付　属　資　料

１．ミニッツ

２．暫定実施計画に沿った中間レポート

３．第３回合同委員会議事録

４．フィリピンにおける稲作データ

５．フィリピン稲研究所（PhilRice）の歴史

1．ミニッツ

MINUTES OF DISCUSSIONS BETWEEN THE JAPANESE ADVISORY TEAM AND AUTHORITIES CONCERNED OF THE GOVERNMENT OF THE REPUBLIC OF THE PHILIPPINES ON JAPANESE TECHNICAL COOPERATION FOR THE RESEARCH AND DEVELOPMENT PROJECT ON HIGH PRODUCTIVITY RICE TECHNOLOGY

The Japanese Advisory Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") headed by Dr. Akihiro GONDOH visited the Republic of the Philippines from March 20 to March 29, 2000.

The Team conducted an overall review and mid-term evaluation of the performance of the Research and Development Project on High Productivity Rice Technology (hereinafter referred to as "the Project") and provided necessary advice for the smooth implementation of the Project.

During its stay in the Republic of the Philippines, the Team carried out a field survey, exchanged views and had a series of discussions with the concerned authorities of the Government of the Republic of the Philippines on the Project from technical and administrative points of view.

As a result of the discussions and the field study, the Team and the Philippine authorities agreed to recommend to their respective Governments the matters described in the document attached hereto.

Muñoz, Nueva Ecija, Philippines
March 27, 2000

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ATTACHED DOCUMENT
A MID-TERM EVALUATION REPORT
BY THE JAPANESE ADVISORY TEAM
FOR
THE RESEARCH AND DEVELOPMENT PROJECT ON
HIGH PRODUCTIVITY RICE TECHNOLOGY
IN
THE REPUBLIC OF THE PHILIPPINES

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1. PROJECT DESCRIPTION

In the Philippines, rice is the most important crop that more than 80% of the Philippines' population consumes as staple food. However, the national average of each paddy yield is only 2.85 tons per hectare, which corresponds to only 80% of the average paddy yield in the Asian region. This low rice yield is one of the main obstacles in attaining rice self-sufficiency. Due to the delay of the mechanization of rice farming compared with neighboring countries, in addition to low yield, labor productivity is relatively low and rice farmers have difficulty in obtaining manpower during the peak season of farming.

With respect to research on rice in the Philippines, the country has been relying on the International Rice Research Institute (hereinafter referred to as "IRRI") that was established in the Philippines, and has been obtaining great results in promoting the "green revolution". However, IRRI has been changing since the 1980s its direction to basic research from its special characteristics as an international organization. It has also been adopting a stance that each country has to attend to its respective local issues on rice farming.

In these circumstances, the Philippine government created the Philippine Rice Research Institute (hereinafter referred to as "PhilRice") through Executive Order 1061 signed by President Marcos (President's Order). However, PhilRice could not push through the envisioned manpower and program expansion due to lack of advanced laboratories and training facilities. In order to overcome these constraints, the Philippine government requested technical cooperation programs from the Government of Japan.

The Government of Japan provided grant-aid cooperation to build the facilities, including drainage canal of experimental fields, and implemented the project-type technical cooperation entitled "The Philippine Rice Research Institute Project in the Republic of the Philippines". This project intended to promote the research and training activities on rice production technologies, especially rice varietal improvement, soils and fertilizer, rice cultivation, plant protection and agricultural machinery. These efforts improved rice production technologies in the Philippines for five years beginning in 1992. Although these goals were met, there still remain many technical problems regarding rice farming in the Philippines.

Taking into consideration the above-mentioned background, the Government of the Philippines requested more project-type technical cooperation from the Government of Japan, in order to develop better technologies for high-yielding rice production for small-scale rice farmers. The Government of Japan (through JICA) responded by dispatching the Preliminary Study Team from February 11 to 22, 1997, to confirm the contents of the proposal submitted by the Government of the Philippines to the Government of Japan concerning the Research and Development Project on High Productivity Rice Technology (hereinafter referred to as "the Project'). The Team examined the possibility of its implementation from a technical viewpoint, and scrutinized its justification according to the Project-type Technical Cooperation Scheme.

Resulting from the above-mentioned activities, JICA dispatched the Implementation Study Team from May 20 to 29, 1997, for the purpose of working out details of the technical cooperation aimed at stabilizing farm management through rice technologies suitable for local conditions, as well as supplying high quality rice in sufficient quantity. They signed the Record of Discussions (hereinafter referred to as "R/D) for the Project on May 28, 1997, in order to commence a five-year technical cooperation project starting August 1, 1997.

Both the Japanese and the Philippine governments agreed to implement this technical cooperation. (The project intended to through PhilRice develop high productivity rice technologies for small-scale rice farmers, thus, stabilizing farm management through rice technologies suitable for local conditions, as well as supplying high-quality rice in sufficient quantity.)

The Project started on August 1, 1997, dispatching three long-term experts (including a Team Leader, a Coordinator and a rice varietal improvement expert). Moreover, an expert in Farm Mechanization was dispatched in October 1997, and an expert in Agronomy was dispatched in April 1998. In the course of the Project implementation, JICA dispatched on March 17-27, 1998 Japanese Consultation Team for the purpose of formulating the detailed Tentative Schedule of Implementation. Technology transfer through the Project's activities was implemented fully. The Project is now nearing its third year of implementation.

2. ACTIVITIES OF THE PROJECT

In accordance with the R/D and Tentative Schedule of Implementation (hereinafter referred to as "TSI") signed on May 28, 1997, the following activities are implemented:

1-1. Development of high-yielding and better-quality promising lines for mechanized farming in irrigated lowlands.
1-2. Development of cool temperature-tolerant and high-yielding promising lines with good grain quality suitable for cool-elevated areas.
1-3. Evaluation of local adaptability of promising lines.
2-1. Development of machinery for plowing, leveling, and seeding for direct-seeded rice cultivation under irrigated lowland paddy condition.
2-2. Development of rice harvesting machinery for small-scale farmers.
3-1. Development of techniques for direct-seeding cultivation.
3-2. Improvement of fertilizer application techniques for higher yielding and better quality rice.
3-3. Improvement of techniques for disease and insect pest management.
4-1. Improvement of techniques for rice grain quality evaluation.
5-1. Development of models of mechanized rice-based farm management.
5-2. Development of an information system for rice and rice-based farming technologies.

2. MEMBERS OF THE ADVISORY TEAM

(1) AKIHIRO GONDOH : Leader
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4. OBJECTIVE OF THE EVALUATION

The mid-term evaluation is to be performed halfway through the project cycle to correct the schedule and to incorporate the results of the evaluation into the ongoing stage of the Project. It determines whether the Project is progressing satisfactorily, and evaluates measures taken (or to be taken) against the change in important assumptions. It likewise determines the necessity of revising the contents of the cooperation and the Project implementation systems of both Japan and Philippine sides.

In the course of the evaluation, the Project Design Matrix (hereinafter referred to as "the PDM") and the detailed TSI are to be reviewed. Based on the observation and study, necessary recommendations on the Project activities for more effective and efficient technical cooperation during the remaining term will be forwarded to concerned authorities of both governments.

5. EVALUATION METHODS

This evaluation was conducted by the Team in accordance with the R/D, the TSI and the PDM through report analyses, field visits, interviews and discussions with the personnel involved in the Project. It was based on "Five Basic Evaluation Components": efficiency, effectiveness, relevance, impact, and sustainability.

The major components are efficiency, effectiveness, and relevance. Efficiency examines to which extent the assistance was adequate and timely. Effectiveness examines the achievement level of the outputs and the project purpose. Relevance examines the adequacy and consistency of the project identification, formulation and implementation in the given conditions. In addition, impact and sustainability examine the influence of the Project for further development.

The PCM evaluation method requires a PDM which summarizes the framework of the Project. The Team utilized the existing PDM, that is attached as ANNEX 1, to examine the level of achievement.

