資料12．協議結果協力課題

協議結果協力課題

プロジェクト名

（英）Research and Development Project on High Productivity Rice Technology

（和）フィリピン高生産性稲作技術研究計画

「フ」国側要請時のプロジェクト名は「高収量機械化稲作技術研究計画（Research and Development on High Yielding and Mechanized Rice Production）」であったが、高収量品種の開発や機械化のみならず、営農、病害虫コントロール等も含めた総合的な高生産性を目指した技術開発が目標であることから、上述のように変更した。

プロジェクト目標

（1）上位目標

高生産性稲作技術が普及して農家経営が安定化すると共に、高品質の米が安定的に供給できるようになる。

（2）プロジェクト目標

フィリピン稲研究所において、土地生産性、労働生産性を考慮した小規模農家向け高生産性稲作技術が研究開発される。

期待される成果

1) 機械化に対応する水稲の多収品種が育成される

2) 小規模農家向け農業機械化稲作技術が開発される

3) 省力・多収をねらいとする水稲栽培管理技術が向上する

4) 米の品質評価・利用技術が向上する

5) 稲を基幹とする機械化経営のための営農システムが開発される

活動

1-1) 灌漑水田向け機械化適性の多収品種を育成する

1-2) 高標高地向け高品質・耐冷性品種を育成する

2-1) 低平灌漑水田向け立毛確保に関係する機械を開発する

2-2) フェーズ1で開発した機械を改良する

2-3) イネ用コンバインを試作する

3-1) 直播栽培法を開発する

3-2) 米の多収・高品質をねらいとする施肥技術を改善する

3-3) 病虫害制御技術を改善する
4-1) 米品質評価技術および米製品開発技術を改善する
5-1) 稲を基幹とする機械化営農モデルを開発する
5-2) 稲作技術および稲基幹の営農技術の情報システムを開発する

専門家派遣計画

（1）長期専門家

日本国政府はプロジェクトリーダー、業務調整員および以下の分野の指導に当たる長期専門家を派遣する。

品種改良、農業機械、栽培

但し、リーダーが上記のうちの一つの分野の指導を兼ねることもある。

（2）短期専門家

プロジェクト活動を円滑に行うために必要に応じて短期専門家を派遣する。

研修員受入計画

毎年数名のプロジェクト関係者に対し日本での研修を行う。

機材供与計画

日本側はプロジェクト活動を円滑に行うために必要となる資機材を供与する。

資料13. PhilRiceより提出のあった資料

THE JAPAN INTERNATIONAL COOPERATION AGENCY PROJECT-TYPE TECHNICAL COOPERATION FOR PHILRICE

PRELIMINARY SURVEY MISSION for R&D Project for High Yielding and Mechanized Rice Production 11-22 February 1997

Department of Agriculture
PHILIPPINE RICE RESEARCH INSTITUTE
Maligaya, Muñoz, Nueva Ecija

CONTENTS

The National Economic Development Plan (NEDP) and the JICA-PhilRice Project-Type Cooperation (Phase II Project)

	NEDP	Phase II Project	Relation or situation
Goal	To enhance the productivity and competitiveness of agriculture.	To develop a sustainable small scale rice farming with the ability to compete in the world market.	The goal of the Phase II Project is contributory to the general goal of the NEDP.
Activities	Grain production has the following activities: • Development, verification and packaging of production & post-production technologies, e.g. varietal improvement, postharvest, crop protection, & farm mechanization • Production & distribution of quality seeds • Information/dissemination/technology assistance and support of field implementation • Institutional development of farmers' cooperatives and assistance to enterprise operation & management • Market assistance to cooperatives in support of NFA's procurement activities • Support to establishment, rehabilitation & maintenance of irrigation systems	The Phase II Project has the following main activities: • Development of farm machinery • Improvement of varieties • Improvement of cultivation techniques • Improvement of weed control techniques • Improvement of pest and diseases management • Development of farm management (socioeconomic aspect) • Improvement of farming systems • Development of rice-based food products	Both the NEDP and the Phase II Project concentrate in improving rice productivity

	NEDP	Phase II Project	Relation or situation
Implementing Agencies	• National Economic Development Authority • Department of Agriculture, attached agencies, regional offices & stations • Local government units	PhilRice and JICA	
Implementing strategy	• Providing adequate infrastructure support • Enacting policy reforms in support of the growth and competitiveness of agriculture and agribusiness activities • Strengthening support services in agriculture • Promoting sustainable agricultural management policies and practices • Strengthening the role of women in agricultural development	• Dispatch of Japanese Experts to the project • Training of PhilRice counterparts in Japan • Provision of R&D supplies, machinery and equipment	
Targeted clientele group	• Rice farmers • Farmers cooperatives/organizations	Rice farmers in favorable environment	
Special concern/ emphasis	Food security, particularly, in food staples such as rice and corn	Technologies especially suited to mechanization	

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Relation or Situation of the proposed Phase II Project to the Medium-Term Agricultural Development Plan

The Medium-Term Agricultural Development Plan (MTADP) and the JICA-PhilRice Project-Type Cooperation (Phase II Project)

