping systems research requires a continual interaction between farmers and researchers, and the flexibility to change research plans to respond to changing situations. Some research trials will be conducted on farmers' fields managed by the farmers themselves in the major rice growing areas of the country using available resources. The farmer will be a key element in the research process and will provide early and continual feedback of the appropriateness of the technological outputs.

On-farm trials managed by the farmers began under Phase II of the project. Through participation in farming systems diagnostic surveys and from interacting with farmers and extension personnel, FOFIFA rice researchers now have a better understanding of farmers' problems and how these problems should be addressed. Phase III will continue to expand on this approach by strengthening the links between the researcher, extension agent, and the farmer.

Project inputs to be used directly and indirectly to support the strengthening of a farmer-oriented, cropping systems-based rice research program include: 29.5 person-months of long and short-term technical assistance; short-term training for 46 Malagasy rice scientists and extension workers; long term training for 10 FOFIFA rice researchers; and the procurement of research equipment, supplies and vehicles to support the research infrastructure. More than 70% of the long-term technical advisors' time will be spent on on-farm activities. Farmer-managed trials will be conducted on 10 farmers' fields in each of the 4 major target rice ecologies. At least 4 full-time Malagasy scientists will be assigned to work as counterparts to the 4 IRRI scientists, and 12 other Malagasy scientists will be trained in conceptualizing, designing, conducting and evaluating on-farm research in a farming systems context. A significant number of IRRI short-term consultants will focus on cropping/farming systems related issues.

Although on-farm research will be continued and strengthened, on-station research, which plays a significant role in developing technologies and varieties for the on-farm trials, will continue to be enhanced as well. The results of on-station will be tested and evaluated through on-farm trials.

#### Technical Assistance

Phase III will continue to provide the long term services of a cropping systems agronomist and a rice breeder to fill a need for more continuous input for the strengthening of an efficient on-farm, farmer-managed research system and to enhance the utilization of economically and financially viable research results, an agro-economist/technology transfer specialist will be added to the IRRI long-term technical assistance team for the full 5-year period. The agro-economist/technology transfer specialist will assist in conducting rice-based multidisciplinary and multi-commodity diagnostic surveys in major rice production areas and help to prioritize and address farmers' problems and constraints and potentials for adoption of improved practices and technologies. He/she will also assist in identifying 1) more efficient and effective methods for testing and dissemination of new technologies through on-farm and farmer participatory research and 2) policy options that would favor farmer adoption of technologies. He/she will assist in packaging and disseminating new technologies to farmers through government, public and private services, and will assist in the development of an effective and appropriate national technology transfer/extension system.

A Malagasy scientist, who is currently studying in the U.S. for a PhD in economics, will return to Madagascar to work in the rice program in the third year of Phase III implementation. The full-time IRRI advisor will work with the PhD graduate to provide valuable on-the-job training.

Given the widespread importance of soil fertility constraints, a fourth resident technical expert, a soils scientist, is required for a 2 1/2 year period. The role of the soils scientist will be to assist the rice program in identifying nutrient dynamics and on-farm soil fertility constraints; assist in integrating past, present and future pedology, soil fertility and laboratory research; assist in developing soil management recommendations for different rice cropping systems; and assist in formulating these recommendations for farmers.

A FOFIFA soils scientist is currently studying for an MS degree in soils science at the University of the Philippines, Los Banos, and will return to Madagascar in May 1990. By the end of the 2 1/2 year period of the IRRI soils scientist's stay, the

FOFIFA soils scientist will have received more than 2 years of on-the-job training and will then be able to fill the technical requirements of that position. Terms of reference and qualifications of the rice breeder, cropping systems agronomist, agroeconomist/technology transfer specialist and soils scientist are listed in Appendix B, Tables 1-4, respectively.

The IRRI resident scientists will continue to have an operational role as integral members of the National Rice Research Team. They will assist in conducting joint research trials in major rice ecologies of the High Plateau, the Middle West, Lac Alaotra, in the Northwest and the Southwest. They will assist with the exchange of germplasm between the activity cooperators, and will also participate in the exchange of scientific information, publications concerning rice research and production, and in the professional interchange of ideas. A major part of their role will be the training of counterpart scientists, who will gradually assume all of the functions carried out by the IRRI scientists. By the fifth year of the project the IRRI scientists should be playing a largely advisory role.

Short-term consultants will continue to provide expertise in other areas of the research program such as farming/cropping systems, agricultural engineering, plant pathology, entomology, weed science, rice breeding, agricultural economics and rice germplasm storage. They will also be used to assist in in-country training of scientists, monitors and extension personnel through the Division of Training and Communication under the DRR. IRRI will provide consultants to assist in achieving the DRR's plans to produce effective avenues for communicating research results and rice information to the extension service and farmers. Approximately 29.5 person-months of short-term consultancies are anticipated over the five year period. IRRI will finance one week per IRRI senior scientist per year for short-term technical assignments to Madagascar. Appendix A, Table 4 lists the planned consultancies.

On MINAGRI's request, IRRI is prepared to provide consultants to assist extension personnel in organizing and implementing in-country training in the area of rice production, training of trainers, and technology transfer

### Training

The proposed training levels reflect the priority given to enhancing the capability of rice researchers began in previous phases. At present, 3 researchers are studying for an MS degree in the Philippines and one researcher for a PhD in the U.S. Additionally, the project is financing the PhD research of a plant physiologist/microbiologist at IRRI to conduct research on rice-based green manure crops. The Phase III proposes the

graduate training of 10 more rice scientists, agriculture engineers and agro-economists from DRR and DRD at the M.S. and PhD levels in the Philippines and in U.S. At the end of Phase III, 15 FOFIFA rice scientists will have received advanced degrees through the project. Short-term training will be continued in cropping/farming systems, integrated pest management, plant pathology, breeding and soil science and fertilizer management with additional emphasis on training in technology transfer, training of trainers and communication. Appendix A, Tables 2 and 3 present short and long term training plans.

In view of the importance of disseminating technologies and rice information to the farmers, extension trainers and supervisors from MINAGRI must be knowledgeable in rice science, methods of communicating and training techniques. Therefore, training at IRRRI of qualified MINAGRI extension staff in basic rice production, training of trainers, technology transfer and communication or other appropriate areas will be provided. The project intends to fund the training 12 MINAGRI extension staff at IRRRI in the area of rice production, technology transfer and communication.

Training of rice scientists will not only be carried out by the IRRRI project. Other donor organizations have supported training in the past, and will continue to provide training to all FOFIFA scientists in statistics, applications of computers in agricultural research, research management, research station management and other areas.

#### Conferences, Workshops, Monitoring Tours

Scientific meetings are vital mechanisms for the exchange of ideas between Malagasy rice scientists and their peers at international and national rice research institutes. Malagasy rice scientists participate in the INSURF, ARFSN and IRTP in Africa and Asia. It is planned that Malagasy rice scientists will be funded by the project to participate in relevant conferences, symposia, workshops and monitoring tours. Provisional number of scientist-visits are listed in Appendix A, Table 9.

#### Commodity Procurement

The commodity budget will be used to meet the needs for field transportation, and office and laboratory equipment and materials for the rice programs at the different research stations. Procurement of commodities for the central rice station will be completed during Phase III, but there will be a greater emphasis on meeting equipment needs of the regional stations, both the existing and future ones. Vehicles will be

needed to meet transportation needs of the increased number of scientists, for new regional stations, for research sites where scientists are stationed and to replace old vehicles purchased during the first phase. Planned commodity purchases are listed in Tables 11 and 12.

### Research Program

IRRI support will be provided to a number of research sub-programs. For the support of 4 of the sub-programs (variety improvement, cropping systems, soils and agro-economy/technology transfer), IRRI will provide resident technical assistance. For the other sub-programs listed below, IRRI will provide short-term assistance to work on priority problems as identified by FOFIFA.

#### Variety improvement sub-program

The objective of IRRI assistance is to develop high yielding rice varieties for irrigated, rainfed lowland and upland ecologies. These varieties would have the following characteristics:

- adapted to farmers cropping systems and to double rice cropping where potential for such exists;
- adapted to low and moderate input levels as practiced by average farmers;
- adapted to major soil, climate, insect and disease stresses of the target ecologies;
- acceptable phenotypic characteristics and having acceptable milling recovery and consumer-acceptable grain, cooking and eating quality.

The research activities that will be undertaken to achieve these objectives include:

1. introduction and evaluation of germplasm from international centers and national programs for irrigated, rainfed lowland and upland ecologies;
2. purification, evaluation and characterization of local varieties;
3. screening introduced and local germplasm and breeding lines for major soil, physiological and biotic stresses; these material will also be evaluated for grain quality characteristics (such as milling recovery, gelatinization temperature, gel consistency and possibly amylose type) with equipment purchased at the end of Phase II;

4. initiation of crosses for priority irrigated and rainfed lowland ecologies in the major rice growing regions and selection and evaluation of progeny according to the breeding objectives;
5. on-farm evaluation and selection of advanced varieties and progeny;
6. preservation of the national rice collection using cold storage facilities purchased by IBPGR and the IRRI Project;
7. development of a database management system for the local and introduced varieties and elite progeny from the crossing program.

The project will require the introduction of about 200 rice varieties per year. The GDRM Quarantine Service will be able to accomodate such a number. The materials to be introduced will be jointly selected by Malagasy and IRRI breeders.

Rice breeders recognize that identifying germplasm with high yields, disease and insect tolerance, and good threshability may not be sufficient. Identifying varieties with superior milling and cooking qualities is important to assure farmer and consumer acceptance. In Phase III, the breeding program will evaluate germplasm for milling and cooking characteristics as well as for grain size, shape and appearance.

The variety improvement program will require the cooperation of soils scientists, physiologists, entomologists and plant pathologists for screening germplasm and progeny for various stresses.

The variety improvement program will supply varieties to the cropping systems program to test the most promising varieties for their adaptability and farmer acceptance.

The variety improvement program will focus on rice improvement in the target ecologies described in Appendix B, Table 6.

In the past, considerable time and effort have been expended in maintaining the national rice collection at CALA. Each year more than 3000 accessions had to be grown out, harvested and processed. With the newly constructed germplasm bank facilities at Mahitsy, the national rice collection will be maintained for a minimum 5-7 years in a series of freezers provided by IBPGR and IRRI. The Project will provide support to ensure the transfer of the germplasm from CALA to Mahitsy and its preservation by refrigeration.

28

### Cropping systems sub-program

The objective of the cropping system research sub-program is to identify and recommend more productive and profitable cropping systems (cropping pattern designs and/or component technologies) than those the farmers currently employ. The activities to be undertaken to achieve this objective include:

1. Conduct of farming systems diagnostic surveys to identify constraints and opportunities in priority target ecologies.
2. Design and test of alternative rice-based cropping patterns and yield component technologies (e.g., improved varieties, fertility and fertilizer management, pest management, weed control, cultural practices) for their agronomic and economic potential. Depending on the target environment, cropping pattern designs that might be tested include rice-rice, rice-upland crops, rice-ratoon, rice-fish and in upland areas, rice intercroops. It is recognized that in many areas the farmers' existing cropping pattern may be the optimum pattern. In the rice monocrop areas, efforts will be made to increase cropping intensity wherever possible.
3. Conduct of farmer-managed technology verification trials to assess the profitability and farmer acceptance of promising technologies.

Success of the above research activities will require multidisciplinary collaboration and a re-orientation of classic research approaches. The cropping systems research program will necessarily share and complement the objectives and activities of other research programs (variety improvement, pest management, agricultural engineering, agro-economics). As non-rice crops are tested as part of the cropping pattern design research, the cooperation and support of other commodity programs will be required.

The project will continue the introduction of non-rice crops from international centers -- beans from CIAT; lentils, chickpeas and favabeans from ICARDA; cowpeas, cassava and maize from IITA; peanuts, pigeonpeas, and "desi" chickpeas from ICRISAT. The ARFSN collects and screens peanuts, cowpeas, mungbeans, pigeonpeas, blackgrams, sesame, maize and sorghum germplasm for their adaptation to the post-rice and pre-rice paddy culture. The Phase III will continue to introduce and test elite germplasm from the ARFSN. National programs of the Philippines, China, USA and others will also continue to serve as a source of germplasm for green manure crops, forage and food legumes, oil seed crops, etc.

In addition, the program will introduce and test green manure legumes for testing in upland rice cropping systems in the Middle-West. These legumes will be tested for their capability of improving fallows by preventing soil erosion and declines in soil fertility and permitting longer crop cycles.

FIFAMANOR is the Malagasy institution responsible for wheat and white potato improvement. The cropping systems program will cooperate with FIFAMANOR in the testing of improved varieties of these crops in rice-based systems. FIFAMANOR may also initiate bean improvement, in which case FOFIFA would cooperate in testing of germplasm.

The very nature of cropping systems research requires a continual interaction between farmers and researchers, feedback from farmer to research, and flexibility to change research plans to respond to changing situations. Monitors will be recruited and specially trained to conduct cropping systems research.

Planned target ecologies are listed in Appendix B, Table 6. Realization of successful cropping systems programs in these areas will depend on the availability of trained manpower.

#### Soils research sub-program

The objective of the soils program is to develop a better understanding of the nutrient constraints and dynamics of rice soils so that soil nutrient management and improvement are based on a scientific knowledge of the particular chemistry of very representative Malagasy paddy soils. This should result in faster identification of soil problems and corrective recommendations. Research activities include:

1. review of the existing literature on soils in Madagascar;
2. conduct of research on the dynamics of Fe, Mn, P, Zn and other important nutrients in order to explain causes and mechanisms of nutritional disorders on adverse soils, particularly iron toxic soils;
3. determination of the most reliable soil tests and critical values for P, K, Zn and other major nutrients for different major soil types;
4. determination of the effect of P sources, water management and cultural practices on the availability of P to the rice plant;
5. conduct of research leading to the identification of improved methods for screening rice germplasm for P deficiency and iron toxicity tolerance.

6. development of a more functional rice soils classification system.

The soils program will be closely linked with the cropping systems program and the variety improvement program. Soils agronomists will, in fact, be key members within the cropping systems team and will conduct research collaboratively on soil management issues in target ecologies mentioned in Appendix B, Table 6 and in formulating recommendations.

The soils program may work in all the ecologies in which the cropping systems sub-program works, especially where there are serious soil-related constraints. The primary focus will be on the High Plateau wetland soils which are affected by strong P deficiencies, P fixation and iron toxicity, and are often "fertilizer non-responsive". These soils problems may occur on approximately 200,000 ha of rice land and perhaps more if the East coast is included.

Research to determine critical soil nutrient values will be relevant for almost all major soil types in Madagascar.

#### Agro-economics/technology transfer sub-program (of DRD)

The DRD conducts a wide range of research activities in the areas of socio-economics, agro-economics, farming systems, training, technology transfer and impact analysis. A long term IRRI advisor and IRRI short term consultants will assist the national rice program in the following:

1. conduct of multidisciplinary and multi-commodity farming systems diagnostic surveys in major rice growing areas in order to identify and prioritize researchable issues;
2. testing, packaging and diffusion of new technologies;
3. conduct of in-dept research on priority socio-economic and institutional and policy constraints to increasing rice production and rice farmers' incomes;
4. evaluation of the impact of research/extension activities in target rice growing areas;
5. development of an effective and appropriate national technology transfer/extension system.

#### Pest management sub-program

The over-all objective is to identify the most important insect and disease pests from the viewpoint of causing economic yield loss and to develop farmer acceptable integrated pest management programs to control them.

### Plant pathology

IRRI short-term consultants will assist plant pathologists in conducting an inventory of rice diseases, confirming the diagnoses of the suspected virus diseases and in identifying the methods of viral transmission.

A nematologist will assist FOFIFA in developing techniques for sampling and identifying pathogenic nematodes and designing research to assess the contribution of nematodes to causing economic yield losses.

### Entomology

The Swiss government-financed integrated pest management project at CALA is conducting research in the Lac Alaotra region on major rice pests found in Madagascar. The GTZ also supports a pest management specialist who works with SPV.

A FOFIFA entomologist will be awarded an MS degree in entomology from UPLB in May 1990.

IRRI short term consultants will assist the rice entomology program in developing improved methodologies to assess the economic damage caused by insect pests, to understand the ecological factors which permit than insect to be a pest, and to develop low cost, integrated pest management techniques with a particular emphasis on prevention.

### Agricultural engineering sub-program

The objective of the agricultural engineering research program is to introduce and test agricultural machinery which are appropriate for the small farmer, make any modifications which would improve their effectiveness and acceptability and to assist commercial enterprises in their fabrication. The research priority is on low cost manual or animal-drawn implements which can be manufactured (and repaired) locally.

IRRI short-term agricultural engineers will assist the program:

1. in identifying research priorities from the viewpoint of farmer constraints and the availability of technologies (from IRRI and other international centers and national programs), and in identifying the fabrication potential of small and large commercial enterprises;
2. in setting up a workshop and in training shop workers in the use of the machines through actually making design

modifications (for example, improving the maneuverability

and efficiency of the hydrotiller or increasing the flexibility of the drum seeder to maneuver better over imperfectly levelled soil);

3. in identifying and resolving technical constraints to the local fabrication of FOFIFA recommended machines.

#### Construction Activities

Construction, to be financed under local PL 480 counterpart funding, will consist of staff housing, guest quarters, storage buildings, workshops, offices and laboratories primarily at Mahitsy but also at Kianjasa, Marovoay and Fianarantsoa. Rehabilitation of offices and laboratories will be done at Ivoloina and Tananandava (see Tables 5 and 6, Appendix A).

#### Technologies to be Developed

Under Phase III, FOFIFA and IRRI scientists will co-operate in introducing and testing a number of rice technologies in major rice producing regions. Table 7 Appendix B, indicates the provisional number of technologies that could be developed for different ecologies in each rice producing region. The number of technologies to be developed and recommended will depend on sufficient manpower and budget.

#### Review of Research Priorities, Strategies and Activities

In 1985, FOFIFA developed its rice research strategies and themes; these were reviewed in 1987 and presented in FOFIFA's Rice Research Project, Phase III. As a result of participation in short-term training program, conferences, workshops and monitoring tours and through the exchange of ideas of consultants over the past years, FOFIFA researchers have been exposed to new information, concepts and methodologies. Through participation in farming systems diagnostic surveys and from conducting on-farm research with the resultant greater interaction with farmers and extension personnel, FOFIFA rice researchers have now a better understanding of farmers' problems and how those problems should be addressed. In 1990, 3 experienced FOFIFA scientists will have completed their MS degrees and will have returned to Madagascar, bringing with them increased and improved research capabilities. A FOFIFA agricultural economist studying for a PhD degree in the MS strengthening FOFIFA capabilities. With the creation of the DRR, leadership of most rice sub-programs will be placed in new

hands, and rice research will have greatly enhanced capabilities in terms of improved facilities, equipment, transport and manpower which did not exist before 1987. Given the greatly changed situation, it is timely that the rice program with its new leadership and greater research potential re-assess its future goals, objectives, strategies and research activities

Therefore, a comprehensive review of national rice research strategies and activities will be conducted about March 1991. The review team will consist of senior Malagasy scientists, donor representatives, and IRRI rice scientists representing a number of disciplines such as research administration, plant pathology, soils, agronomy, farming systems, plant breeding/genetics, agricultural economics, agricultural engineering, and training.