The PDM contains "Objectively Verifiable Indicators" for "Project Purpose" and "Output" that shows their expected destinations. Members of the Team specialized in the subject matters of the Project were guided to evaluate the "Achievement" of "Output" of each subject matter according to the responding "Objectively Verifiable Indicator."

Evaluation of "Project Activities" was mainly conducted based on the information acquired from interviews, reports and other relevant project documents. Based on the results of the evaluation of "Achievement", the Team gave an evaluation score to the respective "Activities" and "Output" in accordance with the following criteria:

Score	Definition
5.0	Completed
4.0	Uncompleted, but the level of achievement is higher than expected (expected to be completed at a later stage of the remaining term)
3.0	Uncompleted, but the level of achievement is relatively high (highly expected to be completed by the end of the Project)
2.5	Smooth progress in accordance with the original plan (expected to be completed by the end of the Project)
2.0	Uncompleted, delayed compared to the original plan Completion by the end of the Project is uncertain)
1.0	Uncompleted, low level of progress (Possibility of completion by the end of the Project is very low)
0	Not yet begun (No progress)

During the evaluation of "Output", when any problem or inefficiency affected the realization of "Output", the Team also analyzed causes of the problems, and made recommendations to solve them.

"Achievement" of "Project Purpose" was evaluated by all the members of the Team according to results of the evaluation of "Output". The other aspects of evaluation such as efficiency, impact, relevance and sustainability of the Project were examined by the member of the Team in charge of overall evaluation through discussions with the managerial members of the Project.

6. PROGRESS OF THE PROJECT

6-1. Accomplishment in Terms of Inputs

(1) Japanese inputs

(a) Dispatch of Japanese experts

A total of five (5) long-term experts have been dispatched in accordance with the R/D and the TSI. They include a Team Leader, a Coordinator and experts in the fields of rice varietal improvement, farm mechanization, and agronomy.

A total of thirteen (13) short-term experts have also been dispatched.

The details are shown in ANNEX 2.

(b) Acceptance of Philippine Counterpart Personnel in Japan for Technical Training

Started in the Japanese fiscal year 1997, a total of fourteen (14) counterparts have been accepted by JICA to avail of the technical training that upgrades their technical skills. All the training programs have been efficiently conducted in cooperation with the Tsukuba International Center of JICA and related research institutions of MAFF. More detailed information is given in ANNEX 3.

(c) Provision of machinery and equipment

Machinery and equipment shown in ANNEX 4 were provided by the Japanese side in order to effectively implement the Project activities. These have no doubt contributed to the successful implementation of the Project activities, and were utilized properly.

(d) Supplementary expenditure for local costs

The Japanese side provided a part of Project management costs in order to implement the Project activities more effectively within the limited time allocation. JICA supplemented a portion of the local cost expenditures necessary for the construction of the Annex building of the National Rice Engineering and Mechanization Center. Supplementary expenditure made by the Japanese side is shown in ANNEX 5.

(e) Dispatch of study team

1) Preliminary Study Team

This was dispatched from February 11 to 22, 1997, in order to clarify the background of the request; identify problems in the implementation of the Project; study the feasibility of the proposed technical cooperation program; and jointly formulate with the Philippine side a tentative master plan of the proposed project.

2) Implementation Study Team

This was dispatched from May 20 to 29, 1997 in order to finalize the master plan and the TSI of the Project.

The R/D and TSI were then signed on May 28, 1997.

3) Consultation Team

This was dispatched from March 17 to 27, 1998 in order to formulate the detailed TSI and the PDM, as well as discuss the major issues related to the Project.

(2) Philippine inputs

(a) Assignment of counterpart and administrative personnel

These personnel and other support staff have been assigned in accordance with the R/D. A list of counterparts is shown in ANNEX 6.

(b) Provision of recurrent expenses

The Philippine side allocated some 50 million pesos (equivalent to 15 million yen) from the commencement of the Project, and allocated some 660 million (equivalent to 210 million yen) for PhilRice R&D activities as shown in ANNEX 7.

(c) Provision of land, buildings and facilities

These were all provided, as they were considered necessary for the implementation of the Project. All the facilities of the project sites have been effectively utilized for the Project.

6-2. Progress of Project Activities

Most of the Project activities are proceeding smoothly. Some activities such as the development of direct seeding equipment and of standard techniques to determine the mechanisms of resistance of rice cultivars to rice blast disease; establishment of criteria for predicting processing qualities of rice; development of farm management models for evaluating mechanized rice-based farming systems; and development of a database for better transfer of rice technology information are still being developed. There is still reason to develop the direct seeding equipment, taking into consideration the current conditions on manpower and rice farming in the Philippines; the utilization of the seeding machinery to be developed; the justification from the technical viewpoint, and so forth. The determination of the mechanisms of resistance of rice cultivars to the rice blast disease, and the improvement of the techniques for rice grain quality evaluation for product processing have been delayed.

It can be concluded that the overall implementation of the Project is progressing smoothly, and the expected results will be attained through the efforts of both the Japanese and Philippine sides in a timely manner.

6-2-1 Development of high-yielding and better-quality rice varieties suited for mechanization

The technical cooperation project develops high-yielding and better-quality rice varieties suitable for mechanization.

For irrigated lowlands, PJ18 is the most promising line selected with less shattering, higher yield, and better grain quality. Mass screening for kernel and sensory qualities, shattering habit, and lodging resistance were conducted for higher breeding efficiency. For direct seeding, adopting a mass screening method for anaerobic tolerance, 20 of 88 lines were selected but have to be confirmed in the field.

For cool elevated areas, breeding focuses on high-yielding with strong cool temperature tolerance varieties. Serious injuries of sterility and blast were considered in field screening. Three lines, PJ9, PJ10 and PJ13, were highly cool temperature-tolerant with stable field resistance to blast and good grain quality but of low yield, hence further improvement is needed.

For local adaptability tests, five irrigated lowland elite lines and three cold-tolerant lines are being evaluated in the National Cooperative Tests (NCT). PJ2, the most advanced line, is now awaiting deliberation for possible varietal release. These elite lines are also being evaluated in four provinces representing Luzon, Visayas and Mindanao. PJ3-1 and PJ(T)4C were nominated to the IRRI International Network for Genetic Evaluation for Rice (INGER).

6-2-2 Development of farm machinery for small-scale rice farmers

A prototype of the hand tractor drawn drum seeder has been perfected and mass-produced for farmers' evaluation. Farmers' needs for mechanized seeding operations were assessed using a questionnaire survey.

A prototype side plow (plow body and linkage for plowing portions of land adjacent to levees), using a Japanese plow body, was designed and fabricated for field trials. Variables influencing its performance were identified for further refinement.

A prototype of the PhilRice rotary reaper developed previously was tested in farmers' fields and then improved. Its final design has been released to private manufacturers for commercialization. The performance of commercial models sold to farmers was monitored to identify points needing further improvement. Suggested modifications were relayed to manufacturers.

Three trial designs for the straw gatherer to be attached to the rotary reaper have been developed. Requirements for attaining the desired effects were identified and the knowledge was applied in subsequent modifications and improvements. Two alternative designs are being pursued.

Design alternatives for the small combine were studied. The pick-up reel and cutter table type header were adopted as the basic devices for crop

gathering. The rotary mechanism has been selected for cutting. Surplus car parts have been assembled to construct the carriage and power unit. The axial flow type thresher has been modified to become the threshing and cleaning unit. The cutter table is being assembled.

6-2-3 Improvement of cultivation techniques for labor-saving and high-yielding rice production

In reducing land preparation cost, the conventional and modified methods of land preparation were compared. Good seedling establishment was achieved with the modified (with lesser number of harrowing) method.

Several varieties and lines were tested for stable seedling establishment, lodging resistance, and yield performance. The varieties PSB Rc74 and PSB Rc34 were highly adaptable for wet direct seeding. One-day soaking, and 2-day incubation, and seeding on the same day of land leveling resulted in better seedling establishment.