	MTADP	Phase II Project	Relation or situation
Goal	To achieve global competitiveness for Philippine agriculture and bestow "people empowerment" upon those dependent on agriculture and fishery for their means of living.	To develop a sustainable small scale rice farming with the ability to compete in the world market.	The goal of the Phase II Project is contributory to the general goal of MTADP
Components	The Gintong-Ani Program (GAP) has seven components and strategies: • Farmers' access to registered and certified seeds • Farmers' access to agricultural credit • Involvement of local government units (LGUs) in GAP planning and implementation • Infrastructure development such as farm-to-market roads and multi-purpose drying pavements • Market assistance • Intensified information campaign • Planning, data management, program monitoring and evaluation	The Phase II Project has the following main activities: • Development of farm machinery • Improvement of varieties • Improvement of cultivation techniques • Improvement of weed control techniques • Improvement of pest and diseases management • Development of farm management (socioeconomic aspect) • Improvement of farming systems • Development of rice-based food products	Both the GAP and the Phase II Project concentrate in improving rice productivity

	MTADP	Phase II Project	Relation or situation
Implementing Agencies	• Dept. of Agriculture (DA), attached Agencies, and Regional Offices & Stations • Organized farmers • Local government units (LGUs)	PhilRice and JICA	• A select group of counterparts from PhilRice staff will work hand in hand with the JICA Experts for the Phase II projects • For the Gintong-Ani Program, DA works hand in hand with the local government units and organized farmers in different key grain areas in the Philippines
Implementing strategy	• Certified seeds distribution; irrigation, post-harvest, and marketing facilities through a credit delivery system • Institutional arrangements between DA and the LGUs on extension services • Provision of infrastructure by DA to the participating LGUs • Market assistance • Collaborative information campaign with LGUs and private sector • Improved project & data management of the Bureau of Agricultural Statistics	• Dispatch of Japanese Experts to the project • Training of PhilRice counterparts in Japan • Provision of R&D supplies, machinery and equipment	
Targeted clientele group	Rice farmers in key grain areas	Rice farmers in favorable environment	
Special emphasis	Package of technologies (POTs) for 5 t/ha target yield	Technologies especially suited to mechanization	

Relation or Situation of the National Rice R&D Network to International Rice Research Institute and State Universities

The National Rice R&D Network and the International Rice Research Institute (IRRI)

	R&D Network	IRRI	Relation or situation
Goal	To enhance and sustain rice production as well as improve the livelihood of rice farmers in the Philippines.	To improve the well-being of present and future generations of rice farmers and consumers, particularly those with low incomes in the whole world	The goal of the Rice R&D Network is contributory to the general goal of IRRI
Program/ Activities	R&D Network implements eight major programs: • Rice varietal improvement • Planting and fertilizer management • Integrated pest management • Rice-based farming systems • Rice engineering and mechanization • Rice chemistry and food science • Social science and policy research • Technology promotion This eight major programs focused their activities on the different major rice ecosystems in the Philippines: • irrigated • rainfed lowland • upland • adverse conditions (saline areas, cool elevated areas) • cross ecosystems	IRRI has five inter-disciplinary research programs focus on the major rice ecosystems: • irrigated • rainfed lowland • upland • flood-prone • cross-ecosystems Current projects include: • developing new plant types for the major rice ecosystems • rice genome studies • sustainability and biodiversity in rice • soil and nutrient management in different rice growing environments • integrated pest management • rice and global warming trends and many others that hold the key to enough rice for the 21st century & beyond.	Both focused their research programs on major rice ecosystems except that IRRI serves the world while the R&D network serves the Philippines

	R&D Network	IRRI	Relation or situation
Participating Agencies	• PhilRice • State Colleges and Universities (SCUs) • DA Regional Offices & Stations	• International Rice Research Institute • International Organizations • National Rice Research Programs	Rice R&D network collaborates with IRRI in implementing rice research programs/activities for Philippines
Implementing strategy	With PhilRice in the lead, SCUs & DA Regional Stations & Offices form the strong base for the formation of a National Rice R&D Network which, while guided by a national rice R&D agenda, possesses the advantage of knowing the specific ecosystem problems and potentials and local needs. • Central Experiment Station conducts strategic as well as applied research on rice and rice-based technologies • Branch Stations conduct applied research on varietal improvement, planting and fertilizer management, and integrated pest management • Regional Research Centers conduct a broad range of rice R&D activities based on regional needs	IRRI's research is done in collaboration with national rice research programs and with advanced laboratories all over the world with the following strategies: • Interdisciplinary ecosystem-based programs in major rice environments • Scientific strength from discipline-based divisions • Anticipatory research initiatives exploring new scientific opportunities • Conservation and responsible use of natural resources • Sharing of germplasm, technologies, and knowledge • Participation of women in research and development • Partnership with farming communities, research institutions, & other organizations	

	R&D Network	IRRI	Relation or situation
	• Cooperating Stations conduct adaptation, verification pilot testing, and on-farm demonstration projects		
Targeted clientele group	Rice farmer in the Philippines	Rice farmers in the whole world	
Special emphasis	Conduct downstream and applied research for specific agro-ecological system in the Philippines	Concentrates on strategic and downstream research for the whole world	Both the Rice R&D Network and IRRI are concerned with the welfare of the small rice farmer