#### Other Organizations Conducting Rice Research

There are other externally-financed organizations conducting research in Madagascar. Since 1984, the Swiss Cooperation has financed a team of 4 Swiss scientists to conduct cooperative research with FOFIFA entomologists on integrated pest management in Lac Alaotra. Research focuses on stem borers and rice hispa. The team is stationed at CALA. Recently, the Swiss Cooperation has recruited a pest management specialist to work with FOFIFA scientists on the possibility of developing viral insecticides against the white stem borer.

Since 1984 IRAT/CIRAD has financed variety improvement and physiological studies for high elevation irrigated (>1500 m) and upland (>1200 m) rice. The team consists of a rice breeder, a physiologist and short-term consultants (e.g., plant pathologist). Activities include introduction and screening of germplasm, a crossing program and growth studies. IRRI has provided the program with germplasm introduced under the IRRI project.

FAO, through the UNDP, finances the Programme Engrais Malgache (Malagasy Fertilizer Program) under the Division of Extension, MINAGRI. The primary goal of the project is to promote fertilizer use. This is done through fertilizer demonstration trials and conducting applied research to fine-tune fertilizer rate recommendations. Over the past 5 years, FOFIFA has cooperated with the PEM in conducting research on the use of supergranules, azolla and sources of fertilizer. More recently,

FAO, IRRI and FOFIFA (DRR and DRD) have conducted comprehensive multilocation fertilizer trials in 7 valleys on the High Plateau to measure variability between and within valleys, to evaluate the agronomic and economic responses to N, P, K and S, and to relate fertilizer responses to farmers' methods of soil classification. IRRI, in the Philippines, will be conducting tissue analysis to better explain the crop nutrition aspects. Two of the three years of the project have been completed.

GTZ has financed the services of a pest management specialist who works with SPV. IRRI has maintained a continual dialogue with this scientist and has provided support in terms of consultancy reports and rice literature. He also participated in the last annual national rice meeting.

Where such opportunities present themselves, the IRRI scientists will cooperate with international (FAO) and national donor organizations (CIRAD, Swiss Cooperation, GTZ, etc.) working in Madagascar.

In addition to taking advantage of international organizations to enhance the development and diffusion of research results, the FOFIFA will continue their involvement with private organizations engaged in research, extension and development. The mechanization section of the rice program works with approximately 4 private fabricators or cooperative groups who are in varying stages of producing machines and small implements designed by IRRI. Local manufacturers of these IRRI-designed machines have made design modifications which have improved the efficiency of rice threshers. Feedback of these design modifications to IRRI have resulted in IRRI's incorporating the design modifications in their own machine. Phase III will continue to enhance the coordination between the project and local manufacturers.

FOFIFA and IRRI are currently cooperating with NGOs such as missionary groups who have a long history in Madagascar of carrying out effective agricultural extension and demonstration programs. These missionary groups include the Lutheran (SAFAFI) and Baptist churches. Both groups participate in FOFIFA's annual rice meetings in which the results of FOFIFA's research activities are presented and discussed. They have shown interest in developing seed multiplication programs, and SAFAFI has financed the cost of translating and distributing IRRI's Primer for Growing Rice into Malagasy for use by farmers and extension

workers. FOFIFA provides small amounts of seed to the missionary groups and other private organizations for testing in their projects. FOFIFA has an established link with a privately-owned sisal factory in which it tests the application and effectiveness of organic fertilizers produced from the factory. With continued improvement in the nation's economy, this company plans to commence seed multiplication in the future. Currently, there are no private sector producers of rice seed.

IRRI and FOFIFA recognize the potential role and long-term impact of the private sector in research diffusion as well as extension per se. The Phase III grant will continue to develop the linkages already established and will explore other potential opportunities for the long-term beneficial impact of the rice research effort.

#### Research-Extension Linkages

Diffusion of research results through the extension service of MINAGRI has been previously discussed on pages 18 and 23. FOFIFA has a mandate for research and MINAGRI does applied research and extension. The creation of the DRR at FOFIFA will eventually result in increasing communication with MINAGRI's extension service. Better communication and coordination between FOFIFA and MINAGRI will result from a Division of Training and Communication to be created in the DRR in which extension training and information diffusion will be key functions. DRR will work with DRD and DVA's "Information and Communications Division" to translate and communicate research results into a message which extension agents can understand and use. In Manjakandriana and Mahitsy, rice researchers and DVA are presently collaborating in conducting farmer participatory trials. This collaboration will be intensified and expanded in future to include setting up of demonstration plots and holding farmer field days together. Researchers will also be involved in the training of extension agents.

Under Phase III grant, IRRI will order an offset duplicator and other printing equipment. FOFIFA, with IRRI's assistance, plans to publish a rice systems newsletter to be sent to every extension agent, non-government organization and private sector agricultural input firm in Madagascar. The newsletter would report FOFIFA's research results; provide general rice information from IRRI, IITA, CIAT, CIRAD and national programs; provide a question/answer service; print the reports of promising or successful farmer technologies; and report the availability of rice literature in Madagascar or outside, etc. It would also print brochures to accompany the release of new varieties,

management practices and production systems. During Phase III, someone will be recruited or trained to organize and implement this activity.

In order to develop stronger farming systems research approaches, more intensive interdisciplinary research and closer research-extension-farmer linkages, FOFIFA plans to organize multi-commodity regional research teams for each of the mahor production regions. The teams will be composed of representatives of the different commodity programs (crops, forestry and animal sciences), socio-economists from DRD, representatives from the regional extension service and representatives of NGOs relevant to the success of effecting farmer adoption of the new technologies (such as input supplies, credit, marketing, etc. ). The regional teams will be responsible for identifying and prioritizing research to address farmer problems and opportunities. Members of the teams will receive in-country training on farming systems philosophy and methodology. The teams are expected to interact much closer with farmers in identifying problems and in designing and evaluating treatments. The closer interaction with the extension agents during all phases of the research process is intended to promote extension's understanding of the technology and its diffusion to farmers. The regional teams will also be responsible for organizing field days for farmers and local extension workers.

It is recognized that rice millers play an important role in providing credit to farmers and in controlling rice milling quality including present head rice recovery. The project will encourage FOFIFA to include rice millers to receive rice informations (invited to field days, receive newsletters and variety bulletins).

Interdisciplinary diagnostic surveys to identify farmer problems have already been conducted in Marovoay and the Middle West and will be conducted in other production environments. The diagnostic surveys and close researcher-farmer interaction through the regional teams should result in the selection of treatments being more compatible with the average or small farmers' resources (income, labor, credit opportunities, etc.).

#### SOCIAL-ECONOMIC ASPECTS OF RICE RESEARCH AND IMPROVEMENT

##### Gender Issues

The method of growing rice in Madagascar is very similar to that practised in Southeast Asia. Land preparation by hoe or animal-drawn plows and harrows is exclusively men's responsibility.

Transplanting is done primarily by women, often using shared labor or hired labor. Handweeding is done primarily by women but weeding by mechanical weeders is performed primarily by men. Both men and women participate in the harvesting, threshing and cleaning of rice.

The impact of the research program would be gender neutral or should favor women farmers. The use of improved varieties, fertilization practices and cultural practices would not alter the role of women in rice culture. The use of straight row planting which often accompanies use of improved varieties and fertilizer may increase use of manual weeders, which are operated by men.

Women's concerns will be taken into account in the research and development process. Within the DRR, of the eight Malagasy rice breeders, four are women; two of the four entomologists and one of the two plant pathologists are women; three of the nine agronomists are women. The position of the National Rice Program Coordinator is held by a woman. In DRD, a woman holds the position as coordinator of the research development program for Marovoay. Thus, there are sufficient women researcher and women in leadership positions who can assure that new technologies are not detrimental to women rice farmer; that is, the technology is at least gender neutral and will not result in women being inadvertently disadvantaged (loss of employment for women workers, increased drudgery, reduced income, etc.)

### Equity Issues

Equity issues may be relevant to this project. It is recognized that technologies are more easily developed and adopted on irrigated areas than rainfed areas. The timely arrival of water and the better water control on irrigated farms provide for more timely cultural practices, better management of nutrients, better weed control, less risk from drought and thus, higher and more stable yields. Irrigated farms have more potential for double cropping. Irrigated farms are more likely to use recommended varieties and associated cultural practices including fertilizer. Experience has shown that adoptability of new technology on irrigated farms is faster and more complete than on non-irrigated farms.

As irrigated areas have research priority over rainfed and upland ecologies, it is expected that farmers in irrigated areas will derive greater and more immediate benefits from research efforts than rainfed farmers. On the other hand, experience in other countries has shown that there is diffusion of technologies

from the irrigated areas to rainfed areas, particularly to the more favorable rainfed areas. We also expect that the benefits will be higher for research conducted in the irrigated (and favorable rainfed) than in unfavorable rainfed and upland environments. Nevertheless, research on priority rainfed and upland ecologies will be conducted, and rainfed farmers will be given equal access to the technologies to test on their farms. However, one can expect that the development and diffusion of technologies for rainfed areas will require more time.

### Land Tenure

Experience in other countries has shown that adoption of new technologies on farms of absentee landlords is more slow than on owner-operator farms. Tenant farmers are often told what varieties to grow and how to grow them. Tenant farmers are understandably averse to purchasing inputs from which they do not receive a full return. The degree of impacting on rice farms under tenant contracts will depend on owner and tenant farmer arrangements to share input costs.

Tenant farming is unlawful in Madagascar. As such no official data are available, but it is known that tenant farming and other forms of land sharing arrangement are widespread. A study conducted in the Middle West by DRD in 1984 indicated that only about 15% of farmers were tenant farmers but each tenant farmer farmed about 2 hectares. The study did not indicate whether tenant farmers were owner-operators of their own farms as well. Under tenant arrangement in the Middle West, tenant farmers provide labor and the owner provides seeds and any other inputs. Tenants receive 2/3 of the production and the owner 1/3. Recent studies by DRD in Manjakandriana have suggested that 40% of the rice area is farmed by tenant farmers whereby the tenant and owner each receive 1/2 of the rice production. The owner usually dictates the variety to be grown. On the other hand, tenant farmers are usually free to grow any crop during the off-season on rice lands and retain all of the production. In other areas of the High Plateau tenant farming is thought to be high and arrangements are similar to those at Manjakandriana.

In the Marovoay area, DRD has just begun to study socio-economic issues, including land tenure. On the left bank of the Marovoay Plain, where both wet and dry season rice is grown, only 4 of the 30 farmers interviewed were tenant farmers, three of the four not owning any rice land of their own. However at Miadana on the northern side of the Marovoay Plain where only wet season rice is grown, none of the 28 farmers interviewed were tenant farmers.

DRD is presently collecting or planning to collect data on land tenure and other socio-economic issues in Marovoay, the Middle West and the High Plateau (e.g. Antsirabe and Manjakandriana). This information will be valuable to the MINAGRI which is now developing a program to provide more stable land tenure arrangements to farmers in order to promote investments, improve soil conservation and fertility and expand production. Thus, the rice program will share land tenure data with MINAGRI and will make farmers aware of MINAGRI's land tenure programs.

It is expected that the adoption of improved technologies, particularly more intensive cropping patterns will increase employment opportunities as farmers are often willing to invest in labor which will realize substantial returns. Adoption of the improved varieties will benefit both farmer adopters whose incomes will be increased, and consumers who will have access to inexpensive rice.

#### **Credit Issues**

Access to credit will be a necessary prerequisite for many farmers to adopt new technologies. Not all farmers have equal access to credit to purchase inputs such as improved seed and fertilizers. Only farm owners are eligible for credit from rural banks as land titles are often used as collateral. Thus, farmer-owners as a group are better placed to purchase and employ recommended inputs. However, not all farmer-owners have titles to their land. Informal studies by DRD in the Middle West and Marovoay suggest that a substantial number of farmers do not have titles to their land although they officially own the land. In such cases, these owners are not eligible for credit. Thus, non-title to the land is an important socio-economic issue in itself. GDRM is suppose to have a program to provide titles to land owners.

#### **Researcher Awareness**

It is important that researchers recognize the needs and socio-economic constraints of the farmer beneficiaries who are both men and women. The diagnostic survey and day-to-day researcher-farmer interactions address these issues and help assure that the research program considers the farmer situation in the planning and design of research. The fact that trials are conducted on-farm provide opportunities for feedback from the beneficiaries to the researchers. Farmer-managed verification trials provide opportunities for beneficiaries themselves to test new technologies and to provide feedback to researchers.

### BENEFICIARIES/BENEFITS

The immediate and principal beneficiaries of this project will be the Malagasy rice scientists who will acquire enhanced capabilities to conduct relevant research because of the training received, and because of their improved access to needed equipment, transport and other facilities. In consequence, FOFIFA as a whole will benefit from the strengthening of its research capabilities. A cadre of trained research scientists who can independently develop new technologies will be needed to meet future rice production requirements. The present 2.8% population increase will require Madagascar to increase rice production by 4.4% annually or to double its rice production about every 12 years. Such an increase cannot be sustained simply by expanding the area grown to rice, but can only be achieved by increasing yields per hectare. This will require a continuous flow of new technologies from researchers to farmers.

Other direct beneficiaries of this project will be the extension service officers and agents of DVA, MPARA who will have received rice production and training-of-trainers instruction at IRRI, or in-country training through IRRI short-term training consultants. Extension officers and agents will benefit, furthermore, from the dissemination of rice information and research results through FOFIFA's brochures, newsletters, field days, etc.--which will strengthen the capability of the extension service to disseminate rice technologies to its farmer clients.

The ultimate and intended beneficiaries of the project will be the rice farmers of Madagascar who make up approximately 70% of the population, and are the majority of those on the lower rungs of the economic ladder. The improved varieties and associated practices developed by the project will increase food production and incomes for the Malagasy rice farmer family. At \$260 per capita, Madagascar's GNP is among the lowest in the African region. An increase in average yields of just 20%--from 1.8 to 2.2 t/ha--(easily achievable with improved varieties which have yielded 2.5 MT/ha in research trials even without fertilizer applications, and up to 3.5 MT/ha with higher levels of input use) would result in an increase on average of 360 kg of paddy rice per hectare, equivalent to a minimum of FMG 64,800 or about \$40.00 per hectare at the average price of FMG 180/kg. As many farmers do not produce enough rice for their own needs and must purchase rice on the market during the "scarcity period" when rice prices are as high as FMG 600/kg, the value of increased production would be even more.

Since rice is the staple food of the Malagasy population, consumers also stand to gain from increases in rice production. The importance of rice in the Malagasy diet cannot be overstated; rice provides about 54% of the calories and a substantial part of the protein supply in the average diet. Annual per capita consumption has been as high as 160 kg of milled rice but is currently about 135 kg as a result of reduced purchasing power.

Economic benefits to Madagascar will be derived from adoption of more productive rice technologies at the farm level. Research undertaken by FOFIFA in collaboration with IRRI is expected to be relevant to approximately one million ha of rice land in Madagascar. Based on results obtained in the High Plateau during Phase II of the Madagascar-IRRI Rice Research Project, it is estimated that modern varieties can increase yields by at least 20% without adjusting input levels. Elsewhere in Madagascar, on more fertile soils, greater increases could be expected.

The adoption of improved management practices including use of moderate fertilizer levels have been shown by FOFIFA and IRRI to increase yields of modern varieties by at least 50% and in many situations by more than 100%.

While acknowledging the difficulty of projecting adoption rates, some indication of the likely pace of adoption can be derived from experience in other countries where significant investments in rice research were made. It is considered reasonable to assume that a strengthening of rice research in Madagascar, supported in part by the Phase 3 Project, will lead to an increase in adoption of modern varieties from an estimated 5% at present to 50% by 2010. With a strengthening of government support services, a similar rate of adoption for improved practices including moderate levels of fertilizer could also be anticipated. Projected increases in production from 1990-2010 are shown below.

	1990	1995	2000	2005	2010
Modern variety (MV) adoption					
- % of target area	5	10	20	40	50
- area (ha)	50,000	100,000	200,000	400,000	500,000
- increase in area since 1990	-	50,000	150,000	350,000	450,000
Accumulated estimated production increase from MV adoption in MT/year <sup>1</sup>	-	18,000	54,000	90,000	162,000

Accumulated estimated production increase from MV and improved practices in MT/year <sup>2</sup>	-	135,000	225,000	405,000	495,000
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<sup>1</sup> assumes 20% yield increase

<sup>2</sup> assumes 50% yield increase

The above projections, although conservative, indicate that investments in rice research may generate for the period 1990-2000 an internal rate of return of 41.6% by farmer adoption of variety alone and 141.7% for variety and improved practices.

#### IMPLEMENTATION SCHEDULE

The implementation schedule for the IRRI grant is necessarily controlled by the different rice growing seasons in different regions. Generally the rainy season rice crop begins October-December. The following is a suggested implementation plan for IRRI during the five year period of the Third Phase.

#### Year 1 (1990)

Throughout the year	Introduction of rice and non-rice germplasm.
January	Equipment supply ordering (requisitioning of some equipments will be initiated in November 1989)
January	English training of proposed MS students and future short-term trainees.
January	Departure of first semester short-term trainees.
February	Crosses initiated at Mahitsy for priority ecologies on the High Plateau, Lac Alaotra, Marovoay and Tanandava
March	Field visits by local and regional extension agents and key farmers.
April	Departure of MS/PhD candidates to the Philippines
April	Arrival of Soils Scientist and Agro economist/technology transfer specialist.
May	Return of MS students from the Philippines.

June	Departure of scientists for graduate training in the U.S.(later if no English language training required).
July	Second semester short-term training at IRRI begins.
August	Annual Rice Meeting of the national rice team/ preparation and coordination of work plans.
September	Initiate farmer managed research trials in selected ecologies.
September	Ordering of equipment for second year
November	Testing/screening of previous rice introductions and local varieties on station and on-farm.
November	Screening and advancing of F <sub>1</sub> , F <sub>2</sub> and F <sub>3</sub> materials.
November	Initiate nutrient dynamic studies as part of soil fertility research program.
November	Selection of short term trainees for second year.
November	Identify MS/PhD candidates who will start training in 1991.
 <u>Year 2 (1991)</u>	
Throughout the year	Introduction and testing of rice and non-rice crops.
February	Crosses initiated at Mahitsy for priority ecologies on the High Plateau, Lac Alaotra, Marovoay and Samangoky.
February	First semester short-term training at IRRI begins.
February	In-country training of research assistants.
March	Field visits by local and regional extension agents and key farmers.
	In depth review of rice research program strategies and activities (IRRI external review team.)

April Departure of MS/PhD students to the Philippines

April USAID midterm evaluation of the Project (USAID will consider combining this evaluation with the February, 1992 in-depth rice research program review).

June Departure of MS/PhD students to the US (in August if no English language training required).