Seeding methods, and seeding and nitrogen rates were investigated. Broadcast and drum-seeding resulted in similar yields. Seeding rates of 40-50 kg/ha in the DS and 50-60kg/ha in the WS were effective. The rate of 120kg N/ha applied at 4 splits increased yield by 9% in the DS. Growth parameters such as plant height, tiller number, and SPAD values as estimates of the plants' nitrogen status were established for the variety PSB Rc14.

Weeds and weed control through herbicides and employment of water management practices were also investigated. Four of six herbicides showed high efficacy on weeds without injury to rice. Deep water (5 to 7 cm) introduced at 8 days after seeding could control weeds fairly well without affecting seedling establishment. Monitoring of insect pest populations was simplified by using the sticky board method.

6-2-4 Improvement of rice quality evaluation techniques

Correlation between conventional method and NIR measurements for moisture, crude protein (both high), and apparent amylose content (low) was determined. The moisture and protein contents of 200 samples can be determined in a day using the NIR instrument.

The moisture, amylose and crude protein contents, fat acidity, pasting properties (RVA) and texture profile (tensipresser) of several Philippine and Japanese rices were evaluated. The physicochemical properties and processing suitability of glutinous rices from the two countries for *arare* production were compared. Packaging options for rice noodles were studied, and insect pests and natural enemies of stored products were identified.

6-2-5 Development of mechanized rice-based farm management systems

Data on yield and socio-economics in the farm level were collected. Geographic Information System was established. Maps of barangay Maligaya, municipality of Muñoz, and province of Nueva Ecija were digitized. Information on rice technologies are ready for conversion in hypertext machine language (HTML). Building up the information structure (installation of 600 m fiber optic cable, cabling of buildings, linking up the branch stations, etc) was started. Information for uploading in the PhilRice website and databases were organized.

6-3. ACCOMPLISHMENT IN TERMS OF ACTIVITIES AND OUTPUTS

Results of evaluation on the achievements of "Output" are discussed here; those of the "Activities" are listed in ANNEX 8.

Output 1) High-yielding and better-quality rice varieties suitable for mechanization are developed.

Objective verifiable indicator and results of the evaluation

1)-1. High-yielding and better-quality rice varieties for mechanized farming in irrigated lowlands

Score: 3.0

1)-2. High-yielding cold-tolerant rice varieties with good grain quality suitable for cool elevated areas

Score: 3.0

1)-3. Evaluation of local adaptability of promising lines

Score: 3.0

Conclusion on the evaluation of achievement of output 1)

Score: 3.0

Output 2) Farm machinery for small-scale rice farmers are developed.

Objectively verifiable indicator and results of the evaluation

2)-1. Development of machinery for plowing, leveling, and seeding for direct-seeding rice cultivation under irrigated lowland paddy conditions

Score: 4.0

2)-2. Development of rice harvesting machinery for small-scale farmers

Score: 4.0

Conclusion on the evaluation of achievement of output 2)

Score: 4.0

Output 3) Cultivation techniques for labor-saving and high-yielding rice production are improved.

Objectively verifiable indicator and results of the evaluation

3)-1. Development of techniques for direct seeding cultivation

Score: 3.0

3)-2. Improvement of fertilizer application techniques for higher-yielding and better-quality rice

Score: 3.0

3)-3. Improvement of techniques for disease and insect pest management

Score: 2.0

Conclusion on the evaluation of achievement of output 3)

Score: 3.0

Output 4) Rice quality evaluation techniques are improved.

Objectively verifiable indicator and results of the evaluation

4)-1. Improvement of techniques for rice grain quality evaluation

Score: 2.0

Conclusion on the evaluation of achievement of output 4)

Score: 2.0

Output 5) Mechanized rice-based farm management systems are developed.

Objectively verifiable indicator and results of the evaluation

5)-1. Development of models of mechanized rice-based farm management

Score: 2.0

5)-2. Development of an information system for rice and rice-based farming technologies

Score: 2.0

Conclusion on the evaluation of Achievement of output 5)

Score: 2.0

Three out of five "Output" have been evaluated as "highly achieved"; another "Output" as "achieved at the expected level". Total score points of output achieved at the half-way point is 14 which is 56% of the full score point (5 outputs times 5 point is 25). Based on this result, the Team recognized that "Five Outputs" of the Project are expected to be achieved during the remaining cooperation term: 40% of output 1; 20% of output 2; 40% of output 3; 60% of output 4; 60% of output 5; a general score of 44%; and the Project is on its way to achieving its expected goals.

7. RESULTS OF THE EVALUATION

7-1. Effectiveness

Due to unexpected weather, heavy rain, lack of necessary data, and the delay in the dispatch of some short-term Japanese experts, some of the Project activities are not progressing as smoothly as expected. However, with the efforts made by both sides, the Project is being implemented satisfactorily. Although some activities are not fully meeting the original expectations, the Project purpose, as well as the expected goals, are expected to be met through the further efforts of the two sides during the remaining term.

7-2. Efficiency

7-2-1. Development of high-yield and better-quality rice varieties suitable for mechanization

The development of high-yielding and better quality promising lines for mechanized farming in irrigated lowland has been conducted as planned. The conduct of various screening activities for the specific traits such as shattering resistance, lodging resistance, anaerobic tolerance and grain quality

contributed to the efficient development of the desired rice lines. Some obstacles on the short viability of *japonicas* in developing the promising lines have been observed. However, to overcome this problem it will be necessary to clarify the dormancy of *japonicas* under tropical conditions and to search for better donor germplasm.

The target of developing cool temperature-tolerant and high-yielding promising lines for cool-elevated areas also has been attained steadily despite the unexpected damage of landslide in the experimental site caused by heavy rainfall. Moreover, several constraints which are affecting the varietal performance are location and season specific. The problems include the serious blast disease and serious sterility by cool temperature in Benguet and the poor vegetative growth especially during wet season in Ifugao rice terraces caused by low water temperature due to continuous flow irrigation practice. However, the selection of promising lines with target traits has been conducted step by step by reinforcing the screening of specific traits, although further improvement through pyramiding these favorable traits will require longer time.

As regards the irrigation and other cultural practices, interdisciplinary collaboration has to be pursued more vigorously.

7-2-2. Development of farm machinery for small-scale rice farmers

In general, various activities were conducted efficiently and as planned. The JICA experts and the counterparts had established good working relationships such that timely inputs had been delivered by both Japan and Philippine sides.

There were problems encountered while in the process of implementing the various activities. These include the following: (a) limited test areas within PhilRice, allotted for testing the prototypes; (b) budgetary constraints due to delayed arrival of funds from funding agencies; (c) delayed fabrication jobs when electric power failures occurred because the existing generator is not capable of supplying power to operate the machine tools, and (d) limited manpower. However, these problems did not significantly affect the amount or quality of the desired outputs that were to be attained during the

period. Measures are now formulated so as to minimize (if not eliminate) encountering these problems in the future.

It may be a good idea to conduct research activities which strengthen linkages with both the domestic and the external farm machinery manufacturers.

7-2-3 Improvement of cultivation techniques for labor-saving and high-yielding rice production

Many achievements were obtained regarding labor-saving land preparation, seedling establishment, nitrogen management and weed control. In the process of experimental activities, the rice was sometimes damaged by golden apple snail, tungro disease, stem borer and prolonged rains.

The analysis of plant N content and the determination of dry biomass for the second rice crop has been delayed due to physical limitations. The optimum N content to attain a certain yield target has not been established due to two factors: (1) insufficient data because only one season crop data were analyzed, and (2) limited stay of the short-term Japanese expert. The methods should be tested with more varieties, and the tests should be conducted in various seasons and locations by Philippine counterparts, using the method transferred by Japanese experts.

In respect to the synthesis and utilization of nationwide historical data on insect pest incidence in the development of location-specific insect pest profiles, the research methods were transferred to the Philippine counterparts. It will be difficult to make further progress and to achieve the expected results due to the lack of necessary data. In addition, although the methods for generating a database were transferred, the (location specific) insect pest profiles were insufficient to achieve the goal. The Philippine counterparts are expected to complete the location specific insect pest profiles using the analysis methods and accumulating data through the survey methods. The pest monitoring is being continued using various methods. Considering the provision of equipment and materials by the Japanese side, the local availability of materials should be taken into account, thus, ensuring the sustainability of Project activities.