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Relation or Situation of the proposed Phase II Project in the PhilRice R& D

The Integrated Rice Research and Development Program (IRRDP) and the PhilRice-JICA Project-Type Cooperation Project Phase II

	IRRDP	Phase II Project	Relation or situation
Goal	To enhance and sustain rice production as well as improve the livelihood of rice farmers in the country	To develop a sustainable small scale rice farming with the ability to compete in the world market	The goal of the Phase II project is contributory to the more comprehensive goal of the Integrated Rice R&D Program.
Project content and activities	The program covers the following components: • Rice varietal improvement • Planting and fertilizer management • Integrated pest management • Rice-based farming systems • Rice engineering and mechanization • Rice chemistry and food science • Social science and policy research • Technology promotion	The Phase II project has the following main activities: • Development of farm machinery • Improvement of varieties • Improvement of cultivation techniques • Improvement of weed control techniques • Improvement of pest and diseases management • Development of farm management (socioeconomic aspect) • Improvement of farming systems • Development of rice-based food products	• The content of each are essentially similar except that the Phase II project is focused into high productivity for competitiveness through a high yielding and mechanized rice production while the IRRDP also includes other traditional systems. • The IRRDP also has wider scope, with some components converging into a common objective not only on mechanized systems but even farmer-improved technologies and systems. • The Phase II project covers the irrigated environment (40% of the total rice area but 70% of the total production) while the IRRDP also covers other ecosystems (rainfed, upland, adverse conditions, etc.)

	IRRDP	Phase II Project	Relation or situation
Implementing Agencies	PhilRice and its R&D Network	PhilRice and JICA	A select group of counterparts from PhilRice staff will work hand in hand with the JICA Experts for the Phase II projects. For the IRRDP, PhilRice staff works hand in hand with the members of the National Rice R&D Network on site-specific problems.
Implementing strategy	• Technology generation, adaptation, and promotion in specific locations • Provision of resources and equipment to the R&D network • Manpower development (degree and non-degree training) for rice researches and extensionists	• Dispatch of Japanese Experts to the project • Training of PhilRice counterparts in Japan • Provision of R&D supplies, machinery and equipment	
Targeted clientele group	Rice farmers in most environments	Rice farmers in favorable environment	
Special emphasis	Location-specific technology recommendations	Technologies especially suited to mechanization	Some technologies developed by the Phase II project will complement some location-specific problems

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JICA Project-Type Technical Cooperation for PhilRice

Summary of Phase I and Phase II Projects

The Japan International Cooperation Agency (JICA) Project for the Philippine Rice Research Institute

	Phase I	Phase II
Title of the Project	The JICA Project-Type Technical Cooperation for the Philippine Rice Research Institute	The JICA Project-Type Technical Cooperation on Research & Development Project for High Yielding and Mechanized Rice Production
Status	On-going	Proposed
Duration	5 years (August 1992 - July 1997)	5 years (August 1997 - July 2002
Goal	To contribute to the improvement of rice technology in the Philippines	To develop a sustainable small scale rice farming with the ability to compete in the whole world market
Immediate Objective	To further strengthen the R&D programs of PhilRice, with the general objective of promoting R&D activities on rice technology at PhilRice	To develop high yielding rice production technologies adapted to mechanized operations
Components	The project has three components: • dispatch of Japanese Experts • training of Philippine personnel in Japan • provision of supplies, machinery & equipment	The project has three components: • dispatch of Japanese Experts • training of Philippine personnel in Japan • provision of supplies, machinery & equipment
Project Content and Activities	1. Varietal Improvement 2. Soils and Fertilizer Management 3. Improvement of Cropping Pattern 4. Integrated Pest Management 5. Farm Mechanization 6. Grain Quality Evaluation 7. Biotechnology 8. Farm management 9. Training & extension	1. Development of farm machinery 2. Improvement of varieties 3. Improvement of cultivation techniques 4. Improvement of weed control techniques 5. Improvement of pest and diseases management 6. Development of farm management 7. Improvement of farming systems 8. Development of rice-based food products

	Phase I	Phase II
Accomplish-ment/ Expected Output	1. Varietal improvement • A promising line, PJ3 (Hinohikari/ IR64; 19% advantage over IR64) • Two promising tungro-resistant lines:- PJ(T)4 and PJ(T)5 • A highly cold-tolerant promising line, PJ2 (from IR61728-4B-2-1, now in multi-location test of the NCT I since 1996 DS) 2. Soils and Fertilizers • Determined the N uptake patterns for each yield level, i.e. 100-110 kg N/ha required for 7 t/ha DS yield • Determined the N fertility of soils collected from rice growing areas • Estimated available amount of N using chemical method showed a positive relationship with mineralizable N obtained using incubation method • Found out that PSB Rc2 has the highest yield (8.4 t/ha at 180 kg N/ha, 5 splits) followed by PSB Rc6 (8.0 t/ha). • Established the Development Stage (DVS) model to predict leaf area index and dry matter accumulation at different N 3. Improvement of Cropping Pattern • Optimized N management for PSB Rc14 in Maligaya vertisol using the Estimation of N Mineralization in Soils, Nitrogen Fertilizer Application, and Tillage Depth Recommendation System Models	1. Development of farm tools and equipment for land preparation, seeding, spraying, harvesting, and processing that will promote farm mechanization in small holder rice cultivation. 2. Development of high yielding varieties suitable to mechanized cultivation practices, such as mechanical direct-seeding, transplanting, harvesting, and threshing. 3. Planting techniques focused on direct seeding, fertilizer management, and water and soil management that are concerned with saving labor through mechanized operations. 4. Improvement of other component technologies as an input to the development of package of technology for mechanized rice culture