July Second semester short-term training at IRRI begins.

August Annual Rice Meeting of the national rice team/ preparation and coordination of work plans.

September Preparation of work plans for Mahitsy and regional stations and sites; preparation of IRRI scientists' annual work plans.

September Ordering of equipment and supplies.

October On-farm, cropping systems testing/technology verification.

November Selection and advancement of rice hybrids.

November Selection of participants for degree and non-degree training.

Year 3 (1992)

January Departure of short term trainees at IRRI.

February In-country training of research scientists and field assistants.

February Crosses initiated at Mahitsy for priority ecologies on the High Plateau, Lac Alaotra, Marovoay and Samangoky.

March Field visits by local and regional extension workers and key farmers.

55

April	Departure of degree MS/PhD students.
August	Annual rice meeting/preparation and co-ordination of work plans.
September	Preparation of work plans for research sites; preparation of annual work plans of IRRI scientists.
September	Ordering of equipment and supplies.
October	Initiation of on-farm, cropping systems research/technology verification trials.
November	Screening, selection and advancement of rice hybrids.
December	Selection of participants for degree and non-degree training.

#### Year 4 (1993)

Throughout the year	Introduction and testing of rice and non-rice germplasm
January	Return of MS students who departed during the 2nd phase.
January	Financial audit of project.
February	Crosses initiated at Mahitsy for priority ecologies on the High Plateau, Lac alaotra, Marovoay and Samangoky.
February	In-country training of extension staff.
February	First semester short-term training at IRRI commences.
March	Field visits by local and regional extension workers and key farmers.
July	Second semester short-term training at IRRI commences.

5/6

July	Return of MS/PhD students.
August	Annual rice meeting/preparation of annual work plans.
September	Preparation of work plans for research sites; preparation of annual work plans of IRRI scientists.
September	Ordering of equipment and supplies.
October	Screening, selection and advancement of rice hybrids.
October	Cropping systems research/technology verification testing.
December	Selection of short-term trainees.
 <u>Year 5 (1994)</u>	
Throughout the year	Screening, selection and advancement of rice hybrids.
February	First semester short-term training at IRRI commences.
February	In-country training of research/extension staff
March	Field visits by local and regional extension agents and key farmers.
September	Preparation of work plans for research sites; preparation of annual work plans of IRRI scientists.
September	Selection and departure of short-term extension trainees.
October	Cropping systems research technology verification testing.
June	Return of last of the MS/PhD students sent during year 2 and early part of year 3 of Third Phase.
September	Final USAID evaluation of project.

September- October	Departure of IRRI scientists except team leader.
December	Departure of team leader.
January 1995	Final financial audit.

### IMPLEMENTATION ARRANGEMENTS

#### IRRI Technical Assistance Team

IRRI will advertise scientist positions in international journals.

IRRI will screen applications and forward to FOFIFA the curriculum vitae of the recommended candidate for each position. Concurrence of FOFIFA and USAID will be sought prior to appointment.

The IRRI cropping system agronomist, soils scientist and breeder will be based at DRR at Mahitsy. The agro-economist/technology transfer specialist will work at DRD in Antananarivo and will serve as Team Leader/Representative. He will have the over-all responsibility for handling the logistic details, participant training documentation, scheduling of short-term consultants, delivery of project equipment, and preparation of annual workplans and project reports. The terms of reference for the IRRI Project's Team Leader are listed in Appendix B, Table 5. The Team Leader will be assisted by local support staff, including a professional administrative officer. However, certain responsibilities will be delegated to the other resident scientists.

Short-term consultants will be provided primarily by IRRI in the Philippines, although some experts may be hired under contract by IRRI. Decisions on short-term consultancies will be made jointly by FOFIFA and IRRI, and USAID concurrence will be requested.

The Ministry of Scientific Research and Technology for Development (MRSTD) will be expected to assign at least one full time research scientist of the Malagasy National Rice Research Team to collaborate with each of the four IRRI long term scientists and short term consultants.

The terms of reference, timing and duration of the short-term consultancies will be decided jointly by IRRI and FOFIFA. Before their departure from Madagascar, consultants will present a verbal summary of their activities, observations, conclusions and recommendations to FOFIFA, and will submit a written draft report to the IRRI Team Leader who will distribute it to concerned Malagasy and IRRI project scientists for review. The reviewed paper will be returned to the consultant who will then submit a final report to the IRRI Team Leader. The final report will be distributed to documentation centers, concerned scientists and USAID and will be included in the semi-annual project report.

### Training

The Rice Research Coordinator of FOFIFA will submit the names of qualified scientists to the IRRI Team Leader for consideration for short and long-term training. Those scientists accepted for training will receive award letters from IRRI. IRRI will arrange for travel and pre-departure allowances. The names of candidates for long-term training should be submitted at least one year in advance of the projected commencement of the degree program. IRRI will arrange for any required examinations, assist the candidate in completing applications, arrange for any required English language outside of Madagascar and be responsible for travel and financial arrangements.

Scientists sent out for degree training should have a contract with MRSTD guaranteeing them a position at the same or higher level on their return.

### Germplasm Procurement

FOFIFA rice breeders and the IRRI rice breeder will jointly develop a list of rice germplasm to be introduced. In regard to non-rice germplasm for the cropping systems program, the FOFIFA cropping systems agronomists and the IRRI cropping systems agronomist will jointly develop a list of introductions indicating, if possible, probable source and quantity.

Import permits from MINAGRI's Quarantine Service will be obtained for all seed imports, which will be handled by IRRI.

### Commodity Procurement

A detailed list of items to be procured under the project is provided in Appendix A, Table 11. This list is broken down by year received, estimated cost and expected source. Where more than one source is indicated, to the extent possible, the first source will be used.

Table 12 provides a summary of commodities to be procured and estimated dollar value by source. It assumes that the first source listed in Table 11 will be used. IRRI will respect USAID policy to procure commodities having US source and origin to the fullest extent possible. For certain items, such as 220v/50Hz laboratory equipment, which are not available in the U.S., the projected source will be 935 or 941. It is understood that this grant would be funded from the Development Fund for Africa, which authorizes Code 935 for procurement. Similarly, project vehicles will be obtained from Japan, France or England due to the inability to obtain servicing and spare parts in Madagascar for U.S. manufactured vehicles.

At least once per year, the resident IRRI scientists and their counterparts will review the list of commodities to be purchased for the coming year, suggest any needed modifications, and provide any further specifications. The project will also seek the commodity needs of station managers and leaders of research sub-programs. The project will, to the extent possible, plan the arrival of the commodities based on project need and local budget availability for clearance charges.

The IRRI scientist in charge of commodity purchase will prepare the requisitions and submit them to the IRRI Representative for authorization and forwarding to the Purchasing Officer, IRRI, the Philippines, who is responsible for sourcing and purchasing. The Office of Safety and Shipping at IRRI is responsible for providing status reports on the procurement process and for arranging sea or air freight shipping to Madagascar.

Actual procurement will be executed by IRRI's Purchasing Department office in Makati-Manila. The Purchasing Department has a purchasing manual which details the Department's objectives and principles and its procedures for canvassing for foreign and local purchases. IRRI's Purchasing Department is fully staffed with 15 trained employees who have had long experience in commodity procurement in the U.S. and elsewhere. It is equipped with telex and telefax communication equipment for quick access to American suppliers. IRRI's Purchasing Department deals directly with U.S. suppliers. IRRI has procurement service agents in Japan and Singapore for assisting in procurement of non-US source commodities. Four employees are responsible just for foreign canvassing and purchasing.

IRRI will purchase commodities based on competitive bids. However, when the estimated value of the item to be purchased

does not exceed \$1,000 canvassing may be dispensed with particularly if there is a previous record of purchase of same or similar items. Canvassing maybe made if there is doubt on the price of the supplier and time is available. For amounts less than \$10,000, informal bids will be solicited from at least three sources. For amounts more than \$25,000, formal bids will be used. In the U.S., the USAID Export Opportunities Bulletin will be used as a vehicle to solicit bids on single purchases exceeding \$25,000; for non-US source commodities, formal solicitation by newspaper or other public communication will be used. For single expenditures exceeding \$100,000, review and prior USAID approval of commodity specifications will be solicited, and advertisement will be made in the Commerce Business Daily Bulletin (CBD) as well as other public sources.

Certain items, such as Peugeot spare parts or office supplies, will be purchased by the IRRI project directly from Mauritian, French or local sources.

IRRI itself will manufacture some equipments for the project. IRRI will certify with each invoice submitted to USAID for payment that the IRRI-manufactured equipment is priced as for any other customer.

The title to all commodities purchased with grant dollars will remain with IRRI until the termination of the project.

### Financial Plan

The project will continue to require funding from USAID in foreign exchange and from PL 480 in local currency. The foreign exchange costs are based on FOFIFA's and IRRI's estimates of short and long-term training and technical assistance requirements and on actual costs of these incurred during the first two phases. Commodity costs are based on the best available estimates. Appendix A, Tables 13 and 14 indicates foreign exchange costs for the third phase.

GDRM local currency funding will be drawn from two sources: regular budget allocations which will cover local permanent personnel salaries; and PL 480 generated local currency to be utilized for construction and rehabilitation costs, improvement of experimentation fields, salaries of contractual research staff, routine operating costs, in-country travel of researchers and in-country training. In addition, the local currency will be used to defray direct local currency requirements of IRRI

61

expatriate staff such as local official transportation, housing rentals, utility costs (electricity, water, gas, telephone, etc.), as well as operating costs to maintain an IRRI support office such as materials, furnitures, utilities, fuel, vehicle maintenance, telex charges, air freight clearance, translators for short-term consultants and, with FOFIFA concurrence, any other extra-ordinary operating costs associated with the presence of the IRRI team. IRRI will provide MRSTD an annual provisional budget for IRRI local costs. FOFIFA has detailed its intended local currency expenditures over the next 5 years in Tables 6 and 7 and summarized in Table 8.

Appendix A, Table 14 shows the total Phase III costs from both IRRI and GDRM sources.

Appendix A, Table 15 shows an overall budget showing the dollar costs of the project to date.

The IRRI Project will have two accounts in Madagascar -- the convertible and the non-convertible accounts. Only foreign exchange may be deposited in the convertible account and either foreign exchange or Malagasy francs may be withdrawn from it. Either foreign exchange or Malagasy francs can be deposited in the non-convertible account but only Malagasy francs may be withdrawn. IRRI will periodically deposit dollars funds into the convertible account to finance international travel, pre-departure allowances, limited purchases of commodities outside Madagascar, salaries and prerequisites of IRRI project support staff, and certain local operating costs of the project such as telexes, air freight charges, fuel, repair of vehicles, purchase of office supplies, etc., on an initial or emergency basis. Most of these local costs are reimbursable from the Treasury.

Monthly local currency expenses will be submitted to Treasury thru FOFIFA for reimbursement. Reimbursement will be deposited in the non-convertible account which will serve henceforth as a revolving fund for local expenses. The non-convertible account will then be used to pay for local costs and be continually replenished through Treasury reimbursements. Delay in Treasury reimbursements may require the project to draw temporarily on the convertible account. Near the completion of the project, arrangements will be made to have remaining balances in the accounts paid directly to USAID.

#### REPORTING REQUIREMENTS

### Financial Reports

IRRI will provide quarterly financial reports as it has in the past.

### Status Reports

The IRRI resident scientists will prepare semi-annual reports (March and September) of IRRI/FOFIFA activities. The reports will include progress made, constraints encountered, proposed solutions to the constraints and planned future activities. The report should advise whether or not USAID action is necessary for problem resolution. The report will be submitted to the USAID representative in Madagascar, the Director General of FOFIFA and IRRI, Los Banos. Copies of all reports prepared by consultants and returning participants will also be provided to USAID and FOFIFA.

### Commodity Procurement Reports

IRRI will submit semi-annual summaries of value of procurement by USAID geographic source and origin codes.

### Project Completion Report

This will be prepared by the IRRI team in collaboration with the USAID project officer.

### EVALUATION

Two evaluations will be conducted under the Phase III program. A mid-term evaluation will be held 12-18 months after Phase III commences, and a final evaluation will be completed at the beginning of the fourth year of implementation. The midterm evaluation will assess the impact of the entire rice research program beginning with Phase I in 1984 and will focus on identifying and addressing impediments to the success of the current phase and respond to any shifts in the GRDM rice research program.

The midterm evaluation will be conducted by a team composed of at least one representative from IRRI/Los Banos (financed by IRRI), FOFIFA, MINAGRI (financed by the GDRM), a REDSO agriculturist and one external consultant selected jointly by USAID and IRRI. The extent consultant will be identified and contracted by IRRI and financed by the project. This evaluation will assess progress towards the proposed objectively verifiable indicators for the following project outputs:

- o improving rice varieties through the introduction of germplasm, breeding, and purification and characterization of existing varieties, including an assessment of the performance of mechanisms established for releasing new varieties in the different regions;
- o researching improved rice-based cropping systems through diagnostic surveys, on-farm research and farmer-managed trials, including assessments of mechanisms to institutionalize farmer-oriented rice research and institutional linkages between research, extension, and quarantine facilities;
- o providing training and technical assistance according to the planned training schedule, and identifying additional training needs;
- o continuing the exchange of information between IRRI and other organizations that work on rice; and
- o improving research capacity through the use and maintenance of the physical facilities at Mahitsy, regional stations and field sites.

An analysis will be made of the rate of farmer adoption of new technologies and its impact on rice yields. An analysis will also be made of those factors which constrain farmer adoption of new technologies. An analysis also will be made of the impact of structural changes which may or may not have occurred in the national rice research program as a result of the GRDM's planned March 1991 review of its strategies and activities in the sector. Finally, an assessment of the effectiveness of short-term consultancies and the application of their recommendations will be made.

Based on these assessments, the mid-term evaluation will identify and make recommendations for correcting shortcomings in the design and/or implementation of the project for the balance of the Phase III program.

A final evaluation will be conducted 9-12 months before the end of project completion by representatives from IRRI, FOFIFA, MPARA, and USAID (REDSO). This evaluation will assess the success of Phase III in meeting its objective of "to strengthen the GRDM's rice capabilities to carry out effective research in the context of a rice-based cropping system and to develop appropriate farmer technologies". The evaluation will be based on verification of the attainment of the project outputs listed

above. In addition, the evaluation will include a preliminary assessment of the impact of the entire 10 years of the IRRI rice research program in Madagascar (Phases I to III) in the areas of institutionalizing FOFIFA-IRRI research cooperation, improving government-farmer coordination of rice research, and assembling the resources necessary for a sustainable rice research program. The final evaluation will also address the broader issues of progress toward establishing research extension linkages within FOFIFA and between FOFIFA and MINAGRI, and the availability and effectiveness of technology dissemination by the private sector. Finally, an analysis will be made of the impact of rice yield increases on farmers' fields, the enhancement of household incomes, and other positive impacts which the program has made on client farmers over its past 10 years of implementation. This data will also be used to assess future needs. Base data for measuring these impacts will be obtained from existing farm household expenditure surveys and historical production data available from MINAGRI, and baseline surveys conducted by FOFIFA. USAID will collect baseline socio-economic data at the beginning of year I of the grant to serve as a measure of impact of adoption and yield changes over the 5 years of the project.

#### Audit

IRRI, as a member of the CGIAR, conducts annual audits. In conjunction with this, the auditors' scope of work will be expanded to include an audit of this project to be financed under the grant. USAID will approve the scope of work in advance and receive copies of the audit.

An audit of the local currency funds will be made after the completion of 30 weeks of implementation of Phase III and again after completion of the project. These audits will address use of counterpart funds for construction, operating costs, and materials purchased and will also analyze disbursements against allocations. The scope of work for the local currency audit will be developed jointly by USAID and FOFIFA and will be financed using local currency which FOFIFA has budgeted for this purpose.

#### ENVIRONMENTAL IMPACTS OF PROJECT ACTIVITIES

The third phase of the project will deal with activities that will generally have little or no negative impact on the environment. In fact, most of the research and training activities to be undertaken by the project would normally qualify for categorical exclusion under 216.2(c) (2) (ii), (iii) and (2) (i) and (ii).

The only activity of concern might be the use of chemical fertilizers and pesticides (insecticides, fungicides and herbicides) on on-farm trial plots. Also of concern here would be the development and extension of chemical seed treatment and Integrated Pest Management (IPM) technologies. These donor concerns will be adequately addressed by IRRI by strictly adhering to AID's recommendations for pest control and pesticide use, as summarized below:

1. The number of pesticides and the quantities to be used will be kept to an absolute minimum. Integrated non-chemical methods for pest control will be explored whenever feasible
2. A list of pesticides which might be considered for use under the project will be sent for approval to the Regional Environmental Advisor (REO) at REDSO/ESA. All relevant information on the pesticides such as formulations, chemical and trade names, target crops and pests will be included. This list will be cleared with REDSO/ESA before any of the listed chemicals are procured or used.
3. The project will continue supporting FOFIFA's ability to effectively use pesticides. The expatriate project personnel will assist all relevant GDRM departments in regards to pesticide regulation and evaluation.
4. IRRI will provide short-term technical assistance in the areas of plant pathology, entomology and weed control. These experts will provide training and guidance to the local project personnel regarding the safe use of pesticides.
5. IRRI will be open to and will welcome on-site inspection/evaluation by REO or any other donor designee to determine its performance in this regard.

TABLE 1. Plan for recruitment and training of FOPIFA rice scientists.