A short-term Japanese expert is expected to be dispatched in order to study the resistance of rice cultivars to rice blast disease. There are not enough references and scientific journals in PhilRice to study the resistance of rice cultivars to rice blast disease. Therefore, to conduct this activity more efficiently, more research through the available literature should be done.

7-2-4. Improvement of rice quality evaluation techniques

Due to functional restriction of the existing analytical equipment, the technological improvement of Near-Infrared Reflectance (NIR) is limited in obtaining the necessary information and analyzing the amylose content of rice.

On the other hand, the short-term expert is expected to help develop the evaluation techniques for predicting processing quality of rice grain.

7-2-5. Development of mechanized rice-based farm management systems

The short-term Japanese expert is expected to transfer the necessary technologies to implement the research activities more efficiently, while the collection of data necessary for developing the models of mechanized rice-based farm management is progressing. With respect to the development of a database for the better transfer of information nationwide, the hardware has been installed. A short-term Japanese expert is expected to develop the structure of the database.

The geo-referencing of farmers' fields has been delayed due to non-availability of global positioning system (GPS) equipment. The expedient provision of GPS equipment is required for conducting this activity. The replication of rice-corn-mungbean suitability analysis in other provinces has been delayed due to a lack of necessary agro-climatic data for mapping agricultural information. So the establishment of agromet station in other provinces is necessary to implement these activities more efficiently.

Due to the lack of necessary data for mapping agricultural information, the utilization of the geographic information system (GIS) technology is limited. However, it can be considered that the Philippine counterparts recognized the necessity of the further collection and maintenance of data, so

the Philippine counterparts are expected to utilize GIS in collecting and accumulating data.

7-3. Relevance

The overall goal and Project purpose remain consistent with the national development plan aimed at increasing agricultural productivity and developing the agricultural industry and food processing, through the Agriculture and Fisheries Modernization Act of 1997 (AFMA). The Department of Agriculture (DA) addresses food security consistent with the visions of AFMA. DA programs are now focused on modernizing Philippine agriculture and fisheries toward food security, poverty alleviation, social equity, and income enhancement.

The main aims of AFMA are: (1) introduction of advanced technologies for increasing agricultural productivity and farmers' income; (2) providing farmers with opportunities to adopt appropriate technologies; (3) dissemination of expertise in new technologies; and (4) developing farmers' organizations to improve their competitiveness in sales and purchases, as well as to empower them in agricultural development. Through the pursuit of the above-mentioned goals, the first priority area of the Estrada Administration can be met, that is, increasing the income of the rural sector where majority of the low-income farmers belong. In addition, as a concrete action plan to improve productivity and competitiveness, the national rice production program pursues the increased use of certified seeds, the storage of harvests for emergency and buffer stocks, and the networking of marketing information centers in principal rice-producing areas of the country. Therefore, being one of the most important issues being addressed in the Philippines since the inception of the Project is increased agricultural productivity, which will lead the country into attaining food security and poverty alleviation.

The Project aims to produce high-quality rice in sufficient quantity and to stabilize farm management through high productivity rice technologies suitable for the conditions in major rice-growing areas. Its two programs are: (1) R&D projects for high-yielding and mechanized rice production; and (2) R&D program on high productivity, centered on human resources

development and advancement of equipment for rice R&D. The Project conforms with concerns of the Medium-Term Philippine Development Plan (MTPDP), agricultural modernization stipulated in the AFMA, priorities set by the DA, and the R&D thrusts of PhilRice.

On the other hand, the Philippines pursues the increase of agricultural productivity, reform/redistribution of agricultural lands, agricultural diversification, conservation of the agricultural environment, and institutional improvement through the MTPDP, 1999-2004, which consists of three major policies: poverty alleviation, food security, and sustainable agriculture.

MTPDP aims to modernize agriculture and fisheries, and create a more diverse economy – one that is dynamic, technologically advanced, and globally competitive, guided by sound practices of resource sustainability, the principles of social justice, and active participation of the private sector. One of the strategies identified in this plan is the need to enhance and improve the delivery of support services by increasing investments in R&D to: (1) develop teams of world-class researchers and technologists; (2) upgrade research facilities; and (3) develop mainstream sustainable agriculture and natural resources management approaches and technologies. The MTPDP is particularly interested in reducing production costs; improving product quality; and enhancing value-added quality for competitiveness.

The Project will help achieve the MTPDP objectives as it develops sustainable small-scale rice farming endeavors, in particular, through improved and highly productive technologies enabling farmers to compete in the world market. Activities under the Project support the RD&E programs of PhilRice. These include the development of high-yielding better quality rice varieties for mechanization, new farm machinery for small-scale farmers, labor-saving and high-yielding cultivation techniques; improvement of rice grain quality evaluation techniques; and development of mechanized rice-based farm management systems.

In addition, the *Gintong Ani* (Golden Harvest) Program (GAP), which promoted the development and extension of location-specific technologies, has designated the irrigated areas as the priority coverage for rice. The *Agrikulturang MakaMASA* (Agriculture for the Masses) program, succeeding

GAP, is aimed at food security, poverty alleviation, sustainable management of natural resources, social fairness and marketing mechanisms through agricultural development.

Furthermore, the continuation of the Project means upgrading the manpower capability and technical competence level of Philippine rice researchers, increase of rice R&D activities and outputs, increased financial support for rice R&D; and creation of a better working relationship and cooperation between Japanese experts and their Filipino counterparts. All of these contribute to the aim of the national government to effectively implement rice R&D efforts in the country, achieve and sustain the country's goal of rice self-sufficiency, and promote greater access of farmers to improved agricultural technologies.

7-4 Project Impact

7-4-1. Impact

Promising rice lines being developed, rice cultivation technologies in the experimentation stage, and prototype agricultural machinery developed by the Project are visible results of the technical cooperation program. However, in the mid-term stage of the implementation of the Project, the remarkable impact of the Project for the target group of small-scale rice farmers has not yet been produced due to time limitation.

Therefore, it is expected that the Project will produce the impact of project implementation in the dissemination stage of results.

(1) Technical impact

The research capabilities on rice production technologies of the Philippine counterparts have been/are being upgraded through the implementation of the Project activities. The Japanese experts have been playing an important role to improve the research capabilities of PhilRice's researchers and technicians through their technical guidance.

(2) Institutional impact

The research capabilities on rice production technologies at PhilRice

are being improved through the technical guidance of the Japanese experts, the supplementary transfer of technology through the training of Philippine counterparts in Japan, and the improvement of the research environment through the provision of machinery and equipment. PhilRice also makes the utmost efforts to strengthen institutional capacity by making inputs such as the allocation of researchers and budget necessary for the Project implementation. PhilRice maintains research and extension activities concerning rice technologies, serving as the center of excellence on rice research in the Philippines as well as in the Asian region.

7-4-2. Extent of Impact

The technical impact produced by the Project implementation is limited due to the time limitation. However, some technologies and knowledge developed by the Project are already disseminated to the small-scale rice farmers as a target group of the Project. These technologies are expected to be disseminated through the existing training and extension activities of PhilRice based on the close relationship with the related agricultural extension institutions and local government units.

7-5. Prospects for Sustainability

Because the most trained researchers are settling into PhilRice, there are no major obstacles to the further development of rice technologies and their dissemination. The financial and human resources necessary for implementing the research activities are being allocated by PhilRice. The Team considers that the sustainability of the Project activities would be ensured by PhilRice.

The Project activities are being satisfactorily implemented in accordance with the Tentative Schedule of Implementation (TSI) to develop technologies that will contribute to increased and labor-saving rice production. Researchers who have gained advanced technologies are expected to become the human resources that contribute to the further development of rice technologies in the Philippines, thus securing the sustainability of the project activities. The research facilities including the experimental fields and

laboratories provided through the grant-aid program, and machinery and equipment provided by the JICA's past and ongoing technical cooperation programs, are well-utilized and managed properly. The further progress of activities to attain the Project objective is expected.