	Phase I	Phase II
Accomplish-ment/ Expected Output	4. Integrated Pest Management • Procedures for future research on IPM were presented based on the discussion of the present IPM research situation • Found out that ◊ the application of niclosamide suppressed the golden snail population ◊ metal screen prevented snail migration into rice paddies and significantly reduced snail population 5. Farm Machinery • Prototype of the mechanical rice reaper • Prototype of mechanical seeder attached to the power tiller 6. Grain Quality Evaluation: Sensory & physicochemical evaluation of grain quality • Sensory evaluation scoring system, was designed and introduced • Rapid and more accurate methods of physicochemical analyses for grain quality were introduced. These are procedures for moisture content determination, milling degree, rice freshness assessment, and tests for cooking quality 7. Biotechnology: Anther culture for rice improvement • New methods in anther culture were introduced; a scheme in handling anther culture materials was also proposed	

	Phase I	Phase II
Accomplish-ment/ Expected Output	8. Farm Management: Design and development of mathematical programming for farm management model analysis • A mathematical programming software (Micro-NAPS) developed from the Japanese version to handle farm management problems 9. Training & Extension • Training on video production to improve basic knowledge and skills on the use of video for technology transfer materials • Rice Production and Promotion Training was conducted for 30 participants from the National Rice R&D Network in support to the Gintong-Ani Program to update the critical mass of master trainers on the latest breakthroughs in rice production and technology promotion	
Dispatch of Japanese Experts	<u>Long Term Experts (6)</u> 1. Team Leader (1) 2. Coordinator (1) 3. Varietal Improvement (2) 4. Soils and Fertilizers (2) <u>Short Term Experts (19)</u> 1. Training & Evaluation (2) 2. Crop Modelling (1) 3. Bio-technology (1) 4. Agronomy (1) 5. Integrated Pest Management (4) 6. Farm Machinery (4) 7. Grain Quality (2) 8. Farm Management (2) 9. Installation of Equipment (2)	<u>Long Term Experts (5)</u> 1. Team Leader (1) 2. Coordinator (1) 3. Farm Machinery (1) 4. Rice Varietal Improvement (1) 5. Mechanized Rice Cultivation (1) <u>Short Term Experts (5 per year)</u> 1. Farm Work 2. Biotechnology 3. Soil Science 4. Plant Physiology 5. Weed Science 6. Plant Pathology 7. Entomology 8. Cropping Systems 9. Farm Management/Economics 10. Food Science 11. Others (e.g. Technology Transfer)

	Phase I	Phase II
Training of Philippine Personnel in Japan	Total: 22 staff 1. Administration (2) 2. Agricultural Machinery (3) 3. Plant Breeding (2) 4. Soils and Fertilizers (2) 5. Entomology (2) 6. Grain Quality Evaluation (2) 7. Rice Cultivation Technology (1) 8. Information Network (1) 9. Agricultural Technology Extension (1) 10. Plant Pathology (1) 11. Farm Management (2) 12. Plant Physiology (1) 13. Audio-Visual Education (1) 14. Biotechnology (1)	5 participants per year 1. Engineering (Farm Mechanization) 2. Farm Work 3. Plant Breeding 4. Biotechnology 5. Agronomy 6. Plant Physiology 7. Soil Science 8. Plant Nutrition 9. Weed Science 10. Plant Pathology 11. Entomology 12. Cropping Systems 13. Farm Management 14. Agriculturel Economics 15. Food Science 16. Others (e.g. Statistics, Technology Transfer
Provision of Supplies, Machinery & Equipment *(Pesos)*	• FY 1992 - 9.5 M • FY 1993 - 14.0 M • FY 1994 - 15.4 M • FY 1995 - 10.4 M • FY 1996 - 9.4 M 58.7 M	• Total : 60 M
Improvement of Infra-structure and Facilities for Development of Farm Equipment (Pesos)		• Total: 10 M

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Draft Arrangement of the Proposal for TSI of JICA Project-Type Technical Cooperation, Phase II

Draft Arrangement of the Proposal for TSI of
JICA Project-Type Technical Cooperation, Phase II