Subject matter	Existing (no.)		Direct recruitment of researchers (no.)	Researchers status : obtained through degree training and up-grading of research assistants (no.)					Recruitment of research assistant	Total at end of Phase III Project		
	Resear- chers	Research : assistants		Year						Resear- chers	Research : assistant	
				1	2	3	4/5	1				2
Breeding	3	4		1	1			1			5	3
Cropping Systems	1	3				2		1			3	2
Soil fertility Pedology	1	5	1		1	1					4	3
Plant pathology	1	1	1			1		1	1		3	2
Weed science	1	0	1						1		2	1
Entomology	1	4	0		2						3	2
Training	0	0	1					1			1	1
Crop physiology	0	1			1				1		1	1
<b>TOTAL</b>	<b>8</b>	<b>18</b>			<b>10</b>			<b>7</b>			<b>22</b>	<b>15</b>

TABLE 2. Number of short-term trainees for the Third Phase

Training course	Year					Total
	1990	1991	1992	1993	1994	
- G B U		1				1
- P S R T C	3	2	1			6
- T J C	2	2		2	2	8
- I P M	1					2
- I N S U R P				1		1
- W S T C		1	1			1
- Rice Prod/Training trainers(4 months)	2	3		3	2	10
- Editing/Publishing (4 mos special)	1					1
- Rice Pathology (5 mos special)		1	1			2
- Germplasm Management (6 mos special)		1				1
- Research Management Training (USDA Washington D.C.)			1	1		2
- Plant Physiology (GBU+INSURP+ special training - 5 mos)			1			1
- Water Management Training			1	1		1
- Tissue Culture			1			1
- Cereal Chemistry/Grain Quality		1				1
- Seed Technology	1					1
- Special research project (6 mos)			1	1	2	4
- Research Station Management (one at IRRF, one at CIMMYT)		1	1			2
<b>TOTAL</b>	<b>10</b>	<b>13</b>	<b>9</b>	<b>3</b>	<b>6</b>	<b>46</b>

G B U: Genetic Evaluation and Utilization

P S R T C: Farming Systems Research Training Course

T J C: Training and Technology Transfer Course

I P M: Integrated Pest Management

I N S U R P: International Network on Soil and Sustainable Rice Farming Systems

W S T C: Weed Science Training Course

TABLE 3. Long-term training for the Third Phase

Training course	Year				
	1990	1991	1992	1993	1994
- U P L B - M S	2	2			
- U S A - M S		1			
- U P L B - Ph D		1			
- U S A - Ph D	1	1			
- Two 6 month periods at IRRI to conduct research for 3eme cycle degree	1	1			
Total	4	6			

TABLE 4. Intended consultancies for the Third Phase (person-months)

Specialization	Year					Total
	1990	1991	1992	1993	1994	
- Agroclimatology		.75				
- Soils Laboratory specialist (JS)	1.50					1.50
- Installation of Atomic Absorption Spectrophotometer by Perkin-Elmer	.25					.25
- Agro-economist	.75	.75	.75		1.00	3.25
- Agricultural anthropologist	1.00			1.00		2.00
- Agricultural engineer		1.00	1.00			2.00
- Agronomist		.50				.50
- Weed scientist	.75	6.00 (JS)	1.00			7.75
- Training specialist (2 member team) to conduct in-country training	2.00		2.00			4.00
- Documentation/Communication	.50					.50
- Plant pathologist	1.50 (JS)					1.50
- Rice breeder	.50					.50
- Entomologist			1.00			1.00
- Nematologist			.75			.75
Strategy Review Team						
- Plant pathologist		1.00				1.00
- Rice breeder		.75				.75
- IPM specialist		.75				.75
Total person-months/yr 1/	8.75	11.25	6.5	2	1	29.5
Total scientist-visits/yr	9	8	6	2	1	26

JS = Junior scientist

1/ The USAID will fund 25 person-months and IBRI 4.5 person-months

TABLE 5. Construction and improvement program.

Station	Mahitsy		Alaotra	Kianjasoa	Marovoay	Tanandava	Piana-rantsoa	Ivoloina	Total
Year	89-90	90-91	89-90	89-90	90-91	90-91	91-92	92-93	
<b>I. CONSTRUCTION</b>									
1. Scientists housing	5	5	6	1	2	-	3	-	22
2. Research assistant housing	-	2	1	3	3	3	1	2	15
3. Administration office	1x	-	-	-	-	-	-	-	1
4. Storehouse	1x	-	-	-	-	-	1	-	2
5. Office-Laboratory	-	-	-	-	1	BH	1	BH	4
6. Guardians' houses	1	1	-	-	1	-	1	-	4
7. Training center	-	1	-	-	-	-	-	-	1
8. Dormitory	-	1	-	-	-	-	-	-	1
9. Agrotechnic lab.	1x	-	-	-	-	-	-	-	1
10. Storage shed	1x	-	-	-	1	1	1	1	5
11. Workshop	1x	-	-	-	-	-	-	-	1
12. Water conveyance	1x	-	-	-	-	-	-	-	1
13. Purchasing land (Ha)	1 (10)	-	-	-	-	-	1 (10)	-	2
14. Guest house	-	1	-	1	1	1	1	-	5
<b>II. IMPROVEMENT</b>									
1. Field development (Ha)	1 (10)	-	-	-	-	-	1 (10)	-	2
2. Road development	1 (10)	-	-	-	-	-	-	1 (0,5)	2

NB: - x: realization in 1988-89  
 BH: rehabilitation  
 (): quantity

TABLE 6. Financial plan of investments and improvements  
( x '000 FNG )

Investment and Improvements	Unit price	Mahitsy		Alaotra	Kianjasoa	Marovoay	Tanandava	Piana- rantsoa	Ivoloina	Total	
		1988	89-90	90-91	90-91	90-91	90-91	90-91	91-92		92-93
I. BUILDING			528,000	1,078,000	540,000	310,000	428,000	240,000	498,000	130,000	3,752,000
1. Scientist housing (4 rooms)	80,000	400,000	400,000	480,000	80,000	160,000	-	240,000	-	-	1,760,000
2. Research assistant housing (3 rooms)	60,000	-	120,000	60,000	180,000	180,000	180,000	60,000	120,000	-	900,000
3. Storehouse (2 rooms)	10,000	10,000	-	-	-	-	-	10,000	-	-	20,000
4. Office-Laboratory (3 rooms)	20,000	-	-	-	-	20,000	80,000	20,000	80,000	-	40,000
5. Guardians' houses (2 rooms)	8,000	8,000	8,000	-	-	8,000	-	8,000	-	-	24,000
6. Training center (hall, offices)	300,000	-	300,000	-	-	-	-	-	-	-	300,000
7. Dormitory (rooms for 20 trainees)	200,000	-	200,000	-	-	-	-	-	-	-	200,000
8. Storage shed	10,000	10,000	-	-	-	10,000	10,000	10,000	10,000	10,000	50,000
9. Purchasing land (Ha)	10,000	100,000	-	-	-	-	-	100,000	-	-	200,000
10. Guest house (5 rooms)	50,000	-	50,000	-	50,000	50,000	50,000	50,000	-	-	250,000
II. IMPROVEMENTS		120,000	-	-	-	-	-	20,000	5,000	-	145,000
1. Field development (Ha)	2,000	20,000	-	-	-	-	-	20,000	-	-	40,000
2. Road development	10,000	100,000	-	-	-	-	-	-	5,000	-	105,000
TOTAL		648,000	1,078,000	540,000	310,000	428,000	240,000	518,000	135,000	130,000	3,752,000

TABLE 7 Estimate expenditures in FMG.  
(X 000 FMG)

Agr. campagne expenditures	90-91	91-92	92-93	93-94	94-95	Total
1. GENERAL SUPPLIES	120,000	145,000	175,000	207,500	260,000	907,500
11. Fuel and lubricant	65,000	85,000	105,000	125,000	155,000	535,000
12. Lab and offices supplies	55,000	60,000	70,000	82,500	105,000	372,500
2. SALARIES AND WAGES	155,000	175,000	187,000	185,000	207,000	909,000
21. Seasonal worker	60,000	70,000	75,000	80,000	85,000	370,000
22. Permanent	80,000	85,000	87,000	90,000	92,000	434,000
23. Training (training, visit, seminar,...)	15,000	20,000	25,000	15,000	30,000	105,000
3. ORDINARY EXPENSES	165,000	247,000	252,000	223,500	251,000	1,139,500
31. Renting (hotel, housing, fields, storehouse)	40,000	50,000	50,000	45,000	45,000	230,000
32. Maintenance of equipment and houses	50,000	65,000	70,000	76,500	90,000	351,500
33. Tools	10,000	10,000	15,000	15,000	15,000	65,000
34. Documentation	5,000	7,000	7,000	7,000	6,000	32,000
35. Ext. services/works	10,000	30,000	20,000	25,000	25,000	110,000
36. Other	50,000	85,000	90,000	55,000	70,000	350,000
4. TRAVELS	105,000	125,000	150,000	170,000	90,000	640,000
Transportation						
TOTAL	545,000	692,000	764,000	786,000	808,000	3,595,000

TABLE 8 Total estimate of expenditures in PMG  
(x 000)

Expenditures	Agr. campagne					Total
	90-91	91-92	92-93	93-94	94-95	
1. CONSTRUCTION-IMPROVEMENT	753,000	2,661,000	558,000	165,000	10,000	4,147,000
- Construction	528,000	2,596,000	498,000	130,000	--	3,752,000
- Improvement	120,000	--	20,000	5,000	--	145,000
- Furniture	65,000	35,000	20,000	10,000	--	130,000
- Equipment	40,000	30,000	20,000	20,000	10,000	120,000
2. FUNCTIONING	545,000	692,000	764,000	786,000	808,000	3,595,000
Sub-total	1,298,000	3,353,000	1,322,000	951,000	818,000	7,742,000
3. Management expenses 5%	65,000	168,000	66,000	47,500	41,000	387,500
TOTAL	1,363,000	3,521,000	1,388,000	998,500	859,000	8,129,500

TABLE 9. Approximate number of Malagasy scientists participating in symposia, conferences, workshops/monitoring tours during Phase III.

Year	Number of participants
1989/90	11
1990/91	11
1991/92	11
1992/93	12
1993/94	12

TABLE 10

## LOGICAL FRAMEWORK

Appendix A

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	ASSUMPTION
<b>GOAL</b>			
----			
To improve rice production on farms in Madagascar.	Rice production increased	Ministry of Agriculture statistics	MPABA reliably collects analyzes and reports farmers' rice yield data; that data are being collected from target ecologies
	Rice production on selected farms in Madagascar increased	IRRI, POPIPA and GDRM reports	GDRM policies were conducive to increasing production
	Availability of improved rice varieties and cultural practices for farmers' production	IRRI reports Field visits	Institutional linkages between all related ministries exist and will stimulate development of improved rice research which, taken together with existing seed multiplication and extension greater rice production
<b>PURPOSE</b>			
-----			
Strengthen capabilities to carry out effective research in the context of a rice-based cropping systems and to develop appropriate farmer technology	1. 3 scientists recruited and 8 scientists trained in conceptualizing, designing, conducting and evaluating on-farm research in farming systems context	Project evaluation IRRI reports	POPIPA recruits, trains and directs researchers and research assistants to conduct research in a cropping systems context
	2. About 75 new technologies developed for target ecologies (see Table 7, Appendix 8)	IRRI reports Field visits	
	3. Rice research facilities established and/or improved at Mahitsy, Lac Alaotra, Marovoay, Tanandava, Fianarantsoa, Kianjason and Ivoloana.	IRRI reports; on-site inspection	POPIPA receives requested PL 480 funding on a timely basis
<b>OUTPUTS</b>			
-----			
1. Identification of improved rice varieties for irrigated and rainfed rice environments through	600 rice varieties introduced and tested in target irrigated, rainfed and upland ecologies	IRRI reports Field visits	Quarantine Service will continue to expedite screening and release of introduced germplasm in a timely manner
a) introduction of germplasm b) and hybridization, and c) purification and characterization of the	100 crosses per year initiated and progeny advanced in target ecologies	IRRI reports Field visits	
Malagasy varieties	Characterization of 400 Malagasy varieties by POPIPA and IRRI	IRRI reports Site visits	

2. Trained personnel for the rice research program	5 MS, 3 PhD and 2 Je. cycle students completed their studies	IRRI reports Photocopies of diplomas	POPIPA identifies qualified scientists and they are admitted to graduate programs
	34 scientists and 12 extension personnel participated in short-term training	IRRI reports Participant completion reports	POPIPA recruits qualified scientists and they are identified by POPIPA for training and are admitted by IRRI for training
	In-country training of 20 POPIPA field staff	IRRI reports	Funding is allocated for conducting in-country training
3. Strengthen and institutionalize applied research, using a rice-based cropping systems context, to identify more profitable cropping systems	Systematic utilization of multidisciplinary diagnostic surveys undertaken at target ecologies	IRRI reports	
	On-farm research on priority rice problems being addressed	IRRI reports Field visits	POPIPA recruits and trains sufficient researchers and monitors in cropping systems methodologies
	Farmer-managed trials conducted on at least 10 farmers' fields at each major target rice ecology/year	IRRI reports Field visits	
	Economic analysis of trials being conducted	IRRI reports	
4. Implementation and review of the country rice research strategy	Completion of a review of activities by Malagasy rice scientists, IRRI scientists and scientists from other donor organizations	IRRI reports Strategy and Planning document	
5. Continue exchange of information between IRRI, other organizations that work on rice and the GDRM rice research program	Participation of Malagasy scientists at international rice conferences and workshops equivalent to 57 scientist-visits	IRRI reports	
	Consultancy visits by 26 experts representing 29.5 p-m	Consultancy reports	
6. Improved capacity to undertake research through upgraded physical facilities and transport	Commodities purchased and delivered to Mahitsy, regional stations and field sites	Project reports On-site inspection	Sufficient funds available for port clearance
INPUTS -----	See budget pages Appendix A, Table 13	Project reports	
201 p-m of long-term technical assistance at \$2,246,000			

29.5 p-m of short-term technical assistance at \$329,640	App. A, Table 4		
Short-term training of 46 Malagasy scientists/extension workers at \$390,300	App. A, Table 2	-"	
Training (5 MS, 3 PhD and 2 Je. cycle) of Malagasy scientists at \$519,700	App. A, Table 3	-"	
57 scientist-visits to conferences, workshops, etc. of \$245,800	App. A, Table 9	-"	
Equipment, supplies and vehicles of \$786,200	App. A, Tables 11-12		
GDRM contribution of \$5,419,700	App. A, Tables 8, 14	FOPIFA's financial reports to Treasury; audits and evaluation	GDRM provides full amount and reimburses on a timely basis
Recruitment of personnel	Qualified personnel recruited	Project reports	Manpower allocations provided by GDRM
Full-time scientists assigned to IRRI scientists	At least one full-time Malagasy rice researcher assigned to work with each IRRI scientist	Project reports	

TABLE 11. Provisional commodity procurement plan, 1989-1994.

		<u>Approximate</u> <u>Dollar</u> <u>Amount</u>	<u>Probable</u> <u>Source</u>
1989/90			
<u>Field/laboratory equipment</u>			
3	Balances (3 kg)	500	US
5	Balances (20 kg)	3,000	US
5	Balances (50 kg)	4,000	US
4	Dial-O-gram	700	US
10	Tape measures (50 m)	600	US
6	Portable sprayers w/accessories	400	Philippines
3	Seeders (Animal-drawn)	600	Philippines
2	Seeders (ICRISAT design)	400	India
1	Seeder (CEEDAMA design)	300	France
2	TH8 threshers with 10HP diesel engines and spare parts	3,500	Philippines
2	TH6 portable threshers with 5HP engines and spare parts	1,200	Philippines
1	Dynamometer	2,000	England
1	1.5 m reapers with 5HP diesel eng.	1,000	Philippines
1	Panicle threshers	500	U.S.
1	KUBOTA 2-wheel tractor w/ accessories and spare parts (Japan)	3,000	Philippines
1	Landmaster 2-wheel hand tractor w/ accessories and parts (England)	3,000	Philippines
40 qts	Oil for engines	200	Philippines
1	Solar powered rat fence (with solar panels, battery, fencing et as designed by IRRI (to protect one hectare)	2,000	Philippines
	Assorted fertilizers for research	1,000	IRRI/Phil.
	Urea supergranules		
	Diammonium phosphate		
	Triple superphosphate		
	Sulfur		
	Acidulated phosphate		
	Zinc oxide		
	Sulfur coated urea		
	Molybdenum		
	Copper sulfate		
	Boron		
1 set	Sampling kit with water retentivity rings above and below the water table	500	US
1	Peat auger set	100	US
1	Hand auger set 7m depth	200	US
1 set	Soil moisture samples kit	200	US
	Soil color charts		
	Soil charts		
	Le ring infiltrometer kit	200	US
	Penetrometer	500	US

1	Pocket shearmeter w/ accessories	500	US
1	Hand vane tester	400	US
1 set	Density measurement 50 mm core cutter 24 packs plastic cover hammering head guide cylinder 24 sample rings	500	US
1 set	Soil moisture holding capacity	500	US
1	Atterberg limits with accessories	200	US
2 sets	Soil sampling equipments	500	US
	Chemicals for soils laboratory	3,000	US
	Chemicals for soils laboratory	1,000	Philippines
	Chemicals for soils laboratory	300	England, France, Germany
3	pH meters	1,500	US
	Sundry chemicals for plant pathology laboratory	2,000	US/IRRI
2	Binocular scopes	1,000	US
4	Seed moisture testers	5,000	US
5	Seed moisture testers	3,500	US
6	Cameras	1,300	US
1	Freezer 220v/50Hz (germplasm preservation)	800	US/Hongk.
2	Screenhouses 4 x 8 m	3,000	
3	Screenhouses 8 x 20 m	4,000	Philippines
1	Boat 4 person (rubber speed), one (deepwater rice at Marovoay)	1,000	US or Hongk.
1	4HP outboard motor (for deepwater rice at Marovoay)	600	US or Hongk.
2 sets	Meteorological equipment	1,500	Europe
	Spare parts for vehicles	5,000	Phil./Japan/ Mauritius
	Equipment for motor pool: hydraulic jack, tool kit, welding machine, grease gun, drill	5,000	US
<u>Office/training supplies and materials</u>			
5	Battery chargers (220v/50Hz)	2,500	US
1	Photocopy machines plus spare parts (220v/50Hz)	3,500	Hongkong
2	Personal copiers (220v/50Hz) with spare cartridges	4,000	Hongkong
2	Stencil machines (220v/50Hz)	5,000	Hongk., Sing.
2	Typewriters (electronic with French keyboard) w/ accessories	2,000	Hongkong Maur., France
1	Typewriter (mechanical, French keyboard, long carriage)	800	Hongkong, US
1000	Electrostatic plates and chemical processor for offset duplicator	1,000	Philippines or Hongk.
200	Reams of paper for offset duplicator	500	Philippines
300	Reams photocopy paper	700	
1	Short wave radio	2,000	
1	Antenna materials for above		

3	Computers w/ screens	8,000	US
	Software for above	3,000	US, IRRI
3	Printers for above	1,500	US
3	Reinkers for above	200	US
4	UPS for above	2,000	US/Phil.
6	Whiteboards	1,400	Philippines
4	Overhead projectors (220v/50Hz) w/ transparent sheets and pens	3,000	US or Hongk.
2	Slide projectors (220v/50Hz)	1,000	US
2	Screens (tripod)	500	US or Hongk.
1	Book binding equipment plus material	600	US
2	Mechanical typewriters long carriage (French keyboard)	1,000	Mauritius Hongkong/ Europe
	Office supplies (stationery, envelopes, file folders, typewriter cartridges, diskettes, etc.)	500	IRRI Store- room, Phil.
	Office supplies/materials for all stations	2,000	Phil., US
1 system	Intercom/telephone	2,500	US

#### Publications

	Books, journals, subscriptions	3,000	US
	Books, journals (in French)	200	France, Belgium, FAO
	Books	300	Japan
	Photocopies and journal articles	1,500	IRRI
	Books (International Centers)	500	International Centers

#### Vehicles

3	Land Rovers (110)	69,000	England
4	Double cabin pick-up	64,000	Japan

1990/91

#### Field/laboratory equipment

1	Two-wheel diesel hand tractor w/ accessories	4,000	England or Japan
	"New" machines for testing	2,000	IRRI
1	Grain dryer (special IRRI design) with blower	1,000	IRRI
2	Dryers for vegetative material	1,000	IRRI design
1	Seed moisture tester	1,000	US
1	Grain counter	2,500	US
	Assorted fertilizers for research program	500	Philippines

	Laboratory equipment for:		
	o plant pathology	2,000	US
	o germplasm laboratory	1,000	US
	o grain quality laboratory	2,000	US
	o agronomy laboratory	5,000	US
	Spare parts for lab equipment	1,000	US/Phil.
	Replacement chemicals/materials for:		
	o agronomy laboratory	4,000	US/Phil.
	o plant pathology laboratory	1,000	US
	o grain quality laboratory	1,000	US
1	Auto analyzer for soils lab.	10,000	US
1	Cold temperature screening tank	2,000	Philippines
	Assorted glassware for soils, plant pathology lab.	2,000	US
2	Germinators	2,500	US
	Photographic supplies/accessories	600	US/Phil.
2	Drying ovens	1,300	US
	Iron/steel raw material	1,000	Philippines
	Power drill press, bending machine, welding equipment, etc.	15,000	US
6	Fire extinguishers	600	US
2	Greenhouse 4 x 8 m	16,000	US
	Spare parts for vehicles, motorcycles	8,000	Phil./Maur.
4	Bicycles plus spare parts	500	US/Phil.
	Meteorological equipment (repla- cement or spare parts)	500	Europe
	Assorted tools/materials for motorpool	2,000	US/Phil.