In order to strengthen the sustainability of the activities of the Project, PhilRice should make further efforts to settle the trained counterparts and secure enough of the financial resources.

8. MEASURES TO BE TAKEN

8-1. Modification of the PDM

The Team concluded that the overall goal, project purpose, outputs and major activities still have relevance, and the R&D thrust should remain unchanged. The Team, however, found that some of the objectively verifiable indicators need to be replaced so that they can be assessed in terms of quality and quantity, giving them greater relevance. The Team and the Project Team carefully examined the existing indicators and revised them in an appropriate manner, for the purpose of setting up revised indicators which allow measurement of progress and achievement of output, project purpose, and overall goal, in response to some changing important assumptions.

As a result of the discussions, the Team and the Project Team agreed to revise the PDM as shown in ANNEX 9.

8-2. Modification of the TSI

Based on the results of the mid-term evaluation, taking into consideration the Project activities and the change of socio-economic conditions in the Philippines, both the Team and Project Team reviewed the Tentative Schedule of Implementation and revised it in detail for the remaining cooperation term integrating the results of the mid-term evaluation.

Both the Team and the Project Team considered that prioritizing the project activities would be necessary for the efficient implementation of the Project under the limited allocation and input. The revised detailed TSI is attached as ANNEX 10.

8-3. Monitoring

The Team highly esteems the present project management led by the Project Team for examining the level of achievement of Project activities and for finding out the problems to be solved in the course of Project implementation. On the other hand, the Team emphasized the greater necessity to introduce the monitoring system based on the Project Cycle Management methods that JICA intends to apply to all of technical cooperation programs for the purpose of (1) optimizing the operation and management of the Project more precisely, (2) ensuring the transparency and accountability to the taxpayers, (3) producing more objective results, and (4) drawing lessons from experience. Monitoring is an effective management method to grasp the level of progress on a regular basis and to understand obstacles for the progress of the Project. Therefore, the periodical reviews and evaluation of the Project activities should be further undertaken together with the Japanese experts and the Philippine counterparts in accordance with the Plan of Monitoring and Evaluation shown as ANNEX 11, PDM and PO.

8-4. Activity Plan and Prospects

The Project accomplished a number of important activities, especially in labor-saving rice farming technologies, developing some promising lines suitable for mechanization, and prototype machinery. In principle, the Project will be completed by implementing the activities described below:

8-4-1 Development of high-yielding and better-quality rice varieties suitable for mechanization

Selection of promising lines with less shattering is to be continued. Several less shattering lines better than PJ-18 are expected to be selected. And the most favorable degree of shattering resistance is identified for improving efficient threshing.

Selection of breeding lines with anaerobic tolerance and root lodging resistance that are indispensable traits for wet direct seeding is to be continued. Several promising lines suitable for wet direct seeding are expected to be selected.

Selection of breeding lines with cool temperature tolerance, stable blast resistance, and suitable for dry or wet seasons is to be continued at the Banaue, Ifugao and in Benguet State University (BSU), La Trinidad, Benguet.

Evaluation of elite lines is to be continued in the National Cooperative Testing trials and other local adaptability tests. More than two lines are expected to be recommended for possible commercial release.

8-4-2 Development of farm machinery for small-scale rice farmers

Designing and fabrication of target prototype machines (side plow, reaper gatherer, and rice combine harvester) will be completed. Tests are to be carried out to identify the factors needing further modification to enhance the performance of developed machine units. Alternative designs are to be sought after and incorporated in improved versions. These cyclic processes are to be repeated until they can be considered ready for testing under on-farm conditions. Feedback on the prototype designs will be solicited to make them better-performing and more acceptable to farmers. Operators' manuals (side-plow, reaper gatherer) are to be developed. Final drawings are to be provided to qualified and interested manufacturers to help establish the sector that is capable of supplying standardized products of reliable quality.

In the end, two prototypes ready for commercial release are to be produced. They are those of side plow for replacing animal power, and crop gathering attachment for the rotary reaper. The first prototype of a combine harvester adapted for small-scale farms will be completed, and ready for field testing.

8-4-3. Improvement of cultivation techniques for labor-saving and high-yielding rice production

To develop techniques for direct seeding cultivation, the following experiments will be conducted: (1) Evaluation of more varieties / lines for their suitability to wet direct seeding, and determination of lodging resistance and yield performance of these varieties, (2) Labor-saving land preparation methods and pre-germinated seed treatment for best seedling establishment;

(3) Establishment of proper nitrogen and water management practices for high yield; and (4) Establishment of integrated weed control management.

To develop nitrogen application techniques for high-yielding and better-quality, the optimal N content of rice plants for high yield of different modern varieties is to be clarified, and the N^{15} labeled nitrogen methods for determination of fertilizer efficiency is to be tried.

For the improvement of techniques for disease and insect pest management, pest monitoring using various methods, and studies to determine resistance of selected rices to blast disease are to be continued.

Finally, the packaged technologies of wet direct-seeded rice cultivation will be completed through the farmer-participatory research approach.

8-4-4. Improvement of rice quality evaluation techniques

Evaluation of the use of the Near Infrared Reflectance (NIR) for moisture and protein to accommodate 200 samples a day will be continued. Its application to other rice grain properties will also be determined. Evaluation of amylose content will be conducted in case a new type of NIR is available.

Critical combination of physico-chemical properties of rice grains for high-quality rice products will be evaluated.

8-4-5 Development of mechanized rice-based farm management systems

Farm management models will be developed for evaluating and improving rice-based farming systems.

Digitized maps of rice-based areas with various attributes will be produced using the Geographic Information System (GIS).

The structure of the RICE TECHNOLOGY DATABASE is to be developed, and all the available Rice R&D information will be stored for easy access by local and international information networks.

9. CONCLUSIONS AND RECOMMENDATIONS

9-1. Conclusions (Summary of Evaluation)

As described above, the Project activities are being conducted as planned through smooth inputs made by both the Japanese and Philippine sides, and the new technologies and research methods are being developed and transferred to the Philippine counterparts. Although there are some activities that have been a little delayed due to unexpected climatic conditions and lack of data (as well as delay of dispatch of short-term experts Japanese experts), it can be considered that the project goals stated in the R/D will be achieved during the remaining cooperation term through the further inputs to be made by both sides.

The Project activities are being conducted in conjunction with the friendly relations between the Japanese experts and their Philippine counterparts, so the expectations to generate advanced rice production technologies and knowledge with further efforts based on the mutual understanding are high.

There are some activities of the technical cooperation program with visible results, such as agricultural machinery developed by the project as the prototype, however, in general, the remarkable impact of the Project for small-scale rice farmers as a target group of the Project has not yet been produced, due to time limitation. Therefore, it is expected for the Project to produce an impact of the Project implementation in the dissemination stage of the results to be obtained by the Project.

On the other hand, the research capabilities of the Philippine counterparts have been/are being upgraded through the technology transfer given by the Japanese experts, thus contributing to the strengthening of the research capabilities on rice production technologies at PhilRice. Although the technical impact produced by the Project is strictly limited due to the time limitation, some technologies developed by the Project are already disseminated to the small-scale rice farmers as a target group of the project.

Because the most trained researchers are working in PhilRice, there are not any major obstacles for further development of rice technologies and dissemination of these developed technologies. Both the financial and human

resources necessary for implementing the Project are being allocated by PhilRice, so it can be considered that the sustainability of the Project would be secured. The research facilities, including the drainage canals of the experimental fields and laboratories provided through the grant aid program, and machinery and equipment provided by the JICA's past and ongoing technical cooperation programs are well-utilized and managed properly, so the further progress of the Project activities to attain the Project objective are expected.

PhilRice is expected to make further efforts to settle the JICA experts' trained counterparts and to secure enough of the financial resources to strengthen the sustainability of the respective activities of the Project.