Field	Subject/ Item	Present R&D Situation	Implementation Strategy	Manpower to be provided, i.e. position of counterpart	Type of Methodology needed from JICA Expert
Rice Varietal Improvement	I. Development of high yielding varieties suitable to mechanized farming in irrigated lowland	Development of lowland irrigated rice varieties with stable yield, resistance to insect pests and diseases and good grain quality remains to be the major breeding program to sustain the Philippines' rice production needs. So far, there is almost no progress in the improvement of less shattering habit in the Philippine rice.	• Strong conventional techniques supported by biotechnological tools and other innovative approaches • Modern screening methodologies for the following: ◊ agronomic traits specifically lodging and shattering resistance ◊ insect resistance disease resistance ◊ grain quality ◊ nutrient-use efficiency (with Agronomy and Soils Division)	Chief SRS Supervising SRS Senior SRS SRS II Research Asst.	• Improved evaluation and selection procedures • Simple and reliable screening techniques for pests resistance and grain quality • Knowledge on the physiological bases of yield potential improvement • Gene transfer technique • Introduction of less shattering gene • Screening techniques for shattering habit
	II. Development of cold tolerant varieties suitable for mechanized farming in cool-elevated areas	Development of varieties tolerant to low temperature at vegetative and reproductive stages using Japonica donor parents and traditional germplasm	• Conventional shuttle breeding using diverse and exotic germplasm • Use biotechnology tools for cold tolerance screening • Strengthen laboratory screening for cold tolerance in the		• Breeding techniques in developing cold tolerant varieties • Simple and reliable screening methodologies for cold and shade tolerance and ratooning ability

Rice Varietal Improvement			seedling and reproductive stages • Incorporate shade tolerance through wide hybridization • Identify genotypes with good ratooning ability as possible second crop in Cordilleras		• Wide hybridization technology and other biotechnology tools
	III. Development of high yielding varieties suited for direct seeding cultivation in irrigated lowland	Current high yielding varieties have been bred for transplanted rice. Breeding for direct-seeded rice needs to be strengthened.	• Evaluate genotypes using laboratory and greenhouse techniques (for direct use as variety or as donor parents) • Strengthen screening technique for direct seeding culture under aerobic and anaerobic conditions (seedling vigor as the major criteria) • Develop elite lines through conventional & non-conventional techniques	Chief SRS Supervising SRS Senior SRS SRS II Research Asst	• Efficient screening techniques to identify donor parents and for evaluating segregating generations • Breeding approaches to direct seeding culture

Field	Subject/ Item	Present R&D Situation	Implementation Strategy	Manpower to be provided, i.e. position of counterpart	Type of Methodology needed from JICA Expert
Agronomy, Soils and Fertilizer	I. Direct seeding cultivation	Plant types, cultivation, and tillage techniques are more established for transplanted rice culture than direct seeded rice culture	Establish database which can indicate where and how direct seeding (wet and dry) is practiced in the different regions in the Philippines: • degree of adoption • problems encountered by farmers • costs and benefits of direct seeding	Chief SRS SRS	• Database organization • Technique for agro-ecological zonation
	1. Ideal plant type	Seedling vigor, shoot and root growth, tillering behavior, lodging resistance, nitrogen use efficiency, and weed competitiveness need to be established	Assess traits of varieties and breeding lines in the field at different water and nitrogen management levels and relate them to rice yields		Establishing reliable plant traits or selection criteria under field condition
	2. Cultivation techniques for mecha-nization	Field levelling is essential for good water control and crop establishment. There is a need for an equipment which can improve crop establishment and reduce amount fo seeds and labor cost	Test land levelling equipment for different soil types and soil moisture conditions; test drill seeder which can create furrow, drop the seeds in the furrow, and cover the furrow		Land levelling and broadcast or drill seeding techniques in collaboration with the Rice Engineering and Mechanization Division
	3. Establish minimum tillage	For a given soil and soil moisture condition, there is a need to establish an optimum number and manner of tillage and land	Test land preparation methods for different soils, moisture or agro-climatic conditions		Minimum tilllage techniques

Agronomy, Soils and Fertilizer		levelling operations which could improve crop establishment, reduce weeds and use of herbicides			
	4. Develop high yielding rice cultivation	The appropriate combination of plant type, land preparation, time of planting, water, nutrient and pest management will have to be established	Determine growth and yield of lines or varieties under different soil, water, nutrient and pest management levels, and climatic conditions		Crop modelling tools to aid in decision making
	II. Improving rice yield, soil nutrient and soil water quality through organic fertilization	The continuous use of inorganic fertilizers (usually NPK) can lead to nutrient imbalance, environmental pollution and reduction in rice yields	Different levels of organic fertilizers (rice straw, manure, etc.) applied singly or in combination with inorganic fertilizers will be tested in lowland rice fields: • extent of substitution • other nutrient elements supplied from organic fertilizers • improvements in soil physico-chemical properties that can be achieved with organic fertilizer	Chief SRS Supvg. SRS	• Integrative tools to aid in decision making • Reliable field-based technique to assess time course of nutrient availability from organic fertilizers