#### Office supplies/Training equipment

4	Whyteboards		
1	Screen (wall)	500	US/Hongk.
1	Photocopy machine	3,500	US/Hongk.
1500	shts Electostatic plates and processor chemical	1,200	US/Phil.
	PA system	2,000	US
500	reams Paper (for photocopy, offset, stencil)	2,000	Philippines
2	Shortwave radios	6,000	US
2	Computers with hard disk, accessories	6,000	US
	IRRI office supplies, furnitures, etc.	2,000	US, IRRI Phil.
	Supplies/spare parts for photocopy machines (ink, drum, cartridges)	3,000	Hongk./Phil.
	Furniture for training center	8,000	US/Phil.
	Office equipment/materials/supplies	2,000	US/Phil.

#### Publications

	Assorted publications	3,000	US, France, FAO
	Photocopies of journal articles	1,000	IRRI Library

Vehicles

2	Double cabin pick-up	30,000	Japan
1	15-passenger bus	15,000	Japan, France
2	Motorcycles w/ sidecars plus spare parts	2,300	Philippines

1991/92

Field/laboratory equipment

6	Small 4HP, 8HP and 10HP replacement engines and replacement parts for same	3,000	US/Phil.
2	Portable thresher with engines Introduction of "newly-designed" IRRI machines	2,000	Philippines
2	Vogel thresher with diesel engine	1,000	Philippines
2	IRRI-designed irrigation pumps w/ engines	4,000	Philippines
5000	Plastic bags small	2,000	Philippines
7000	"- medium	1,000	Philippines
5000	"- large		
2	Scales (100 kg)	1,500	US/Phil.
4	Scales (50 kg)	3,500	US/Phil.
2	Balance (5 kg)	2,000	US
	Chemicals for agronomy, plant pathology and grain quality laboratories	6,000	US/Phil.
	Materials, supplies for Agr. mechanization program (iron materials,...)	1,000	Philippines
	Spare parts for vehicles, motor- cycles, bicycles	6,000	Japan Phil., Maur.
1	Screenhouse 8 x 20 m	4,000	Philippines
1	Greenhouse 8 x 20 m with blower/heater	20,000	US

Office/training supplies and materials

1	Shortwave radio with antenna	3,500	US
4	Computer, spare parts (replacement) with printer and UPS, software diskettes, reinkers	5,000	US
	Spare parts/supplies for photocopy machines (drum, cartridges, ink, etc.)	2,000	Philippines
1600	shts Electostatic plates plus chemical processor	1,500	Philippines
500	reams Paper for offset duplicator, photocopy machines, stencil machines	1,700	Philippines
	Training supplies (transparent sheets, marker pens,...)	200	Philippines

Equipment, furniture supplies for IRRI office, documentation, and all stations	3,000	Phil., US
<u>Publications</u>		
Publications/photocopies	4,000	US/Phil.
<u>Vehicles</u>		
1 Land Rover	22,500	England
1 Double cabin pick-up	17,600	Japan
2 Motorcycles with sidecars	3,000	Philippines assembled
1992/93		
<u>Field/laboratory equipment</u>		
5000 each size Plastic bags (small, medium, large)	1,000	Philippines
Sundry field/lab equipment for all stations	6,000	US/Phil.
Sundry chemicals for agronomy, plant pathology, grain quality laboratory and for germplasm	10,000	US, Phil.
Sundry equipment/supplies for:		
o agronomy/physiology lab.	8,000	US
o plant pathology lab.	3,000	US
o grain quality lab.	2,000	US
o germplasm	2,000	US
Spare parts for vehicles, motor- cycles	12,000	Phil., Japan Mauritius
<u>Office/training supplies</u>		
Office equipment, materials supplies	2,000	Phil., US
Computer spare parts, software, accessories	5,200	US/IRRI
Supplies/materials for IRRI office	2,000	IRRI/US
1 Photocopy machine w/ spare parts	3,000	
Spare parts/cartridge for photocoppy machines	3,000	
1500 shts Electrostatic plate and chemical processor	1,500	
500 reams Paper for offset, photocopy stencil, etc.	2,000	
<u>Publications</u>		
Publications, photocopies of scientific articles	7,000	US, IRRI

Vehicles

2	Double cabin pick-up	35,000	Japan
2	Motorcycles with side car	3,500	Philippines

1993/94 (Year 5)

Field/laboratory equipment

2	Two-wheel Landmaster diesel tractors w/ accessories (E/sh)	6,000	Philippines
2	Portable thresher with engines (IRRI design)	3,000	Philippines
2	TH8 thresher (IRRI design) w/ diesel engine	5,000	Philippines
	Plastic bags	3,000	
	Sundry laboratory chemicals for:		
	o agronomy lab.	8,000	US/Phil.
	o plant pathology lab.	2,000	US
	o grain quality lab.	2,000	US
	Laboratory equipment for:		
	o agronomy lab.	10,000	US/Phil.
	o plant pathology lab.	4,000	US
	o grain quality	2,000	US
	o germplasm management	1,000	US/Phil.
	Assorted laboratory and field equipment	5,000	US/Phil.
	Materials for agricultural engineering workshop	2,000	Philippines
	Spare parts for vehicles/ motorcycles	16,000	Japan, Phil.
	Replacement meteorological equip.	1,500	Europe

Office/training supplies and materials

2	Computer/replacement parts/ printer accessories, UPS	12,000	US/Phil.
	Materials for IRRI office	2,000	Philippines
	Office supplies/materials for all stations	4,000	Philippines
	Spare parts for photocopy machines	3,000	US, Hongk. Phil.
2000	shts Electrostatic plate with chemical processor	3,000	Philippines
700	reams Paper	3,500	Philippines

Publications

	Publications/photocopies of articles	8,000	US
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Vehicles

2	Motorcycles with sidecar	4,000	Philippines
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Appendix A

TABLE 12. Summary Procurement Plan -- amount  
(in USD) expended according to source

Items	US Source	941 Source	935 Source	Total
Vehicles	-	12,800	253,100	265,900
Laboratory and Field equipment	208,700	91,900	30,500	331,100
Publications	25,000	3,000	500	28,500
Office equipment and supplies	95,600	55,400	-	151,000
<b>TOTAL</b>	<b>329,300</b> <b>(42%)</b>	<b>163,100</b> <b>(21%)</b>	<b>284,100</b> <b>(37%)</b>	<b>776,500</b>

Note: The source summary is based on Table 11; where two sources are denoted in Table 11, Table 12 assumes the first source is used. IRRI will make every attempt to use US source and origin.



## Appendix A

TABLE 14. Madagascar-IBBI Research Project Financial plan (\$ or \$ equivalent)

	Budget			
	USAID	GDRM	IBBI	Total
Technical assistance	2,636,650		59,500	2,696,150
Personnel		536,000		536,000
Training/Conference	1,155,800	70,000	62,840	1,288,640
Equipment/supplies	786,200	479,700	15,000	1,280,900
Construction/improvement		2,598,000		2,598,000
Operating expenses/services:		1,457,700	233,000	1,690,700
Indirect costs	873,800			873,800
Contingency		258,300		258,300
Audit/Evaluation	147,450	20,000		167,450
<b>TOTAL</b>	<b>5,600,000</b>	<b>5,419,700</b>	<b>370,340</b>	<b>11,399,000</b>

GDRM contribution converted at \$1.00 = PMG 1500.

TABLE 15. Overall Project costs Phase I and II.

Component	PHASE I Expenditure	PHASE II		Sub-total	T O T A L
		Actual expenditure 8.21.86-4.30.89	Estimated expenditure 5.01.89-8.20.89		
I. Technical assistance	508,891.45	638,646.90	86,230.83	724,877.73	1,233,769.18
II. Training and networking activities	128,322.54	240,887.38	73,861.97	314,749.35	443,071.89
III. Commodities	308,755.60	561,200.06	221,266.82	782,466.88	1,091,222.48
IV. Other direct costs, indirect costs (8.5%) and contingency	98,736.85	148,008.24	80,108.24	228,117.05	326,853.90
<b>Total</b>	<b>1,044,706.44</b>	<b>1,588,743.15</b>	<b>461,467.86</b>	<b>2,050,211.01</b>	<b>3,094,917.45</b>

TABLE 1. Terms of reference and qualifications of the Rice Breeder

Terms of reference

1. Provide on-the-job training of FOFIFA counterpart.
2. Assist rice breeders and disciplinary scientists in developing and institutionalizing a comprehensive, multidisciplinary approach to variety improvement in Madagascar.
3. Assist in identifying, describing and prioritizing target ecologies based on their hydrology, climate, soils, biotic constraints and potential for production increases.
4. Assist in defining the breeding objectives, germplasm requirements, breeding methods and work sites based on the constraints and opportunities of the priority ecologies in different production areas.
5. Assist in selecting and introducing required germplasm for breeding objectives in priority ecologies.
6. Assist breeders and disciplinary scientists in the development of screening techniques, evaluation of germplasm, planning of crosses and selection and testing of superior progenies.
7. Assist in the purification, evaluation and characterization of local germplasm and in its preservation in the germplasm bank.
8. Collaborate with breeders and disciplinary scientists in screening germplasm for morphological, physiological, edaphic and biotic stresses.
9. Collaborate in the design, execution and supervision of research trials and in the collection, analysis, interpretation and presentation of data.
10. Collaborate with FOFIFA breeders in developing a computerized database system for local and selected introduced germplasm.
11. Assist in identifying breeders for short or long-term training.

12. Assist in up-grading the research capabilities of FOFIFA researchers and technicians through collaborative planning and work activities, making available relevant scientific literature and identifying opportunities for their participation in conferences, workshops and other scientific meetings.
13. Undertake additional responsibilities as assigned by the IRRI team leader.
14. Prepare annual workplans and quarterly reports.

#### Qualifications

Candidate must possess a PhD in plant breeding with a minor in plant pathology, and have a minimum of five years of relevant work experience in rice breeding. Fluency in speaking and reading French (minimum S-3, R-3) is required. Candidate must have demonstrated ability to work as a member of a multi-disciplinary team and to train counterparts.

The rice breeder will work in close collaboration with the other members of the FOFIFA/IRRI rice research team and will work under the direction of the IRRI Team Leader.

TABLE 2. Terms of reference and qualifications of the Cropping Systems Agronomist

Terms of reference

1. Provide on-the-job training of FOFIFA counterparts.
2. Collaborate in implementing cropping systems methodologies in major rice ecologies.
3. Assist in identifying and describing target ecologies for cropping systems research.
4. Collaborate in the planning and implementing of multi-disciplinary farming systems diagnostic surveys.
5. Assist in the planning, design and implementation of cropping pattern design and component technology testing at priority cropping systems sites.
6. Assist in identifying, introducing and evaluating non-rice germplasm for testing non-rice germplasm at cropping systems sites.
7. Assist in the collection and in the agronomic and economic evaluation and presentation of research results.
8. Collaborate with the cropping systems team in the design and analysis of farmer-managed technology verification trials at cropping systems sites.
9. Collaborate in formulating technologies for farmer recommendation.
10. Prepare annual work plans and quarterly reports.

Qualifications

PhD in agronomy or soils with a minimum 5 years experience in cropping/farming systems in developing countries. Individual should be able to work as part of a multi-disciplinary team and take the lead in organizing and implementing rice-based cropping systems research. Fluency in French (minimum S-3, R-3) is required.

This person will work in close collaboration with the other members of the FOFIFA/IRRI research team and work under the direction of the IRRI Team Leader. Administrative experience desirable.

TABLE 3. Terms of reference and qualifications of the  
Soils Scientist

Terms of reference

1. Train FOFIFA counterparts.
2. Collaborate in developing a comprehensive, long-term program to identify and resolve farmer soil fertility constraints primarily in wetland environments.
3. Assist in implementing a program for carrying out nutrient dynamic research in iron toxic and other priority problem of soils in order to better understand soil fertility constraints on iron toxic soils, focus would be on the dynamic of Fe, P, K, Mn and Zn.
4. Assist in identifying critical nutrient values for major rice soils. Priority would be P, K, Zn and perhaps S and Si.
5. Assist in integrating pedology, laboratory and applied research studies.
6. Help identify and develop more functional rice soil classification system and maps.
7. Collaborate with the rice variety improvement program in developing improved techniques for screening of germplasm for adverse soil tolerance.
8. Collaborate with the agronomists in developing soil management recommendations for different rice cropping systems.
9. Assist in formulating soil fertility management practices.
10. Collaborate in the planning, design and supervision of research trials and in the collection, analysis, evaluation and presentation of results.
11. Prepare annual work plans and quarterly reports.
12. Undertake additional responsibilities as assigned by the IRRI team leader.

### Qualifications

Should have a PhD in soils or soil fertility/management area, with 5 years of work experience in a developing country. Should be able to work as a member of a multidisciplinary farming systems team. Fluency in French (minimum S-3, R-3) is required. Administrative experience will be desirable.

The soils scientist will work in close collaboration with the other members of the FOFIFA/IRRI research team and will work under the direction of the IRRI Team Leader.

TABLE 4. The Terms of References of Agro-economist/Technology Transfer Specialist.

1. Provide on-the-job training of FOFIFA counterparts.
2. Promote multi-disciplinary farm/field focused studies of dominant rice-based systems to
  - a. generate quantitative understanding of the systems including base-line data
  - b. help identify research priorities and feasible technology boundaries for researcher-managed to farmer-managed trials.
  - c. anticipate/identify non-technical constraints (e.g. markets, input supply, cash availability) which must be addressed to ensure that emerging technologies are feasible and sustainable and feed this information to researchers, policy makers and planners.
3. Participate within multidisciplinary teams in the design, execution and evaluation of research designed to solve on-farm problems.
4. Work with FOFIFA, MRSTD and MPARA staff in the development, evaluation and extension of rice recommendations and identify other skills needed to ensure successful technology transfer which may be provided through specific training of Malagasy scientists and extension officers and/or through short term consultancies.
5. Forge links with agencies involved in agricultural infrastructure (credit, markets, input supply, extension) to ensure its capacity to service emerging technology.
6. Foster active liaison between the rice programs technical expertise and other agencies with capacity and responsibility for planning and policy formation.

Qualifications

Candidate must possess a PhD in agro-economics and have a minimum five years relevant work experiences in socio-economic, agro-economics technology transfer or farming systems research. Fluency in speaking and reading French (minimum S-3, R-3) is required. Candidate must have demonstrated ability to work on a member of a multi-disciplinary team, to train counterparts and to have a facility for communication. Administration experience is desirable.

95

## Appendix B

**TABLE 5. Terms of reference for IRRI Team Leader.**

1. In consultation with FOFIFA scientists, order equipment, supplies and scientific literature for the project; follow-up on same; after clearance of commodities, designate destination and distribute commodities.
2. Oversee clearing of air freight shipments and, where necessary, assist FOFIFA in clearing sea freight shipments.
3. In coordination with FOFIFA and IRRI, Philippines, arrange for short and long term training of FOFIFA scientists and extension personnel.
4. In coordination with FOFIFA, arrange for FOFIFA scientists' participation in conferences, workshops and monitoring tours.
5. In coordination with FOFIFA and IRRI, arrange for short-term consultants, visits and monitoring tours to Madagascar.
6. Assist in coordinating the different research sub-programs and seek opportunities for research, extension and development programs to more effectively communicate and cooperate.
7. Handle official correspondence regarding the administrative aspects of the project; coordinate the writing up and distribution of the quarterly reports to USAID, IRRI and FOFIFA; provide an overview of the administrative and scientific aspects of the project.
8. Oversee the monthly submission of monthly bank statement reports, transaction reports, etc., to the Director of Finance and Accounting, IRRI; oversee monthly submission of expenses to Treasury through FOFIFA.
9. Oversee the general management of the office.
10. Oversee recruitment of IRRI support staff, up-dating contracts, payment of salaries, etc.

TABLE 6. Regions, sites and ecologies with approximate impact areas where POPIPA plans to conduct applied research in a cropping systems context and types of research to be conducted.

REGION	SITE	ECOLOGY	RESEARCH	IMMEDIATE TARGET AREAS (Ha)	HOMOLOGOUS AREAS TO WHICH TECHNOLOGY COULD BE TRANSFERRED (Ha)
High Plateau	Sambaina Nord Manjakandriana	Irrigated intermediate season rice having varying levels of iron toxicity.	Rice-upland crops Rice-ratoon Component technology	2,000	Ambatolampy (2,000) Anjozorobe (2,000) Fianarantsoa (6,000)
	Mahitsy	Main season rice in valleys and plains (some degree of iron toxicity).	Component technology Rice-fallow Rice-ratoon Rice-upland crops Component technology	4,000	Northern part of the High Plateau (110,000) Fianarantsoa (70,000)
	Betafo	Irrigated early and intermediate season rice; good soils.	Rice-rice Rice-ratoon Rice-upland crops Has high potential for double cropped rice Component technology.	3,000	Antsirabe (2,000) Fianarantsoa (8,000) Northern part of the High Plateau (2,000)
	Fianarantsoa (1)	Irrigated early and intermediate season rice; soils not as fertile as at Betafo.	Rice-rice Rice-ratoon Rice-upland crops Component technology	15,000	
		Main season rice	Rice-upland crops Component technology	40,000	Northern part of the High Plateau (110,000)
Lac Alaotra	Lac Alaotra	Irrigated rice	Component technology Rice Rice-upland crops	25,000	
		Rainfed lowland	Component technology (weeds controls and established variety) Rice-upland crops	50,000	
		Upland	Cropping pattern design Component technology	3,000	Kianjasoa (20,000)
Middle-West	Kianjasoa/ Tsiroanomandidy	Irrigated	Rice-rice Rice-upland crops Component technology	5,000	Ambositra (5,000)
		Rainfed wetland	Rice-upland crops Component technology	25,000	Ambositra (20,000)

		Upland	Cropping pattern design Component technology	20,000	Ambositra (5,000) Lac Alaotra (3,000)
Northwest	Tsararano Marovoay	Dry season rice (Irrigated, good soils).	Component technology Rice-deepwater rice Rice-upland crops	8,000	Mahajanga (25,000) North ( )
		Wet season rice (rainfed, fair soils poor water control)	Rice-upland crops Component technology	20,000	Port-Berge (10,000) Mahajanga (10,000)
Southwest	Tanandava	Almost year-round irrigated rice fertile soils	Cropping pattern design Component technology	3,000	Tulear (40,000) Morondava (40,000)
East coast	Ivoloina	10 month rainy season; flooding, drainage problems, poor soils.	Component technology (variety improvement)		

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(1) Applied research in a cropping systems context not yet initiated because of lack of manpower.