The detailed Tentative Schedule of implementation for the remaining cooperation term of the Project was set up as shown in ANNEX 10.

9-2. RECOMMENDATIONS

As a result of the review and mid-term evaluation of the Project activities, the Team has made the following recommendations to both the Japanese and Philippine governments:

(1) While the machinery and equipment necessary for the technology transfer of the Japanese experts have been / are being provided by JICA, the Team has considered that the machinery and equipment should be introduced systematically in accordance with the necessity and the schedule of technology transfer. In addition, although many books and scientific journals are provided to PhilRice through the provision of equipment, PhilRice is expected to allocate the necessary funding in order to secure the continuation for gaining technological information after completion of the Project.

On the other hand, it will be important for PhilRice to share the technological information with IRRI, the Philippine universities, and other relevant institutions.

The Team considered that it would be crucial for PhilRice to continue to allocate the expenses necessary to ensure the sustainability of the Project and for further development of the research activities. In addition, PhilRice is expected to further strengthen its own technological, financial and institutional bases.

(2) PhilRice is expected to maintain institutional partnerships with both the national and local agricultural extension institutions and take a greater initiative for the general coordination of research and development of rice production technologies in the Philippines, in order to: a) grasp the real technological needs of rice farmers through building strong linkages with national agricultural extension institutions, as well as with local government institutions, technological information exchange, and seminars; b) promote the efficient development of rice production technologies useful for small-scale rice farmers; c) disseminate technologies and knowledge developed by the Project to extension workers through the existing extension and training activities set up at PhilRice, as well as to promote the technological information exchange with other relevant extension institutions and rice farmers.

(3) The functional limitations of existing Near-Infrared Reflectance (NIR) for analyzing the amylose content of the rice grain cause obstacles to smooth implementation of the Project activities. To solve this problem, the introduction of the scanning type-NIR capable of gathering sufficient information and analyzing rice grain amylose content will be required. So, it is preferable that the Japanese side study the introduction of the upgraded NIR capable of analyzing amylose content through the coming provision of equipment.

(4) The Team considered that it will further be necessary for the smooth implementation of the Project to attend to the technological needs more quickly by utilizing the local human resources and domestic cooperation.

(5) In accordance with the Plan of Evaluation and Monitoring, the Project Team should carry out the monitoring of the Project, in order to examine the level of achievement, grasp the change of preconditions and important assumptions, analyze the obstacles and study their solutions. In addition, the Project Team should prepare the Project Achievement Chart describing the results of the monitoring, which shall be submitted to both Japan and Philippine sides to receive an appropriate guidance for smoother implementation of the Project.

ANNEXES

ANNEX 1. Existing Project Design Matrix for Research and Development Project on High Productivity Rice Technology.

Cooperation term: August 1, 1997 – July 31, 2002 | **Implementing organization: PhilRice, Department of Agriculture**

Drafted by the Consultation Team and PhilRice Team | **Target group: Small-scale rice farmers**

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Overall Goal High quality rice is supplied in sufficient quantity and farm management is stabilized through high productivity rice technologies which are sustainable for the conditions in rice growing areas.	• Stabilization of self-sufficiency in rice production • Improvement of farm management	Rice Statistics	Agricultural policies will not drastically change.
Specific Objective High productivity rice technologies for small-scale rice farmers are developed through the project implementation by the Philippine Rice Research Institute.	• Improvement of productivity through high yield and better grain quality	Farm management survey by PhilRice	Small-scale farmers adopt the technology developed by PhilRice.
Outputs of the Project 1) High-yielding and better quality rice varieties which are suitable for mechanization are developed. 2) Farm machinery for small-scale rice farmers are developed. 3) Cultivation techniques for labor-saving and high-yielding rice production are improved. 4) Rice quality evaluation techniques are improved. 5) Mechanized rice-based farm management systems are developed.	1) Twenty promising lines are developed 2) Four prototype machines are developed 3) Labor-saving at 25% in transplanted and 40% in direct-seeded rice; 10% yield increase 4) Faster rice grain quality evaluation techniques (200 samples/day) are developed 5) Two times faster evaluation and delivery of developed technologies are achieved	1) Commercial varieties 2) Prototypes 3) Cultivation techniques 4) Evaluation techniques 5) Adoption survey	Research activities and PhilRice commitment to the project will be maintained.
Activities of the Projects 1-1) To develop high-yielding and better quality promising lines for mechanized farming in irrigated lowlands. 1-2) To develop cool-temperature tolerant and high-yielding promising lines with good grain quality suitable for cool-elevated areas. 1-3) To evaluate local adaptability of promising lines. 2-1) To develop machinery for plowing, leveling, and seeding for direct-seeding rice cultivation under irrigated lowland paddy condition. 2-2) To develop rice harvesting machinery for small-scale farmers.. 3-1) To develop techniques for direct-seeding cultivation. 3-2) To improve fertilizer application techniques for high-yielding and better quality rice. 3-3) To improve techniques for disease and insect pest management. 4-1) To improve techniques for rice grain quality evaluation. 5-1) To develop models of mechanized rice-based farm management. 5-2) To develop an information system for rice and rice-based farming technologies.	Inputs : (Japanese side) 1. Dispatch of Experts (1) Long-term 1. Team Leader 2. Coordinator 3. Varietal Improvement 4. Farm Mechanization 5. Agronomy (2) Short-term (as needed) 2. Provision of machinery and equipment 3. Acceptance of Philippine counterpart personnel for training in Japan	(Philippine side) 1. Counterpart and administrative personnel 2. Land, buildings and facility 3. Repair or replacement of machinery 4. Maintenance and operating expenses	PhilRice will continue to conduct high quality research. PRE-CONDITION PhilRice will continue as an established rice research center in the Philippines.

ANNEX 2. List of Japanese Experts Dispatched

FIELD	NAME	ASSIGNMENT PERIOD (year.mo.date)
Long Term Experts (5)		
1) Research and Training Planning	Dr. Hitoshi TAKAHASHI	1997.08.01 - 1999.07.31
2) Coordination	Mr. Takanobu NAWASHIRO	1997.08.01 - 1999.07.31
3) Plant Breeding	Mr. Takehiko SASAKI	1997.08.01 - 1999.07.31
4) Agricultural Machinery	Engr. Shuji ISHIHARA	1997.10.13 - 1999.10.12
5) Agronomy	Mr. Shoji FURUYA	1998.04.17 - 2000.04.16
Short Term Expert (12)		
1) Agricultural Machinery (Reaper)	Mr. Kunihiko MAEOKA	1997.10.23 - 1997.11.20
	Engr. Koji INOOKU	1999.03.16 - 1999.04.30 2000.03.23 - 2000.05.06
2) Agricultural Machinery (Seeder)	Dr. Ryuji OTANI	1998.01.06 - 1998.02.18
3) Agronomy	Mr. Shoji FURUYA	1998.03.10 - 1998.03.28
4) Soil Chemistry	Dr. Shigeru TAKAHASHI	1999.01.13 - 1999.02.24
	Mr. Mizuhiko NISHIDA	2000.02.22 - 2000.03.31
5) Weed Science	Mr. Yoshiaki KAWANA	2000.01.16 - 2000.02.26
6) Entomology	Mr. Shingo OYA	1998.11.10 - 1998.12.19
7) Food Science	Dr. Tetsuo SATO	1999.02.24 - 1999.04.09
	Mr. Hiroshi OKADOME	2000.02.22 - 2000.03.31
8) Farm Management	Mr. Jinzo SAITO	1999.03.16 - 1999.04.30
9) Information Systems	Mr. Tarayuki AIHARA	2000.03.14 - 2000.03.31

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ANNEX 3. List of Counterpart Personnel Accepted in Japan