Agronomy, Soils and Fertilizer	III. Growth, yield, and use of inorganic fertilizers in irrigated lowland rice	There is a need to relate increase in yields to nutrient use efficiency. Increased nutrient use efficiency can reduce fertilizer cost and reduce environmental pollution	Establish nutrient (particularly N) uptake and distribution for different varieties in response to time and rate of N application	Chief SRS SRS	• Quick and reliable techniques to assess soil and plant N status • Techniques to assess N use efficiency of varieties and breeding lines
	IV. Improving rice yields in less productive environments	As land devoted to rice production decreases and rise in population increases demand for rice, there is pressure to improve rice yields in less productive environments. However, soil physico-chemical and agro-climatic problems will have to be overcome.	Identify constraints to rice production in less productive environments. Conduct test trials in less productive environments	Supvg. SRS SRS	Convenient and reliable field diagnostic tools to assess soil physico-chemical problems

Field	Subject/ Item	Present R&D Situation	Implementation Strategy	Manpower to be provided, i.e. position of counterpart	Type of Methodology needed from JICA Expert
Crop Protection	I. Mass rearing of biocon agents	Most rearing techniques for biocon agents employ the use of their natural food sources. These techniques are often tedious, time-consuming, and could hardly meet the demands for supply of biocon agents by workers on biological control. There is a need to develop rearing techniques, using artificial media, for the mass production of promising biocon agents	Development of techniques: • for rearing yellow stemborer using artificail diet • to prolong shelf-life of natural/alternate hosts of egg parasitoids of yellow stemborer, rice black bug, etc.	Chief SRS SRS	Tools and techniques in rearing stemborer and egg parasitoids using artificial media.
	II. Mecha-nism of resistance to insect pests	Although the procedure and technique to study the ovicidal effect of rice cultivars against eggs of planthoppers are already available, there is still a need to develop a quick and reliable technique to determine the effect of these cultivars on longevity, fecundity, and growth and development of planthoppers and other major insect pests of rice	Development of standard techniques to study the mechanism of resistance of rice cultivars against major insect pests such as brown planthoppers, green leafhoppers, stemborers, rice black bug, etc.	Supervising SRS SRS	Diagnostic tools and procedures to determine the mechanism of resistance of rice against stemborer, green leafhopper and rice black bugs.

Crop Protection	III. Mechanism of resistance to pathogens	Tools and techniques to study the mechanism of resistance of rice cultivars against fungal and bacterial diseases are lacking	Development of standard techniques to study the mechanism of resistance of rice cultivars against major disease such as sheath blight, bacterial blight, blast, etc.	Supervising SRS SRS	Techniques to evaluate the mechanism of resistance of rice against plant pathogens.
	IV. IPM data base and application softwares	Historical data on the incidence of pests in the Philippines are available. But there is a need t o synthesize and package these data in order to be able to develop location specific pest information and surveillance systems and to come up with application softwares for IPM decision-making purposes	Development of IPM database and application software.	Chief SRS Supervising SRS	Computerization of IPM data

Field	Subject/ Item	Present R&D Situation	Implementation Strategy	Manpower to be provided, i.e. position of counterpart	Type of Methodology needed from JICA Expert
Farm Mechanization	I. Development of zero-tillage (or minimum tillage) machinery for crop establiishment for dry land and wetland	Past R&D efforts on seeding machinery development were concentrated mainly on seeders for puddled soils or conventionally prepared upland fields. Although there have also been efforts to develop zero or minimum till seeders in the past, at present available seeders either need to be redesigned or improved for higher capacity and efficiency	• Acquisition and test of existing/ promising prototypes. • Redesign/improve prototype through value engineering or analysis techniques. • Development of prototypes for mini-4-wheel tractor and 2-wheel tractor (riding type) mounting.	Senior SRS	• Instrumentation techniques for draft force measurements • Design of untilled soil cutting device • Design of seed metering device • Test procedures
	II. Development of rice combine	Past R&D efforts on rice harvesting machines were focused mainly on the reaper and stripper. Recently there are attempts by IRRI and PhilRice to develop a combine based on the stripper header concept. On the other hand, Thailand has developed a combine with cutterbar header and axial flow thresher mounted in a self-propelled, track-type prime mover	Adaptation of Japanese and/or western combine designs for local fabrication which would entail • incorporation of cutter bar or rotary cutter header • head feeding/screw-type threshing mechanism adaptation • Development of frame structure/prime mover with track-type locomotive device	Senior SRS	• Planning design • Power train design • Hydraulic system design • Fabrication/assembly techniques • Test procedures

Field	Subject/ Item	Present R&D Situation	Implementation Strategy	Manpower to be provided, i.e. position of counterpart	Type of Methodology needed from JICA Expert
Farm Mechanization	III. Improvement of prototype	A promising reaper prototype with rotary cutting mechanism and a mechanical paddy seeder drawn by power tiller have been developed and need further refinement prior to commercialization	• Conduct further tests • improvement/refinement through value engineering/ analysis techniques • Construction/Test of models for commercial release	Senior SRS SRS II	• Instrumentation techniques for torque/draft measurements • Techniques for commercial machine design • Part manufacturing method
	IV. Development of equipment for village level processing of rice and by-products into rice foodstuff, i.e. noodles, instant cereal, etc.	• Except for the rice micromill, centrifugal huller and flour mill, no other rice and by-product processing equipment have been developed. • Design and development of both the process operations and equipment for village level processing of rice is needed for local adaptation and commercialization	• Collaborate with PhilRice RCFS to develop process operations. • Acquire and test existing prototypes which can be locally adapted/ manufactured. • Improvement/ refinement of equipment through value engineering/ analysis	Senior SRS	• Process and equipment design • Equipment test procedure • Process control system design and instrumentation • Product quality analysis and testing