TABLE 7. Provisional number of technologies to be developed by ecology and region during the Phase III.

Technologies (1)	Middle West		Mahitsy	Manjaka-ndriana	Antsi-rabe	Piama-rantsoa	CALA			East coast			Port Berge	Saman-goty	
	U	W	W	W	W	W	IR	RF	U	W	DS	DW	WS	W	W
1. Variety	1	4	2	2	2	2	2	2	1	2	2	2	2	2	2
2. Land preparation				1			1	1			1				
3. Cultural practice		1	1	1				1			1				
4. Weed management		1						1	1		1				
5. Insect management	1	1	1	1	1	1					1		1		
6. Disease control			1	1	1	1					1				
7. Fertility/fertilizer management	1	1	1	1	1										1
8. Cropping intensification		1	1	1	1		1	1	1		1	1			
9. Agricultural machines		1					1	1			1				

## Abbreviations used:

U = Upland

W = Wetland

IR = Irrigated Wetland Rice

RF = Rainfed Wetland rice

DS = Direct Seeded rice

DW = Deepwater rice

WS = Wet Season

(1) indicates the number of technologies to be recommended for each ecology in a region. The same technology (variety, insect control practice, cultural practice, etc.) may be recommended for more than one region. Thus, the technology is counted for each region for which it is recommended. Technologies are inter-related. For example, the recommendation for disease control may be a variety. Thus, variety is counted once for a variety recommendation and again as a method of disease control.

## SC (1) - COUNTRY CHECKLIST

Listed below are statutory criteria applicable to: (A) FAA funds generally; (B) (1) Development Assistance funds only; or (B) (2) the Economic Support Fund only.

A. GENERAL CRITERIA FOR COUNTRY ELIGIBILITY

1. FY 1989 Appropriations Act Sec. 578 (b).  
Has the President certified to the Congress that the government of the recipient country is failing to take adequate measures to prevent narcotic drugs or other controlled substances which are cultivated, produced or processed illicitly, in whole or in part, in such country or transported through such country, from being sold illegally within the jurisdiction of such country to United States Government personnel or their dependents or from entering the United States unlawfully? No
  
2. FAA Sec. 481 (h): FY 1989 Appropriations Act Sec. 578; 1988 Drug Act Secs. 4425-07. (These provisions apply to assistance of any kind provided by grant, sale, loan, lease, credit, guaranty, or insurance, except assistance from the Child Survival Fund or relating to international narcotics control, disaster and refugee relief, narcotics education and awareness, or the provision of food or medicine.) If the recipient is a "major illicit drug producing country" (defined as a country producing during a fiscal year at least five metric tons of opium or 500 metric tons of coca or marijuana) or a "major drug-transit country" (defined as a country that is a significant direct source of illicit drugs significantly affecting the United States, through which such drugs are transported, or through which significant sums of drug-related profits are

laundered with the knowledge or complicity of the government): (a) Does the country have in place a bilateral narcotics agreement with the United States, or a multilateral narcotics agreement? and (b) Has the President in the March 1 International Narcotics Control Strategy Report (INSCR) determined and certified to the Congress (without Congressional enactment, within 45 days of continuous session, of a resolution disapproving such a certification), or has the President determined and certified to the Congress on any other date (with enactment by Congress of a resolution approving such certification), that (1) during the previous year the country has cooperated fully with the United States or taken adequate steps on its own to satisfy the goals agreed to in a bilateral narcotics agreement with the United States or in a multilateral agreement, to prevent illicit drugs produced or processed in or transported through such country from being transported into the United States, to prevent and punish drug profit laundering in the country, and to prevent and punish bribery and other forms of public corruption which facilitate production or shipment of illicit drugs or discourage prosecution of such acts, or that (2) the vital national interests of the United States require the provision of such assistance?

N/A

3. 1986 Drug Act Sec. 2013; 1988 Drug Act Sec. 4404. (This section applies to the same categories of assistance subject to the restrictions in FAA Sec. 481 (h), above.) If recipient country is a "major illicit drug producing country" or "major drug-transit country" (as defined for the purpose of FAA Sec 481 (h), has the President submitted a report to Congress listing such country as one (a) which, as a matter of government policy, encourages or facilitates the production or distribution of illicit drugs; (b) in which any senior official of the

N/A

- government engages in, encourages, or facilitates the production or distribution of illegal drugs; (c) in which any member of a U.S. Government agency has suffered or been threatened with violence inflicted by or with the complicity of any government officer; or (d) which fails to provide reasonable cooperation to lawful activities of U.S. drug enforcement agents, unless the President has provided the required certification to Congress pertaining to U.S. national interests and the drug control and criminal prosecution efforts of that country? N/A
4. FAA Sec. 620 (c). If assistance is to a government, is the government indebted to any U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies, (b) the debt is not denied or contested by such government, or (c) the indebtedness arises under an unconditional guaranty of payment given by such government or controlled entity? NO
5. FAA Sec. 620 (e) (1). If assistance is to a government, has it (including any government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities? NO
6. FAA Secs. 620 (a), 620 (f), 620D; FY 1989 Appropriations Act Secs, 512, 550, 592. Is recipient country a Communist country? If so, has the President determined that assistance to the country is vital to the security of the United States, that the recipient country is not controlled by the international Communist conspiracy, and that such assistance will further promote the independence of the recipient country from international communism? Will assistance be provided NO

either directly or indirectly to Angola, Cambodia, Cuba, Iraq, Lybia, Vietnam, South Yemen, Iran or Syria? Will assistance be provided to Afghanistan through the Soviet-controlled government of Afghanistan?

7. FAA Sec. 620 (j). Has the country permitted, or failed to take adequate measures to prevent damage or destruction by mob action of U.S. property? No
8. FAA Sec. 620 (l). Has the country failed to enter into an investment guaranty agreement with OPIC? No
9. FAA Sec. 620 (o); Fishermen's Protective Act of 1967 (as amended) Sec. 5. (a) Has the country seized, or imposed any penalty or sanction against, any U.S. fishing vessel because of fishing activities in international waters?  
(b) If so, has any deduction required by Fishermen's Protective Act been made? No
11. FAA Sec. 620 (g); FY 1989 Appropriations Act Sec. 518. (a) Has the government of the recipient country been in default for more than six months on interest or principal of any loan to the country under the FAA? (b) Has the country been in default for more than one year on interest or principal on any U.S. loan under a program for which the FY 1989 Appropriations Act appropriates funds? No
12. FAA Sec. 620 (s). If contemplated assistance is development loan or to come from Economic Support Fund, has the Administrator taken into account the percentage of the country's budget and amount of the country's foreign exchange or other resources spent on military equipment? (Reference may be made to the annual "Taking Into Consideration" memo: "Yes, taken into account by the Administrator at time of approval of N/A

Agency OYB." This approval by the Administrator of the Operational Year Budget can be the basis for an affirmative answer during the fiscal year unless significant changes in circumstances occur.)

12. FAA Sec. 620 (t). Has the country severed diplomatic relations with the United States? If so, have relations been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?  
No
13. FAA Sec. 620 (u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the A.I.D. Administrator in determining the current A.I.D. Operational Year Budget? (Reference may be made to the "Taking into Consideration" memo.)  
The A.I.D. Administrator has taken Madagascar's arrearages into account in determining the current O.Y.B. (see memo dated Dec. 20, 1989.)
14. FAA Sec. 620A. Has the President determined that the recipient country grants sanctuary from prosecution to any individual or group which has committed an act of international terrorism or otherwise supports international terrorism?  
No
15. FY 1989 Appropriations Act Sec. 568. Has the country been placed on the list provided for in Section 6 (j) of the Export Administration Act of 1979 (currently Libya, Iran, South Yemen, Syria, Cuba, or North Korea)?  
No
16. ISDCA of 1985 Sec. 552 (b). Has the Secretary of State determined that the country is a high terrorist threat country after the Secretary of Transportation has determined, pursuant to Section 1115(e)(2) of the Federal Aviation Act of 1958, that an airport in the country does not maintain and administer effective security measures?  
No

104-

17. FAA Sec. 666(b). Does the country object, on the basis of race, religion, national origin or sex, to the presence of any officer or employee of the U.S. who is present in such country to carry out economic development programs under the FAA? No
18. FAA Secs. 669, 670. Has the country, after August 3, 1977, delivered to any other country or received nuclear enrichment or reprocessing equipment, materials, or technology, without specified arrangements or safeguards, and without special certification by the President? Has it transferred a nuclear explosive device to a non-nuclear weapon state, or if such a state, either received or detonated a nuclear explosive device? (FAA Sec. 620E permits a special waiver of Sec. 669 for Pakistan.) No
19. FAA Sec. 670. If the country is a non-nuclear weapon state, has it, on or after August 8, 1985, exported (or attempted to export) illegally from the United States any material, equipment, or technology which could contribute significantly to the ability of a country to manufacture a nuclear explosive device? No
20. ISDCA of 1981 Sec. 720. Was the country represented at the Meeting of Ministers of Foreign Affairs and Heads of Delegations of the Non-Aligned Countries to the 36th General Assembly of the U.N. on Sept. 25 and 28, 1981, and did it fail to dissociate itself from the communique issued? If so, has the President taken it into account? (Reference may be made to the "Taking into Consideration" memo). Madagascar's participation in the 36th and subsequent communique has been taken into account by the President (See memo dated Dec. 20, 1989)
21. FY 1989 Appropriations Act Sec. 527. Has the recipient country been determined by the President to have engaged in a consistent pattern of opposition to the foreign policy of the United States? No

22. FY 1989 Appropriations Act Sec. 513. Has the duly elected Head of Government of the country been deposed by military coup or decree? If assistance has been terminated, has the President notified Congress that a democratically elected government has taken office prior to the resumption of assistance? **No**
23. FY 1989 Appropriations Act Sec. 540. Does the recipient country fully cooperate with the international refugee assistance organizations, the United States, and other governments in facilitating lasting solutions to refugee situations, including resettlement without respect to race, sex, religion, or national origin? **Yes**

B. FUNDING SOURCE CRITERIA FOR COUNTRY ELIGIBILITY

1. Development Assistance Country Criteria

FAA Sec. 116. Has the Department of State determined that this government has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, can it be demonstrated that contemplated assistance will directly benefit the needy? NO

FY 1989 Appropriations Act Sec. 536. Has the President certified that use of DA funds by this country would violate any of the prohibitions against use of funds to pay for the performance of abortions as a method of family planning, to motivate or coerce any person to practice abortions, to pay for the performance of involuntary sterilization as a method of family planning, to coerce or provide any financial incentive to any person to undergo sterilizations, to pay for any biomedical research which relates, in whole or in part, to methods of, or the performance of, abortions or involuntary sterilization as a means of family planning? NO

2. Economic Support Fund Country Criteria

FAA Sec. 502B. Has it been determined that the country has engaged in a consistent pattern of gross violations of internationally recognized human rights? If so, has the President found that the country made such significant improvement in its human rights record that furnishing such assistance is in the U.S. national interest? N/A

FY 1989 Appropriations Act Sec. 578(d). Has this country met its drug eradication targets or otherwise taken significant steps to halt illicit drug production or trafficking?

SC (2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable to projects. This section is divided into two parts. Part A includes criteria applicable to all projects. Part B applies to projects funded from specific sources only: B(1) applies to all projects funded with Development Assistance; B(2) applies to projects funded with Development Assistance loans; and B(3) applies to projects funded from ESF.

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

A. GENERAL CRITERIA FOR PROJECT

1. FY 1989 Appropriations Act Sec. 523; FAA Sec. 634A. If money is sought to be obligated for an activity not previously justified to Congress, or for an amount in excess of amount previously justified to Congress, has Congress been properly notified?  
A Congressional Notification expired without objection on
2. FAA Sec. 611(a)(1). Prior to an obligation in excess of \$500,000, will there be (a) engineering, financial or other plans necessary to carry out the assistance, and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?  
(a) Yes  
(b) Yes
3. FAA Sec. 611(a)(2). If legislative action is required within the recipient country, what is the basis for a reasonable expectation that such action will be completed in time to permit orderly accomplishment of the purpose of the assistance?  
No legislative action is required

4. FAA Sec. 611(b); FY 1989 Appropriations Act Sec. 501. If project is for water or water-related land resource construction, have benefits and costs been computed to the extent practicable in accordance with the principles, standards and procedures established pursuant to the Water Resources Planning Act (42 U.S.C. 1962, et seq.)? (See AFD Handbook 3 for guidelines.) N/A
  
5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and total U.S. assistance for it will exceed \$1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability to maintain and utilize the project effectively? N/A
  
6. FAA Sec. 209. Is project susceptible to execution as part of a regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs. No
  
7. FAA Sec. 601(a). Information and conclusions whether projects will encourage efforts of the country to:  
(a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, savings and loan associations;  
(d) discourage monopolistic practices;  
(e) improve technical efficiency of industry, agriculture and commerce; and  
(f) strengthen free labor unions.  
(a) N/A  
(b) N/A  
(c) N/A  
(d) N/A  
(e) Improved rice seed varieties and cultural practices will increase the technical efficiency of agriculture.  
(f) N/A
  
8. FAA Sec. 602(b). Information and conclusions on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise). Approximately 45% of total project procurement of \$730,500 will be from the US for laboratory and field equipment, publications, and office equipment and supplies.

9. FAA Sec. 612(b), 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 in lieu of dollars.
- The host country will finance 47% of the the total project costs (equivalent to \$5,023,125) in local currency generated from the sale of US commodities.
10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?
- N/A
11. FY 1989 Appropriations Act Sec. 521. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?
- The assistance is primarily to increase production of rice for domestic consumption, since current demand exceeds supply of this staple food.
12. FY 1989 Appropriations Act Secs. 549. Will the assistance (except for programs in Caribbean Basin Initiative countries under U.S. Tariff Schedule "Section 807," which allows reduced tariffs on articles assembled abroad from U.S.-made components) be used directly to procure feasibility studies, prefeasibility studies, or project profiles of potential investment in, or to assist the establishment of facilities specifically designed for, the manufacture for export to the United States or to third country markets in direct competition with U.S. exports, of textiles, apparel, footwear, handbags, flat goods (such as wallets or coin purses worn on the person), work gloves or leather wearing apparel?
- No
13. FAA Sec. 119(g)(4)-(6) &(10). Will the assistance (a) support training and education efforts which improve the capacity of recipient countries to prevent loss of biological diversity; (b) be provided under a long-term agreement in which the recipient country agrees to protect ecosystems or other
- (a) Yes  
Germplasm of indege-  
neous rice varieties  
will be purified and  
saved.  
(b) No  
(c) No  
(d) No

wildlife habitats; (c) support efforts to identify and survey ecosystems in recipient countries worthy of protection; or (d) by any direct or indirect means significantly degrade national parks or similar protected areas or introduce exotic plants or animals into such areas?

14. FAA Sec. 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (either dollars or local currency generated therefrom)? N/A
15. FY 1989 Appropriations Act. If assistance is to be made to a United States PVO (other than a cooperative development organization), does it obtain at least 20 percent of its total annual funding for international activities from sources other than the United States Government? N/A
16. FY 1989 Appropriations Act Sec. 538. If assistance is being made available to a PVO, has that organization provided upon timely request any document, file, or record necessary to the auditing requirements of A.I.D., and is the PVO registered with A.I.D.? N/A
17. FY 1989 Appropriations Act Sec. 514. If funds are being obligated under an appropriation account to which they were not appropriated, has prior approval of the Appropriations Committees of Congress been obtained? N/A
18. State Authorization Sec. 139 (as interpreted by conference report). Has confirmation of the date of signing of the project agreement, including the amount involved, been cabled to State LT and A.I.D. LEG within 60 days of the agreement's entry into force with respect to the United States, and has the full text of the agreement been pouched to those same offices? (See Handbook 3, Appendix 6G for agreements covered by this provision). Yes, this will be done.

B. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FY 1989 Appropriations Act Sec. 548  
(as interpreted by conference report for original enactment). If assistance is for agricultural development activities (specifically, any testing or breeding feasibility study, variety improvement or introduction, consultancy, publications, conference, or training), are such activities (a) specifically and principally designed to increase agricultural exports by the host country to a country other than the United States, where the export would lead to direct competition in that third country with exports of a similar commodity grown or produced in the United States, and can the activities reasonably be expected to cause substantial injury to U.S. exporters of a similar agricultural commodity: or (b) in support of research that is intended primarily to benefit U.S. producers?

(a) No - The program is designed principally to increase production of a staple food for domestic consumption.

(b) No

b. FAA Secs. 102(b), 11, 113, 281(a). Describe extent to which activity will (a) effectively involve the poor in development by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, dispersing investment from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using appropriate U.S. institutions: (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental

(a) The project will help rural smallholder farmers in target areas to increase their rice production and incomes by at least 20% through the development of improved varieties and cultural practices.

(b) N/A

(c) N/A

(d) Extension messages will be targetted to women who constitute a major portion of the rural on-farm-work-force.

(e) N/A

112-

institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries?

FAA Secs. 103, 103A, 104, 105, 106, 120-121; FY 1989 Appropriations Act (Development Fund for Africa). Does the project fit the criteria for the source of funds (functional account) being used?

Yes

- d. FAA Sec. 107. Is emphasis placed on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?
- e. FAA Secs. 110, 124(d). Will the recipient country provide at least 25 percent of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)?
- f. FAA Sec. 128(b). If the activity attempts to increase the institutional capabilities of private organizations or the government of the country, or if it attempts to stimulate scientific and technological research, has it been designed and will it be monitored to ensure that the ultimate beneficiaries are the poor majority?

Yes - Hand and animal powered rice planting, weeding, and threshing equipment will be developed which can be locally made and serviced.

The host country will provide 47% of the total cost of the program.

Yes

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

The project will work through the National Organization for Agricultural Research (FOFIFA) by implementing its National Rice Research Program prepared by FOFIFA scientists. A major component of the project will be training to improve the technical skills of these scientists.

h. FY 1989 Appropriations Act Sec. 536. Are any of the funds to be used for the performance of abortions as a method of family planning or to motivate or coerce any person to practice abortions?

No

Are any of the funds to be used to pay for the performance of involuntary sterilization as a method of family planning or to coerce or provide any financial incentive to any person to undergo sterilizations?

No

Are any of the funds to be used to pay for any biomedical research which relates, in whole or in part, to methods of, or the performance of, abortions as a means of family planning?