Field	Name/Position	Training Period	Affiliation/Destination
FY 1997			
1) Farm Mechanization	Engr. Rizaldo E. ALDAS (Sr. Sci. Res. Specialist)	1998.02.29 - 1998.10.23	Tsukuba International Agricultural Training Center
2) Agricultural Ext. Service	Engr. Leo C. JAVIER (Chief Sci. Res. Specialist)	1998.03.16 - 1998.04.25	Ministry for Agriculture, Fisheries & Food (MAFF), National Agriculture Research Center (NARC)
3) Food Processing	Ms. Juma Novie B. AYAP (Sr. Sci. Res. Specialist)	1998.03.31 - 1998.11.22	National Food Res. Institute (NFRI), Tsukuba & Niigita
4) Information Processing	Ms. Teodora L. BRIONES (Dev. Mgt. Officer III)	1998.03.31 - 1998.05.31	NARC
FY 1998			
5) Agricultural Extension	Mr. Paterno I. REBUELTA (Sr. Science Res. Specialist)	1998.05.05 - 1998.07.10	Tokyo International Center (TIC)
6) Agronomy	Ms. Evelyn F. JAVIER (Science Research Specialist)	1998.05.12 - 1998.11.14	NARC
7) Biotechnology	Ms. Victoria C. LAPITAN (Science Research Specialist)	1998.06.15 - 1998.12.22	National Institute of Agrobiological Resources (NIAR)
8) Entomology	Dr. Alejandra B. ESTOY (Sr. Science Res. Specialist)	1998.08.17 - 1998.09.29	Kyushu National Agricultural Experiment Station
9) Plant Breeding	Mr. Hilario C. DELA CRUZ (Chief Science Res. Specialist)	1998.08.17 - 1998.10.31	Tohoku National Agricultural Experiment Station and NARC
10) Food Science	Ms. Marissa V. ROMERO (Sr. Science Res. Specialist)	1998.03.30 - 1998.09.11	NFRI
FY 1999			
11) Farm Management	Ms. Alice M. BRIONES (Sr. Science Res. Specialist)	1999.05.23 - 1999.10.29	NARC
12) Plant Physiology in Rice	Dr. Rolando T. CRUZ (Chief Science Res. Specialist)	1999.06.07 - 1999.08.13	NARC, Tohoku and Kyushu National Agricultural Experiment Stations
13) Administration of the Institute	Dr. Leocadio S. SEBASTIAN (Deputy Diretor for R&D)	1999.08.23 – 1999.09.10	MAFF, NARC and others
14) Farm Mechanization	Engr. Elmer G. BAUTISTA (Science Res. Specialist)	2000.03.20 – 2000.06.25	Tsukuba International Center, and Bio-oriental Research Advancement Institution, Omiya City

ANNEX 4. LIST OF MACHINERY AND EQUIPMENT PROVIDED BY JAPAN

ITEM NO.	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	DATE DELIVERED	LOCATION	USAGE
I.	**FY 1997**						
A.	**Locally Purchased**						
1.1	Microscope lamp, 6630-H09, Leica general purpose, valuable for stereomicroscopy, wide aperture with heat-reflecting coating, 3-link arm, ventilated housing includes 6V halogen-cycle lamp, 3-wire and plug for 120V, 50 or 60 Hz	2	42,780	85,560	June 23, 1998	PBBD	A
	with Lamp Bulb, 6630-H24, 20W	2 (pk of 10)	16,760	33,520	June 23, 1998	PBBD	A
1.2	CO_2 Injector System for LI-COR LI-6400 photosynthesis analyzer, LI-6400-01 with CO_2 source assembly, CO_2 controller; and 3 packs (25/packs) 12 g CO_2 cylinders	1	268,290	268,290	June 23, 1998	ASD	C
1.3	Leaf Area Meter LI-3100, LI-COR, laboratory model, includes both 0.1 and 1.0 mm^2 resolution, interface connection for 3000A-01 & dust cover with: - 3100 fluorescent lamps (2 pcs) - 3100 lower & upper transparent belts (1 unit each)	1	544,500	544,500	July 9, 1998	ASD	A
	- 3100 TBL lower transparent belt	4	2,904	11,616	July 9, 1998	ASD	A
	- 3100 TBU upper transparent belt	4	2,904	11,616	July 9, 1998	ASD	A
1.4	Desktop Computer, Compaq DeskPro 2000, 5200 MMX, M2100/Intel Pentium 200 MMX processor, 128 MB RAM, 1.44 MB floppy drive	1	76,370	76,370	March 26, 1998	SSPR	A
	- COMPAQ 21" color monitor	1	81,330	81,330	March 26, 1998	SSPR	A
1.5	Printer/Plotter, HP DesignJet 750 C plus color Inkjet printer, 72 MB RAM (to be used for mapping of rice varieties, insect pests & diseases, soil fertility, production, technologies, etc)	1	327,300	327,300	March 26, 1998	SSPR	A

ITEM NO.	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	DATE DELIVERED	LOCATION	USAGE
1.6	Digitizer, CALCOMP drawing board III, 36"x48"	1	122,000	122,000	May 26, 1998	SSPR	A
1.7	PC Based GIS Software, ARCView ver 3.0 for Windows 95, CD	1	87,720	87,720	May 18, 1998	SSPR	A
	- installation & delivery		1,000	1,000	May 18, 1998	SSPR	A
	- training on Introduction to ARCView 3.0 for 3 days	1 pax	9,000	9,000	June 24, 1998	SSPR	A
1.8	Computer, note-type, COMPAQ Armada 1510	1	54,950	54,950	Dec. 21, 1997	JICA	
1.9	Cabinet, mini-multi purpose, SC-MM	1	6,000	6,000	Jan. 26, 1998	PBBD	A
1.10	Cabinet, steel, SC-SL	1	7,100	7,100	Jan. 26, 1998	PBBD	A
1.11	Cabinet, filing, FC-SP	1	5,950	5,950	Jan. 26, 1998	PBBD	A
1.12	Seed keeping chiller, KORIN KRS-130AF	2	23,800	47,600	Feb. 27, 1998	PBBD	A
			Sub-total	***1,781,422***			
B. Shipped from Japan							
1.13	UV Transilluminator Workstation with the following:	1	930,857.68	930,858	Oct. 16, 1998	PBBD	A
	- desktop computer, IBM PC300GL; monitor, ATTIC; keyboard, IBM; and mouse						A
	- circuit board, camera controller, ARCHIVE, 120V drawing 135-175						A
	- circuit board, display, ARCHIVE, drawing 135-176						A
	- circuit board, VFD4						A
	- PCI frame grabber/video card						A
	- printer, SONY digital graphic printer UP-D890						A
	- convertible transilluminator, FOTODYNE, 220V						A
	- UV clear, removable eclipse, slide						A
	- CCD camera, 75CE for VII eclipse with mounting bracket, Foto/Analyst						A
	- CCTV lens, 48mm, Foto/Eclipse w/ XC75 version II eclipse						A
	- Foto/Analyst investigator, 220V Ver II Eclipse, FOTODYNE						A
	- Foto/Analyst Foto/Eclipse benchtop darkroom FOTODYNE						A
	- filter, interference, fluor grn						A

ITEM NO.	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	DATE DELIVERED	LOCATION	USAGE
	- filter, Ethidium bromide 60-2030, eclipse Ver II						A
	- filter, COOMASSIE blue 60-2031, eclipse Ver II						A
	- software, PC Image CD ROM only						A
	- software, GELPRO 3.0 for Windows						A
	- cables and manuals						A
1.14	Nitrogen Analyzer, QDS-12M, Mitamura Riken Kogyo, AC220V with the following:	1 lot	764,621	764,621	Mar. 23, 1999	ASD	A
	- digestion controller, MRK						A
	- AVR stavol, Matsunaga, Model SVC 22364						A
	- digestion tube rack with 12 holes						A
	- vapor still, Kjeldahl-Auto DS-4S						A
	- automatic buret, Model APB-410 and accessories						A
	- diaphragm vacuum pump MZ-2C						A
	- tubes and other accessories						A
1.15	Spot Welder DAIDO, SN-31137 with accessory and consumables, manual	1	128,719	128,719	Oct. 16, 1998	REM	A
1.16	Cone Penetrometer, SPAD DIK-5520 with spare parts, consumables, case (color: orange) and manual	1	91,045	91,045	Oct. 16, 1998	REM	C
1.17	Floor Stand with 2 pcs middle board (color: avocado green)	1	12,558	12,558	Oct. 16, 1998	REM	D (to be installed in the new building)
1.18	Electronic force balance with tray, AND HP-22K, SN-13007223	1	20,721	20,721	Oct. 16, 1998	REM	C
1.19	Electronic force balance (SN-D421301817) with tray and adaptor (SN-017390), SHIMADZU BL-220H	1	51,488	51,488	Oct. 16, 1998	REM	C
1.20	Swing rotor HITACHI, P28S-999, Part No. 9022800 swing bucket rotor, 6x40 ml., 28,000 rpm for Himac SCP 85 H2 Ultracentrifuge with: balance H050, bucket stand, bucket tubes (6 pcs), centrifuge tubes 40PA (150 pcs) and manual	1	587,084	587,084	Oct. 16, 1998	CPD	C