Field	Subject/ Item	Present R&D Situation	Implementation Strategy	Manpower to be provided, i.e. position of counterpart	Type of Methodology needed from JICA Expert
Rice Chemistry	I. Improvement/ development of new techniques for rice grain quality evaluation 1. Improvement of existing methods for amylose determination 2. Development of test kit for grain quality determination	There is an ongoing research on the use of NIR spectroscopy in the analysis of the different grain quality parameters There is a problem with amylose analysis at present, the acid used is suspected to increase absorbance at 600nm, resulting to higher amylose content • Amylose content of rice is one of the major basis for recommendation of selections to be varieties. A test kit that can be brought to the field for rapid amylose analysis will be advantageous. • Range of starch properties among new cultivars becomes narrower. Existing quality test procedures can no longer discriminate among varieties	• Calibrate the NIR analyzer for moisture, crude protein and apparent amylose content • Use of other buffer systems such as formate and trichloroacetiate will be tried • Training of staff re: recent methods of assessing quality (e.g. taste analyzer, digital image analyzer, DNA electrophoresis, GC-MS of rice aroma, etc) • Adoption of secondary tools for testing rice quality • Validation of previously introduced sensory and other techniques • Indentification of techniques suitable for screening indica rices	Senior SRS SRS I SR Assistant SR Analyst Sr. consultant	• How to go about developing a more rapid method based on existing one (or will approximate results of existing methods) • Buffer preparation and selection • Methods of preparing test kits • Recent techniques of grain quality evaluation • Method optimization and validation

Field	Subject/ Item	Present R&D Situation	Implementation Strategy	Manpower to be provided, i.e. position of counterpart	Type of Methodology needed from JICA Expert
Rice Chemistry	II. Rice food products improvement and development 1. Improvement of processing and packaging of traditional food produced from rice 2. Improvement of nutrient content 3. Development of new products 4. Standardization of developed/ improved rice food products	• We have standardized recipes for rice-based chiffon cake, brownies and waffles • Done varietal screening and shelf life evaluation for chiffon cake, brownies and waffles • Ongoing work on improvement/standardization of recipes of rice food products • Will start nutrient composition determination • Division lacks somebody with expertise on food product development • With proposals "on-hold"	• Training of PhilRice staff re: rice food processing and utilization • Study tour to various food processing centers in Japan, Thailand and other countries • Bench scale production of standardized food products • Improvement of the quality of indigenous rice food products	Senior SRS SRS I SR Assistant SR Analyst Senior consultant	• Rice food processing and utilization • Extrusion, fermentation, baking and biotechnological techniques for rice food processing • Shelf-life evaluation • Nutrient composition determination • Statistical analysis of data • Detailed methods for packaging studies • Method on nutrient fortification (what to use in fortifying and needed analysis) • Food processing mechanization • Process optimization • Food quality assurance and control
	III. Identification of more rapid and cost-saving methods of analysis				

Field	Subject/ Item	Present R&D Situation	Implementation Strategy	Manpower to be provided, i.e. position of counterpart	Type of Methodology needed from JICA Expert
Rice Chemistry	IV. Establishment of criteria for predicting processing qualities of rice	Criteria for processing qualities are based mainly on amylose content and gelatinization temeprature. Other parameters should also be studied and will be correlated with processing qualities	To test other physicochemical properties and use these in predicting processing qualities of rice		Methods in analyzing processing qualities of rice

Field	Subject/ Item	Present R&D Situation	Implementation Strategy	Manpower to be provided, i.e. position of counterpart	Type of Methodology needed from JICA Expert
Farm Management	I. Development of decision tools and models for integrated nutrient management	• Many studies have addressed purely technical aspect of INM • Studies on economic optimization of INM are few No decision tools have been developed to aid farmer in their INM	• Survey to estimate response function by season, location, ecosystem, variety (MV, TV) • Model optimization of INM management under various risk assumption	1 SRS (survey) 1 Supvg. SRS (modeling)	• Crop modeling • Computer programming • Economic modeling
	II. Development of decision tools and models for investment in machinery by farmers and cooperatives	• Studies have been few on specific technologies, of particular phase of farm operation • No attempt to use results of these studies to develop analytical tool that will have durable usefulness to end users such as farmer-cooperators and machinery producers-distributors	• Survey to examine structure, conduct, performance of agricultural machinery sector • Generate technical parameter of various technologies in different phases of farm operation • Generate economic parameters • Modeling economic and financial performance measures • Development of user-friendly software • Validation of model	1 junior staff (survey) 1 staff (modeling)	Computer programming of economic and financial analysis techniques