No

i. FY 1989 Appropriations Act. Is the assistance being made available to any organization or program which has been determined to support or participate in the management of a program of coercive abortion or involuntary sterilization?

No

If assistance is from the population functional account, are any of the funds to be made available to voluntary family planning projects which do not offer, either directly or through referral to or information about access to, a broad range of family planning methods and services?

N/A

j. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?

Applicable procurement rules allow A.I.D. to make a non-competitive assistance award, in this case.

k. FY 1989 Appropriations Act. What portion of the funds will be available only for activities of economically and socially disadvantaged enterprises, historically black colleges and universities, colleges and universities having a student body in which more than 40 percent of the students are Hispanic Americans, and private and voluntary organizations which are controlled by individuals who are black Americans. Hispanic Americans, or Native Americans, or who are economically or socially disadvantaged (including women)?

No funds in the project are specifically targetted for these groups except for the benefit of low income Malagasy farmers.

FAA Sec. 118(c). Does the assistance comply with the environmental procedures set forth in A.I.D. Regulation 16? Does the assistance place a high priority on conservation and sustainable management of tropical forests? Specifically, does the assistance, to the fullest extent feasible: (a) stress the importance of conserving and sustainably managing forest resources; (b) support activities which offer employment and income alternatives to those who otherwise would cause destruction and loss of forests, and help countries identify and implement alternatives to colonizing forested areas; (c) support training programs, educational efforts, and the establishment or strengthening of institutions to improve forest management; (d) help end destructive slash-burn agriculture by supporting stable and productive farming practices; (e) help conserve

Yes  
(a) N/A  
(b) Yes  
(c) N/A  
(d) Yes  
(e) Yes

production on lands already cleared or degraded; (f) conserve forested watersheds and rehabilitate those which have been deforested; (g) support training, research, and other actions which lead to sustainable and more environmentally sound practices for timber harvesting, removal, and processing; (h) support research to expand knowledge of tropical forests and identify alternatives which will prevent forest destruction, loss, or degradation; (i) conserve biological diversity in forest areas by supporting efforts to identify, establish, and maintain a representative network of protected tropical forest ecosystems on a worldwide basis, by making the establishment of protected areas a condition of support for activities involving forest clearance or degradation, and by helping to identify tropical forest ecosystems and species in need of protection and establish and maintain appropriate protected areas; (j) seek to increase the awareness of U.S. government agencies and other donors of the immediate and long-term value of tropical forests; and (k) utilize the resources and abilities of all relevant U.S. government agencies?

- (f) N/A
- (g) N/A
- (h) N/A
- (i) N/A
- (j) N/A
- (k) N/A

m. FAA Sec. 118(c)(13). If the assistance will support a program or project significantly affecting tropical forests (including projects involving the planting of exotic plant species), will the program or project (a) be based upon careful analysis of the alternatives available to achieve the best sustainable use of the land, and (b) take full account of the environmental impacts of the proposed activities on biological diversity?

- (a) N/A
- (b) N/A

116

- n. FAA Sec. 118(c)(14). Will assistance be used for (a) the procurement or use of logging equipment, unless an environmental assessment indicates that all timber harvesting operations involved will be conducted in an environmentally sound manner and that the proposed activity will produce positive economic benefits and sustainable forest management systems; or (b) actions which will significantly degrade national parks or similar protected areas which contain tropical forests, or introduce exotic plants or animals into such areas?
- (a) NO  
(b) NO
- o. FAA Sec. 118(c)(15). Will assistance be used for (a) activities which would result in the conversion of forest lands to the rearing of livestock; (b) the construction, upgrading, or maintenance of roads (including temporary haul roads for logging or other extractive industries) which pass through relatively undegraded forest lands; (c) the colonization of forest lands; or (d) the construction of dams or other water control structures which flood relatively undegraded forest lands, unless with respect to each such activity an environmental assessment indicates that the activity will contribute significantly and directly to improving the livelihood of the rural poor and will be conducted in an environmentally sound manner which supports sustainable development?
- (a) No  
(b) No  
(c) No  
(d) No
- p. FY 1989 Appropriations Act. If assistance will come from the Sub-Saharan Africa DA account, is it (a) to be used to help the poor majority in Sub-Saharan Africa through a process of long-term development and economic growth that is equitable, participatory, environmentally sustainable, and self-reliant; (b) being provided in accordance with the policies contained in section 102 of the FAA;
- (a) Yes  
(b) Yes

(c) being provided, when consistent with the objectives of such assistance, through African, United States and other PVOs that have demonstrated effectiveness in the promotion of local grassroots activities on behalf of long-term development in Sub-Saharan Africa; (d) being used to help overcome shorter-term constraints to long-term development, to promote reform of sectoral economic policies, to support the critical sector priorities of agricultural production and natural resources, health, voluntary family planning services, education, and income generating opportunities, to bring about appropriate sectoral restructuring of the Sub-Saharan African economies, to support reform in public administration and finances and to establish a favorable environment for individual enterprise and self-sustaining development, and to take into account, in assisted policy reforms, the need to protect vulnerable groups; (e) being used to increase agricultural production in ways that protect and restore the natural resource base, especially food production, to maintain and improve basic transportation and communication networks, to maintain and restore the renewable natural resource base in ways that increase agricultural production, to improve health conditions with special emphasis on meeting the health needs of mothers and children, including the establishment of self-sustaining primary health care systems that give priority to preventive care, to provide increased access to voluntary family planning services, to improve basic literacy and mathematics especially to those outside the formal educational system and to improve primary education, and to develop income-generating opportunities for the unemployed and underemployed in urban and rural areas?

(c) N/A  
(d) Yes  
(e) Yes

q. FY 1989 Appropriations Act Sec. 515.  
If deob/reob authority is sought to be exercised in the provision of DA assistance, are the funds being obligated for the same general purpose, and for countries within the same general region as originally obligated, and have the Appropriations Committees of both Houses of Congress been properly notified?

N/A

2. Development Assistance Project Criteria  
(Loans Only)

a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan at a reasonable rate of interest.

N/A

b. FAA Sec. 620(d). If assistance is for any productive enterprise which will compete with U.S. enterprises, is there an agreement by the recipient country to prevent export to the U.S. of more than 20 percent of the enterprise's annual production during the life of the loan, or has the requirement to enter into such an agreement been waived by the President because of a national security interest?

N/A

c. FAA Sec. 122(b). Does the activity give reasonable promise of assisting long-range plans and programs designed to develop economic resources and increase productive capacities?

N/A

3. Economic Support Fund Project Criteria.

- a. FAA Sec. 531(a). Will this assistance promote economic and political stability? To the maximum extent feasible, is this assistance consistent with the policy directions, purposes, and programs of Part I of the FAA? N/A
  
- b. FAA Sec. 531(e). Will this assistance be used for military or paramilitary purposes? N/A
  
- c. FAA Sec. 609. If commodities are to be granted so that sale proceeds will accrue to the recipient country, have Special Account (counterpart) arrangements been made? N/A

5C(3) - STANDARD ITEM CHECKLIST

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

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

A. PROCUREMENT

1. FAA Sec. 602(a). Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed? Yes
2. FAA Sec. 604(a). Will all procurement be from the U.S. except as otherwise determined by the President or determined under delegation from him? Yes
3. FAA Sec. 604(d). If the cooperating country discriminates against marine insurance companies authorized to do business in the U.S., will commodities be insured in the United States against marine risk with such a company? N/A
4. FAA Sec. 604(e); ISDCA of 1980 Sec. 705(a). If non-U.S. procurement of agricultural commodity or product thereof is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? (Exception where commodity financed could not reasonably be procured in U.S.) N/A

12/1

5. FAA Sec. 604(q). Will construction or engineering services be procured from firms of advanced developing countries which are otherwise eligible under code 941 and which have attained a competitive capability in international markets in one of these areas? (Exception for those countries which receive direct economic assistance under the FAA and permit United States firms to compete for construction or engineering services financed from assistance programs of these countries.) No
6. FAA Sec. 603. Is the shipping excluded from compliance with the requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 percent of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent such vessels are available at fair and reasonable rates? No
7. FAA Sec. 621(a). If technical assistance is financed, will such assistance be furnished by private enterprise on a contract basis to the fullest extent practicable? Will the facilities and resources of other Federal agencies be utilized, when they are particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs? Yes  
N/A
8. International Air Transportation Fair Competitive Practices Act, 1974. If air transportation of persons or property is financed on grant basis, will U.S. carriers be used to the extent such service is available? Yes
9. FY 1989 Appropriations Act Sec. 504. If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States? Yes

122

10. FY 1989 Appropriations Act Sec. 524. If assistance is for consulting service through procurement contract pursuant to 5 U.S.C. 3109, are contract expenditures a matter of public record and available for public inspection (unless otherwise provided by law or Executive order)? Yes
- B. CONSTRUCTION
1. FAA Sec. 601(d). If capital (e.g., construction) project, will U.S. engineering and professional services be used? N/A
2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable? N/A
3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed \$100 million (except for productive enterprises in Egypt that were described in the CP), or does assistance have the express approval of Congress? N/A
- C. OTHER RESTRICTIONS
1. FAA Sec. 122(b). If development loan repayable in dollars, is the interest rate at least 2 percent per annum during a grace period which is not to exceed ten years, and at least 3 percent per annum thereafter? N/A
2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights? N/A

132

3. FAA Sec. 620(h). Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the communist-bloc countries? **Yes**
4. Will arrangements preclude use of financing:
- a. FAA Sec. 104(f); FY 1989 Appropriations Act Secs. 525, 536.  
(1) To pay for performance of abortions as a method of family planning or to motivate or coerce persons to practice abortions; (2) to pay for performance of involuntary sterilization as method of family planning, or to coerce or provide financial incentive to any person to undergo sterilization; (3) to pay for any biomedical research which relates, in whole or part, to methods or the performance of abortions or involuntary sterilizations as a means of family planning; (4) to lobby for abortion? **Financing of all items on this list is precluded.**
- b. FAA Sec. 483. To make reimbursements, in the form of cash payments, to persons whose illicit drug crops are eradicated? **Yes**
- c. FAA Sec. 620(g). To compensate owners for expropriated or nationalized property, except to compensate foreign nationals in accordance with a land reform program certified by the President? **Yes**
- d. FAA Sec. 660. To provide training, advice, or any financial support for police, prisons, or other law enforcement forces, except for narcotics programs? **Yes**
- e. FAA Sec. 662. For CIA activities? **Yes**

- f. FAA Sec. 636(i). For purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained? DFA regulations allow Code 935 procurement.
- g. FY 1989 Appropriations Act Sec. 503. To pay pensions, annuities, retirement pay, or adjusted service compensation for prior or current military personnel? Yes
- h. FY 1989 Appropriations Act Sec. 505. To pay U.N. assessments, arrearages or dues? Yes
- i. FY 1989 Appropriations Act Sec. 506. To carry out provisions of FAA section 209(d) (transfer of FAA funds to multilateral organizations for lending)? Yes
- j. FY 1989 Appropriations Act Sec. 510. To finance the export of nuclear equipment, fuel, or technology? Yes
- k. FY 1989 Appropriations Act Sec. 511. For the purpose of aiding the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights? Yes
- l. FY 1989 Appropriations Act Sec. 516; State Authorization Sec. 109. To be used for publicity or propaganda purposes designed to support or defeat legislation pending before Congress, to influence in any way the outcome of a political election in the United States, or for any publicity or propaganda purposes not authorized by Congress? Yes
5. FY 1989 Appropriations Act Sec. 584. Will any A.I.D. contract and solicitation, and subcontract entered into under such contract, include a clause requiring that U.S. marine insurance companies have a fair opportunity to bid for marine insurance when such insurance is necessary or appropriate? Yes

IRRI

P.O. Box 933  
Manila, Philippines  
Telephone: 88-48-69  
88-83-51 to 53

RICE INSTITUTE

Cable: Ricefound Manila  
Telex (ITT) 45365 RICE PM  
40890 RICE PM  
(RCA) 22456 IRI PH  
(EASTERN) 63786 RICE PH  
FAX: 63-2-8178470

June 23, 1989

Dr. Baudouin de Marcken  
Mission Director  
U.S. Agency for International Development  
c/o American Embassy  
16, rue Rainitovo  
Antananarivo, Madagascar

Dear Dr. de Marcken:

The Malagasy Rice Research Project (Grant No. 936-4111-G-00-6011-00) as amended will expire August 20, 1989. The project has been very fruitful and the collaborating parties have agreed to continue the research and training collaboration. A proposal for the Third Phase of the project has been prepared by both FOFIFA and IRRI scientists. I understand that a copy of the proposal has already been sent to you.

Given the urgency of the need for development of Madagascar's rice production, we hope USAID will favorably consider our proposal.

With best wishes.

Very truly yours,



F.A. Bernardo  
Deputy Director General

cc: Dr. Peter W. Shirk  
Dr. K. Lampe  
Dr. J.R. Hooper  
Mr. E.N. Sayegh

FAX No. 34012

FABAC

126

Director General a.i.

to

IRRI Director General  
P.O.Box 933, Manilla  
Philippines.

Subject: Phase III of FOFIFA/IRRI project

Dear Sir,

As you know, the 5 year extended agreement for FOFIFA-IRRI cooperation starting on August 1988 was signed on September 9, 1987 by the Minister of Technological and Scientific Research for Development, Mr. Zafera Antoine RABESA and Mr. S. Swaminathan, IRRI Director General.

I have the honor to suggest that you request USAID to maintain its financial support to our project and to IRRI.

For its part, FOFIFA has sent a letter to USAID concerning this issue on 17 november 1987 (see attached copy).

We look forward to an ever closer cooperation during this third phase.

Sincerely,

Dr. Ravohitrarivo Clet Pascal

171

N° 152 - ESTD/CEH/DG/DS-RV

01 JANV 1989

LE DIRECTEUR GENERAL P.1

à

Monsieur LE DIRECTEUR GENERAL  
de l'IRRI  
P.O. Box 933, Manila

PHILIPPINES

O B J E T : 3ème phase du projet  
FOFIFA/IRRI.

Monsieur Le Directeur Général,

Comme vous le savez, la convention de coopération FOFIFA-IRRI I prolongée pour une nouvelle période de cinq (5) ans à compter du mois d'août 1988 a été signée le 9 septembre 1987 par Monsieur le Ministre de la Recherche Scientifique et Technologique pour le Développement Zafera Antoine RABESA et Monsieur le Directeur Général de l'IRRI, Monsieur S. SWAMINATHAN.

Par la présente, j'ai l'honneur de vous suggérer de bien vouloir contacter l'USAID pour lui demander de poursuivre l'appui financier qu'il a déjà apporté à notre projet et à l'IRRI.

Du côté FOFIFA, une lettre a été adressée à l'USAID dans ce sens le 17 novembre 1987 (cf. copie jointe)

Espérant un développement encore plus intense de notre coopération durant cette troisième phase, je vous prie de croire, Monsieur le Directeur Général, à l'expression de mes sentiments distingués.

Copie à

- Chef de Mission IRRI  
à Madagascar.



Ministère de la Recherche Scientifique et Technologique  
Madagascar

178

Director General

to

Mission Director  
USAID/Madagascar  
Antananarivo

SUBJECT: Phase III FOFIFA/IRRI  
Research Cooperation.

Dear Sir,

In order to implement the research cooperation agreement between FOFIFA and IRRI signed on September 09, 1987 by his Excellency RABESA Zafera Antoine, Minister of Technological and Scientific Research for Development, and the IRRI Director General, Mr. M.S. SWAMINATTAN, I have the honor to submit you the following requests:

1- Support of the two present IRRI experts, (Dr James HOOPPER and Dr. B.B. SHAHI) in Madagascar during Phase III (August 1988 to August 1993)

2- Appointment of an additional member for the specialist team during Phase III, an Agronomist with the following qualifications:

- good knowledge in soil sciences
- experience in rice culture
- experience in soil/plant relationships
- french fluency or at least having an elementary level in french

3- The support of an IRRI provided a consultant for the design, implementation and the follow-up of certain operations which will be defined by the rice team:

- 2 - 4 month missions are recommended.
- short-term missions of less than one week will be significantly reduced.

For your information, these requests were welcomed by Dr. M.S. SWAMINATTANT during his stay in Madagascar on the signing of the agreement.

We hope that these requests will receive USAID's approval and financial support.

Sincerely,

Enc. 1 report of technical execution of the phase 2  
1 project of the rice research for the phase 3 of the project.

Signed: Dr. Charles RAZAFINDRAKOTO



Repoblika Demokratika Malagasy

-----  
MINISTERE DE LA RECHERCHE SCIENTIFIQUE ET TECHNOLOGIQUE  
POUR LE DEVELOPPEMENT

-----  
FOIBEM-PIRENENA MOMBA NY FIKAROHANA AMPIHARINA AMIN'NY FAMPANDROSOANA  
NY AMBANIVOHITRA

-----  
CENTRE NATIONAL DE LA RECHERCHE APPLIQUEE AU DEVELOPPEMENT RURAL

-----  
DIRECTION GENERALE  
-----

Antananarivo, le 17/07/1987

LE DIRECTEUR GENERAL DU FOFIFA

à

Monsieur LE REPRESENTANT DE  
L'USAID à MADAGASCAR

- ANTANANARIVO -

N° 3948 - MRSTU/CEN/DG/DS/RLa

OBJET : Coopération de recherche FOFIFA/IRRI  
en 3e phase.

Monsieur le Représentant,

En vue de concrétiser la convention de coopération de recherche entre le FOFIFA et l'IRRI signée le 09 Septembre 1987 par son Excellence RABESA Zafera Antoine, Ministre de la Recherche Scientifique et Technologique pour le Développement, et le Directeur Général de l'IRRI Monsieur M.S. SWAMINATHAN, j'ai l'honneur de vous soumettre les requêtes suivantes :

1°- Maintien pendant la durée de la troisième phase du projet (Août 1988 en Août 1993) des deux experts actuels de l'IRRI résidant à Madagascar Docteur James HOOPER et Docteur B.B SHAHI.

2°- Renforcement de l'équipe d'expert par l'affectation à Madagascar pendant la 3e phase, d'un Agronome ayant le profil suivant de :

- solide connaissance en science des sols
- solide expérience de la riziculture
- solide expérience en matière de connaissances des relations sols-plantes
- partant français ou au moins ayant un niveau élémentaire de la langue française

B.P. 1690,  
186, Rte Dama-Ntsoa RAZAFINTSALAMA

.../..

Tél : 256 - 76, 258 - 79  
ANTANANARIVO

3°- L'appui de l'IRRI par l'envoi de consultant pour la conception, la mise en place et le suivi de certaines opérations de recherche qui seront définies par l'équipe riz :

- Les missions de moyennes durées de 2 à 4 mois sont les plus recommandées.

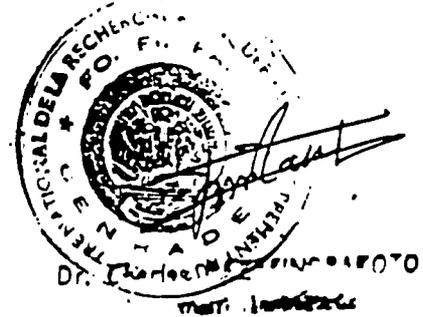
- Les missions de courtes durées de moins d'une semaine sont à réduire au maximum.

Par ailleurs, il y a lieu de mentionner que ces requêtes ont été accueillies favorablement par le Docteur M.S. SWAMINATTAN lors de son passage à Madagascar pour la signature de la Convention.

Espérant que ces requêtes rencontreront l'agrément de l'USAID en terme de financement, je vous prie de croire, Monsieur le Représentant, à l'expression de mes sentiments les meilleurs.

- P.J :- 1 Rapport d'exécution technique de la 2e phase du projet  
- 1 Projet de recherche rizicole pour la 3e phase du projet.

LE DIRECTEUR GENERAL



Attachment 6

INTERNATIONAL CONTRACT II

COUNTRY

TO

AGRICULTURE-IBRA Rice Research  
Project Phase III

PROJECT NO. 687-0105

PROJECT NO.

DATE

P. Thomas, *P. Thomas*  
Development Officer  
USAID/Phase III

Agency's Determination \_\_\_\_\_

Agency's Determination \_\_\_\_\_

APPROVED

DATE OF APPROVAL  
Miss. of Director, USAID/Washington

DATE \_\_\_\_\_

CONCURRENCE

*[Signature]*  
Regional Development Officer

APPROVED \_\_\_\_\_

DATE \_\_\_\_\_

REMARKS

REMARKS

*[Faint handwritten notes]*

Best Available Document

INITIAL ENVIRONMENTAL EXAMINATION

Country: Madagascar

Project Title and Number: Madagascar-IRRI Rice Research  
Project; Phase III

Project No.687-0105

Funding: \$5,500,000

IEE Prepared By: John R. Thomas *John Thomas*  
Agricultural Development Officer  
USAID/Madagascar

Positive Determination \_\_\_\_\_

Negative Determination \_\_\_\_\_ X \_\_\_\_\_

Action Requested By: \_\_\_\_\_  
Baudouin de Marcken  
Mission Director; USAID/Madagascar

Date: \_\_\_\_\_

Concurrence: \_\_\_\_\_  
Regional Environmental Officer

Approved: \_\_\_\_\_

Disapproved: \_\_\_\_\_

Date: \_\_\_\_\_

Clearances:

USAID/Madagascar:PDO:DStauffer *DS* Date: 12/4/89  
REDSO/ESA/RLA: SSpielman \_\_\_\_\_ Date: Dec 1 89

133-

MEMORANDUM OF UNDERSTANDING  
BETWEEN

Attachemnt 7

THE MINISTRY OF SCIENTIFIC RESEARCH AND TECHNOLOGY  
DEVELOPMENT

AND

THE INTERNATIONAL RICE RESEARCH INSTITUTE

FOR

THE MADAGASCAR - IRRI RICE RESEARCH PROJECT  
PHASE III

Project Description

The goal of the Madagascar-IRRI Rice Research Project, Phase III is to improve rice production on farms in Madagascar.

The purpose of the Phase III is to strengthen GRDM's capabilities to carry out effective rice research in the context of a rice-based farming system and to develop appropriate farmer technologies.

The expected outputs of the Project's Phase III are:

1. Strenghtening of rice research using a farming systems approach to identify 1) more profitable cropping systems; 2) higher yielding and better adapted varieties; 3) low cost, farmer-acceptable soil fertility management and pest management practices as well as cultural practices, and 4) appropriate machinery to facilitate production operations, reduce drudgery and reduce production costs.
2. Identification of improved varieties for irrigated, rainfed and upland ecologies by:
  - a) introduction of germplasm for irrigated, rainfed and upland ecologies;
  - b) a hybridization program targeted for irrigated and rainfed ecologies;
  - c) purification and characterization of Malagasy varieties within the existing collection of germplasm material adaptable to irrigated, rainfed and upland conditions.
3. Trained personnel for the rice research program.



- 4. Implementation and review of national rice research strategies and activities for the long term development of the rice program and the Department of Rice Research (DRR).
- 5. Continued exchange of information between IRRI, other organizations that work on rice, and GRDM rice research program.
- 6. Improved capacity of MRSTD to undertake research through up-graded physical facilities and transport.

A formal Cooperative Agreement between MRSTD and IRRI was signed on September 09, 1987 with the view of increasing the national research capability on rice and rice-based farming systems.

The Phase III is designed to further support this agreement and to strengthen the relationship between MRSTD and IRRI.

The project inputs to be provided by IRRI and the MRSTD to support achievement of the above outputs, and the responsibilities of each party, are detailed in the attached project document entitled Madagascar-IRRI Rice Research Project, Phase III.

Project Responsibilities

In furtherance of the above purpose and objectives, the MRSTD and IRRI do hereby covenant and agree as follows:

- 1. In order to facilitate the extension of rice research results and the availability of improved seed varieties to farmers, the MRSTD will:
  - a) Strengthen and institutionalize the research-development linkages by the creation for each target region of a regional rice program team under the inter-ministerial regional research-development committee.

This team will meet at least one time per year at the end of each rice season. Its role is:

- 1. to define the research priorities considering farmers' constraints and resources;
- 2. to identify among FOFIFA's research accomplishments those most promising for pre-production evaluation, and to determine practical methods for their on-farm testing by farmers.

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- b) Regularly provide to development programs and farmers information on rice production through the publication of:
- o a "Rice Newsletter" at least two times a year;
  - o brochures or technical bulletins or manuals describing newly recommended varieties or technical packages as often as required.
  - o an annual report of activities and scientific results.
- c) At the appropriate time, distribute to at least 30 farmers per region seed samples of varieties to be recommended and promoted. Varietal performance and evaluation will be undertaken by farmers in collaboration with FOFIFA's regional research teams.
- d) Organize field day visits to research and demonstration plots one time per year in each rice production region. FOFIFA will also train extension agents and farmers.
- e) Organize at the appropriate time an official ceremony marking the transfer of MRSTD's research results to the Ministere de la Production Agricole et du Patrimoine Foncier (MINAGRI) or development organizations.
- f) Provide to MINAGRI the list of varieties for the Center for Seed Multiplication (CMS) to multiply for each region following the national seed plan that is in the process of being established and assure the supply of M<sub>1</sub> seeds according to the estimated needs as confirmed by orders to FOFIFA.
- g) Contribute to the realization of the National Plan for Agricultural Extension (PNVA) by participating in the training of MINAGRI trainers.

Additional actions to facilitate the dissemination of research results will be the subject of no less than quarterly consultations between IRRI, MRSTD and USAID. IRRI shall propose dates for said consultations.

To allow sufficient time for application and completion of university admission requirements, participants for long-term overseas training will be identified by MRSTD and their names conveyed to IRRI no less than 8 months before the

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scheduled training is to begin. Intended PhD or troisieme cycle scholars must be identified by November 1990 and MS scholars by November 1992 to ensure completion of studies before the project terminates.

IRRI shall advise MRSTD/FOFIFA of scheduled long-term and short-term training programs, conferences, workshops, etc. as early as possible.

3. MRSTD will assure that local currency requirements for the project, as set forth in the schedule below, are provided for, in a timely manner, within the government's annual budget.

GRDM Budget Year 1990/91	FMG 1.363.000.000
GRDM Budget Year 1991/92	FMG 3.521.000.000
GRDM Budget Year 1992/93	FMG 1.388.000.000
GRDM Budget Year 1993/94	FMG 998.500.000
GRDM Budget Year 1994/95	FMG 859.000.000
TOTAL	FMG 8.129.500.000

4. In order to facilitate the sustainability of project activities and to enhance the sharing of scientific and managerial skills, the following are identified as principal counterparts for the below designated IRRI long-term resident scientists:

IRRI Team Leader: head of Department of Rice Research

IRRI Agricultural Economist: the heads of Research-Development programs in each target area.

IRRI Soils Scientist: the pedologist or assistant in charge of implementing soils research in each target area.

IRRI Cropping Systems Agronomist: the agronomists responsible for research in each target area.

IRRI Rice Breeder: the breeders responsible for implementing the research program in each target area.

MRSTD encourages IRRI resident scientists to develop professional contacts with scientists undertaking research related to the improvement of rice-based farming systems.



## INITIAL ENVIRONMENTAL EXAMINATION

### I. SUMMARY PROJECT DESCRIPTION

The goal of the Madagascar-IRRI Rice Research Project, Phase III, is to improve rice production on farms in Madagascar. Improvement in rice production will be achieved primarily by increasing yields per unit of land. The purposes of this project are to strengthen the country's capabilities to carry out effective rice research in the context of a rice-based cropping system and to develop appropriate technologies for the rice farmers. Related to these objectives are a few other important project elements - providing long and short-term training to the Malagasy staff, strengthening research-extension linkage, and rehabilitating and equipping the main rice research station located at Mahitsy and several other regional research centers. USAID will finance technical assistance, training and commodity (vehicles, laboratory and office equipment, supplies) procurement under this project.

### II. EXAMINATION OF THE NATURE, SCOPE AND MAGNITUDE OF ENVIRONMENTAL IMPACTS

#### A. Research and Extension Activities

In the third phase of the rice research project, IRRI will assist FOFIFA (the Government of the Democratic Republic of Madagascar's (GDRM) agricultural research institution) in developing its human and physical resources, and collaborate in conducting research themes in priority rice ecologies and in disseminating research results. Some of the important research activities started under phase II, such as purification and evaluation of national rice collection, introduction of new rice germplasm, rice-based cropping systems research, etc. will continue. This phase will pay special attention to soil fertility and management research. Detailed studies will also be conducted on the dynamics of soil micronutrients in an effort to explain causes of nutritional disorders in rice soils. The project will conduct both on-station and on-farm trials, but on-farm trials will receive more emphasis in the third phase. A long-term IRRI advisor will assist Malagasy scientists to conduct these trials using a farming systems

approach to research. In addition, this person will conduct socio-economic analysis, and will assist in the transfer of project generated technologies. The technologies to be generated by the project should be relevant to the small farmers of Madagascar, and thus considerations would be given to the resource and input availability to these farmers. Major emphasis will be placed on developing and/or identifying improved varieties which will produce higher yields with little or no use of purchased inputs. The varieties will also be selected for their resistance to common diseases, lodging, and grain shattering. In other words, every effort will be made to increase grain output by cutting down on production losses, and using improved management techniques. Since chemical fertilizers and pesticides will be considered as a last resort, use of these inputs will be kept to a minimum.

Technical assistance and training provided under this project will be environmentally neutral. Commodity procurement will include vehicles, agricultural implements, office and laboratory supplies and equipment. Rice germplasms and other crop species that will be imported to the country will originate for the most part from IRRI, in the Phillipines. The resident IRRI advisors have already established a system to import genetic materials to Madagascar over the past five years, which has met the country's strict quarantine regulations. Once cleared by the Ministry of Agriculture's (MPARA) Quarantine Division, the genetic materials will be handled by qualified FOFIFA staff working under the direct supervision of IRRI technicians for research and development purposes.

In conclusion, the FOFIFA/IRRI project-related activities will have minor, direct and indirect impacts on land, water, and natural resources in the project activity locations and in their vicinities, and in some cases will even positively impact on the environment through improved soil management.

Recommendation:

Normally agricultural research and extension activities of this nature would qualify for a categorical exclusion under sections 216.2 (c) (1) (iii) and 216.2 (2) (ii) of Reg. 16. However, a few project-related activities which may be of some concern have been identified and are discussed below:

## B. Specific Research Activities Which May Pose Environmental Concerns

Implementation of the project will unavoidably result in secondary impacts. However, these impacts will be either minor or of a type that could be contained with good supervision and management.

### 1.0 Agrichemical Use

The use of agricultural chemicals in the project target areas is minimal at present. Less than 5% of the rice farmers are believed to be using chemical fertilizers, and that too is at about one-tenth of the recommended dose. Some farmers use urea only in the rice nurseries. Use of fungicides and insecticides on the rice fields is virtually unknown. However, there is a widespread belief among most researchers and policy makers that, in the near future, the country will have to rely on chemical inputs to keep rice production at par with the population growth.

FOFIFA/IRRI researchers will make a conscious effort to generate technologies which will rely on improved seed, disease resistant varieties, and improved management practices. When there will be a need to keep insect pests under control, the concept of integrated pest management will be used. It would be, however, necessary for the researchers to test potentially useful chemicals for efficacy under controlled conditions, and this use should not be ruled out.

FOFIFA/IRRI researchers intend to use limited quantities of agrichemicals under the following situations:

- a) On-station trials: plan to use manure/chemical fertilizer, and pesticides (insecticides, fungicides, and herbicides);
- b) Researcher-managed on-farm trials: plan to use manure/fertilizer, insecticides and fungicides;
- c) Farmer-managed on-farm trials: plan to use manure and chemical fertilizer; and
- d) Seed multiplication (breeder seed): plan to use manure/ fertilizer, insecticide and fungicide.

### 1.1 Persons Who will be Handling the Pesticides

All pesticides to be purchased will be identified by the IRRI researchers. Upon receipt, these will be handled and stored by the research technicians under the direct supervision of the IRRI researchers. Pesticide solutions will be prepared and applied by the research technicians and/or permanent station laborers at the research stations while under the direct supervision of the IRRI researchers. For farmer-managed on-farm trials, no pesticide use will be recommended by the project. However, the participating farmers will apply chemical fertilizers themselves, if needed, under the supervision of the research technicians. All research technicians handling pesticides will be trained by IRRI technicians in the proper use of these chemicals, and will work under the direct supervision of IRRI technicians.

### 1.2 Training Level of Pesticide Applicators

Up to now, neither the research technicians nor the permanent laborers working at FOFIFA have had adequate training on safe handling, formulating and application of pesticides. This is due to the simple reason that pesticide use by FOFIFA is not widespread at this time. IRRI consultants in the past have provided limited on-the-job training to a few technicians, but more is needed. The project has made provisions in the third phase for bringing in short-term consultants in the following relevant areas: Weed science, Entomology, Nematology and Integrated Pest Management. These experts will spend time with the researchers and technicians and advise them on the proper use and handling of pesticides.

### Recommendations

1. FOFIFA/IRRI has already prepared a list of chemical fertilizers and pesticides that might be considered for use by the project personnel. This list should be forwarded to the Regional Pesticide Advisor (RPA) at REDSO/ESA for evaluation. If necessary, the RPA will advise the project personnel regarding preferred formulations. No pesticide should be ordered until approved by the RPA.

2. The persons who would be handling and using pesticides should receive prior training. The project should order protective clothing, masks, gloves, boots, etc. for the

applicators. Attention should be paid to the proper storage and safe-keeping of pesticides; it may be necessary for IRRI/USAID to request GDRM to build a detached storage shed at Mahitsy for this purpose.

3. Pest Management Guidelines should be drawn up for Madagascar, prepared by the RPA, using locally available information. The RPA is scheduled to come to Madagascar in July 1990, in connection with the IPM review. At that time, he should be requested to visit the FOFIFA/IRRI activity sites and make appropriate recommendations.

## 2.0 Other Activities

The project does not anticipate undertaking any other activities which may engender environmental concerns. Irrigation will be used in about 80% of the on-station trials. FOFIFA already has established irrigation systems, and the project will not alter these systems in any way. A question may, however, be raised about ground water contamination by chemicals to be used in the rice fields. This is expected to be minimal for the following reasons:

- a) The amounts of fertilizers and chemicals to be used in the experiments will be kept to a minimum. Some of the fertilizers will be effectively removed by the plants, and some of the chemicals used will be dissipated into the atmosphere and lost.
- b) Rice fields have low water permeability, and thus the downward movement would be very slow (2-4 mm/day). These soils also have relatively high soil organic matter content which has a tendency to absorb chemicals.
- c) Pesticides will be used only when absolutely necessary, and at the lowest effective rates. Pesticides with low residual activity and low LD50 will be selected whenever possible.

A question may also be raised as to whether or not project-related activities could increase soil loss due to erosion. In Madagascar at present, 1.25 million hectares are planted under rice every year, while the maximum land area to be utilized for research and demonstration purposes in any

given year will be about five hectares. As mentioned earlier, most of the research efforts will be concentrated on irrigated, flat lands where soil erosion is not a major concern. There is a possibility of some soil erosion on one to two hectares to be used under the rain-fed conditions, however, compared to the total cultivated area in the country, this is almost negligible. Nevertheless, to address various soil-related problems, the project has decided to engage a soil scientist for the initial 30 months of the project life. Therefore, the project will have a positive impact in the soil fertility management area.

FOFIFA will be constructing some buildings at regional research centers, and rehabilitaing others using counterpart funds. These facilities will be utilized by the IRRI project. All buildings will be single story structures and will be made with locally available and sound construction materials. Building sites are readily available and will require no land alteration. The sites are flat with good drainage, and are adjacent to existing roads to allow clear access for construction materials/equipment. Designs for new building construction will be used which are similar to those already existing, and which have proven to be successful. No significant negative impacts are expected from the construction or renovation activities. The rest of the counterpart funds will be used to pay local salaries, operational and maintenance expenses, and local costs to support the IRRI long-term technicians.

#### Recommendations

1. During the training sessions for extension agents and farmers, efforts should be made to make them aware of health hazards and detrimental effects to the environment caused by improper use of chemicals.
2. Building designs for new construction should be scrutinized by a qualified construction engineer to ensure that adequate sanitation (i.e. septic tanks) is provided where necessary.

143'

### III. SUMMARY

A. The primary impacts of the project will be generally positive, and in certain cases they will reverse some negative impacts now evident in FOFIFA's activities.

B. Long-term secondary impacts in terms of agrichemical use may occur. However, all activities related to chemical use will be closely supervised by well-trained and qualified research personnel. Anyone connected with the project who would be expected to use agrichemicals will receive appropriate training in the safe use of these materials.

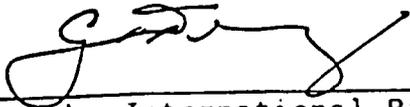
C. In every case where applicable, AID environmental guidelines will be followed.

### IV. DETERMINATION

On the basis of the foregoing environmental examination, and providing that the recommendations are carried out during implementation, a negative determination is recommended for the project.

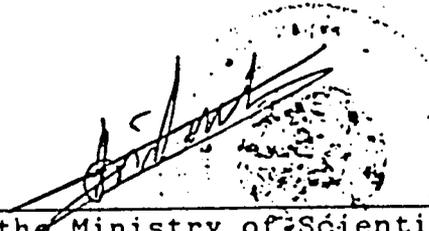
Each IRRI resident scientists will discuss the outline of research programs and activities with the heads of the respective division of DRR and DRD. These discussions should take place during the annual planning workshop. The programs will be budgeted before each rice campaign commences.

Signed :



For the International Rice Research Institute

Date : \_\_\_\_\_



For the Ministry of Scientific Research and Technology Development

Date : \_\_\_\_\_

18 07 1989

145