Field	Subject/ Item	Present R&D Situation	Implementation Strategy	Manpower to be provided, i.e. position of counterpart	Type of Methodology needed from JICA Expert
Farm Management	III. Development of farm management models for optimization of productivity and incomes for rice-based farming systems	PhilRice is in the process of building up capabilities in this area of farm management and optimization. The expertise, however, is inadequate because the area of farm management is so broad. There are wide gaps in in terms of farm management is concerned.	• Collaboration with other DA agencies • Experimentation to generate tech. parameters	Senior SRS	• Farm management modelling and simulation • Ex-ante farm model (time and motion study)
	IV. Development of network design to efficiently and quickly monitor changes and developments in rice-based farm production sector	• There is inadequate information on land use and crop suitability existing at present • The establishment of GIS in PhilRice will help in quick monitoring and situational analysis in the agriculture sector, quick assessment of the impact of changes in the targeted areas	• Collaboration of other DA agencies to collect information on land use, suitability and other information • Establishment of a GIS for the rice based farming system	Sup SRS	GIS and land use modeling

Field	Subject/ Item	Present R&D Situation	Implementation Strategy	Manpower to be provided, i.e. position of counterpart	Type of Methodology needed from JICA Expert
Training, On-Farm and Communi-cation	Development of an Information System for Rice and Rice-Based Farming Technologies 1. Pool matured technologies on rice and rice-based farming which are generated by the National Rice R&D Network and other research institutions 2. Organize data bases on rice and rice-based farming technologies/ information 3. Improvement of training/ communication/ weather facilities in the Branch Stations	• Rice information technology not fully networked • Many untrained information workers • Database of rice technology absent • Few and limited information technology in branch stations • Information scant and in disarray • Information inaccessible to most people • No central source of data/statistics and technology in rice	• Packaging, inventory, indexing, classification, regional workshops • Generation of database program • Generation of hypertext files • Acquisition of computers ◊ networking ◊ training of information workers ◊ resource center • Acquisition of facilities for training/ communication/weather station	Chief information officer Supvg SRS	• Communication/ information expert • Library Science • Systems analyst • Computer programmer • Computer expert • Telecommunication specialist/expert • Agromet specaillist

Summary of the Tentative Plan
for the R&D OF HIGH PRODUCTIVITY TECHNOLOGY
IN RICE PRODUCTION IN THE PHILIPPINES

Field	Category		
	Land productivity	Labor productivity	Cost productivity/farmers' income
Varietal improvement (Long and Short Term Expert)	(1) Development of high yielding varieties suitable to mechanized farming in irrigated lowland 1) Improvement of shattering resistance 2) Improvement of lodging tolerance 3) Improvement of yielding ability with high grain quality and pest resistance (2) Development of cold tolerant varieties suitable for mechanized farming in cool elevated areas 1) Improvement of cold tolerance with shattering resistance 2) Improvement of shade tolerance with high yield	(3) Development of high yielding varieties suited for direct seeding cultivation in irrigated lowland 1) Improvement on seedling vigor under aerobic and anaerobic conditions	

Field	Category		
	Land productivity	Labor productivity	Cost productivity/farmers' income
Agronomy, soils, and fertilizer	(1) Improvement of fertilizer application (Short Term Expert) 1) Improvement of rice yield, soil nutrient and soil water quality through organic fertilization 2) Improvement of nutrient use efficiency 3) Improvement of rice yield in less productive environments	(1) Development of direct seeding cultivation (Long Term Expert) 1) Search for ideal plant type for direct seeding cultivation 2) Development of seed-bed preparation for vigor seedling 3) Establishment of minimum tillage system 4) Development of high yielding direct seeding cultivation	
Farm mechanization (Long and Short Term Experts)		(1) Development of minimum tillage machinery for crop establishment 1) Conceptualization and designing of minimum tillage machinery 2) Development of prototype machinery (2) Improvement of Maligaya Rice Seeder and Reaper (developed in Phase I) 1) Maligaya Rice Seeder 2) Maligaya Rice Reaper	(1) Development of equipment for rice food products processing 1) Development of rice noodle maker 2) Development of rice cake maker, etc.

Field	Category		
	Land productivity	Labor productivity	Cost productivity/farmers' income
Farm mechanization (Long and Short Term Experts)		(3)Development of rice combine 1) Conceptualization and designing of rice combine 2) Development of prototype combine	
Crop protection, food chemistry, farm management and other fields	(1) Food chemistry (Short Term Expert) (2) Farm management (Short Term Expert) (3) Other fields as needed (Short Term Expert) 1) Farming systems	(1) Crop protection (Short Term Expert) 1) Mass rearing of biocon agents 2) Mechanism of resistance to insect pests 3) Mechanism of resistance to pathogens	(1) Crop protection (Short Term Expert) 1) IPM database and application softwares (2) Food chemistry (Short Term Expert) 1) Improvement and development of rice food products 2) Improvement/ development of new techniques for grain quality evaluation (2) Farm management (Short Term Expert) 1) Development of farm management models for optimization of productivity and incomes

Summary of the Tentative Plan

Field	Category		
	Land productivity	Labor productivity	Cost productivity/farmers' income
Crop protection, food chemistry, farm management and other fields			(2) Farm management (Short Term Expert) 2) Development of decision tools and models for investment in machinery and integrated nutrient management in rice farming 3) Development of network design to monitor changes and developments in rice production sector (3)Other fields as needed (STE) 1) Technology extension