ITEM NO.	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	DATE DELIVERED	LOCATION	USAGE
1.21	Centrifuge, TOMY Seiko MX-160 with rotor TMA-24 (1 pc); tube holder (24 pcs); microcentrifuge tubes 2.2 ml (500 pcs), 1.5 ml (500 pcs), 0.75 ml (100 pcs); lock; fuse; allen wrench; fix crew; and manual	1	257,438	257,438	Oct. 16, 1998	CPD	B
1.22	Sonic Sifter Separator, SEISHIN L-200P with fine collector holder, circuit board (spare), transformer (Toyuzumi, 500 W), cord, brush, spatula, stainless steel sieves 38, 75 and 150 microns and manual	1	882,196	882,196	Oct. 16, 1998	CPD	C
1.23	Vacuum pump, MILLIPORE CP8 DM-3836 with 50 m tygon tubing RE3603, transformer SE600 Maruman and manual	1	50,232	50,232	Oct. 16, 1998	CPD	B
1.24	Low temperature incubator HITACHI CR-32C, SN-289984; temp. range: -10 to 50°C; sensitivity: ±0.2°C; 100 VAC with transformer, keys, extra tray and manual	1	138,137	138,137	Oct. 16, 1998	CPD	A
1.25	Thermal Cycler, BIORAD Gene Cycler 170-6701, 200 V with cord and manual	1	116,161	116,161	Oct. 16, 1998	CPD	A
1.26	Roller mill, BRABENDER Quadrumat Junior with 70 mesh sieve (34 pcs); transformer BRABENDER with cord; cleaning brush (5 pcs), paint/flat brush 16"; and allen wrench (1 set-10 pcs)	1	1,158,471	1,158,471	Oct. 16, 1998	RCFS	C
1.27	Multi-media LCD Projector, EIKI LC-6200, SN-07401119 with case, cables VGA & MAC II, screen #032274; cover, remote control, and manual	1	222,903	222,903	Oct. 16, 1998	TPD	B
1.28	Multi-media LCD Projector, EIKI LC-4300, SN-G7401700 with case, cables VGA & MAC II, screen #032283, cover, remote control, and manual	1	131,859	131,859	Oct. 16, 1998	PCPO	A
1.29	Cutting Plotter, MIMAKI Pro Series Model CG-61 Type E-2IIC, SN-72807898 with accessories	1	109,882	109,882	Oct. 16, 1998	TPD	B
1.30	Color scanner for film and print, SHARP JX-350, SN-85105575, 600 dpi with cord and film scanner SHARP JX-35F6, SN-8C100466, adaptor WINSTAR NF-100, 100 W UK reg#2043635	1	39,244	39,244	Oct. 16, 1998	PCPO	D (ultra SCSI printer port cord not yet available)

ITEM NO.	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	DATE DELIVERED	LOCATION	USAGE
1.31	Milling machine, universal type, Model" TK-US3N-LH with layout table and spare parts	1	2,933,361	2,933,361	Apr. 21, 1999	REM	C
1.32	Slotter machine, Model MY-160S with slotter chuck, round bites of different sizes and spare parts	1	718,689	718,689	Apr. 21, 1999	REM	C
1.33	Foot shearing machine, Model: A4-620 with spare parts	1	1,593,868	1,593,868	Apr. 21, 1999	REM	D(to be installed in the new building)
1.34	Bending roll machine, Model: 6 type 2000-3.2 with splashes of mud apparatus and spare parts	1	672,966	672,966	Apr. 21, 1999	REM	A
1.35	TIG ARC welding machine, Model: 500P with standard and special accessories, and spare parts:	1	408,288	408,288	Apr. 21, 1999	REM	D(to be installed in the new building)
	- power supply for welder, AVP-500						
	- Welding torch, AW-18						
	- Cable hose, BMRH-500H						
	- Gas flow regulator, AR-2F						
	- Remote controller, K5042B						
	- Cable, 6m						
	- Welding bar steel, 2.44mm, 3.2 mm						
	- Cool water circulation, PU-301						
	- spare parts						
1.36	Press brake, model APM-8020	1	1,693,686	1,693,686	Apr. 21, 1999	REM	D(to be installed in the new building)
	- metal patterns (lower and upper)						
	- holder, IVDH						
	- spare parts						
1.37	Electric dynamometer, Model DWE-7/20-P and spare parts	1	2,337,673	2,337,673	Apr. 21, 1999	REM	D (to be installed in the new building)
1.38	Flow meter, Model: FP-2140H with signal cable 5m FP-011 and spare parts	1	214,448	214,448	Apr. 21, 1999	REM	-do-
1.39	Indicator, Model: DF-2410	1	137,491	137,491	Apr. 21, 1999	REM	-do-
1.40	Mini-elf, Mitsubishi "cargo truck double cabin" and accessories	1	1,401,921	1,401,921	Oct. 9, 1998	Research	B

ITEM NO.	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	DATE DELIVERED	LOCATION	USAGE
1.41	Light truck, Mitsubishi Pajero, high roof wagon and accessories	1	755,818	755,818	Oct. 9, 1998	Research	B
1.42	Books, 14 volumes	1 lot	58,516	58,516	Aug. 19, 1998	Library	A
1.43	Journals	1 lot	1,279,753	1,279,753	(estimate)	Library	A
			Sub-total	***19,900,093***			
C. Brought by Experts							
1.44	Balance, electric with adaptor, SB 800	1	32,662.58	32,663	Aug. 30, 1997	PBBD/T. Sasaki	D(out of order)
1.45	Balance, electric with adaptor, PB 5001	1	27,413.24	27,413	Aug. 30, 1997	PBBD/T. Sasaki	C
1.46	Balance, auto-B-type	1	16,214.64	16,215	Aug. 30, 1997	PBBD/T. Sasaki	C
1.47	Dish, grain quality testing, S-100B	300	74.07	22,222	Aug. 30, 1997	PBBD/T. Sasaki	C
1.48	Meter, grain moisture, PM-700	1	37,095.36	37,095	Aug. 30, 1997	PBBD/T. Sasaki	C
1.50	Recorder, portable, WR 7400	1	87,489.06	87,489	Oct. 23, 1997	REM/K. Maeoka	C
1.51	Computer, desktop, COMPAQ Presario 4190	1	83,610.38	83,610	Nov. 14, 1997	JICA/T. Nawashiro	A
1.52	Software, MS Office 97 ST (Japanese)	1	14,144.07	14,144	Nov. 14, 1997	JICA/T. Nawashiro	A
1.53	Printer, color BJ 455J with adaptor, cable and ink cartridge	1	43,753.28	43,753	Nov. 14, 1997	JICA/T. Nawashiro	A
1.54	Transformer, SVC-1000ND	1	7,144.94	7,145	Nov. 14, 1997	JICA/T. Nawashiro	A
1.55	Dictionary	1	4,433.65	4,434	Nov. 14, 1997	JICA/T. Nawashiro	A
1.56	Computer, Power Macintosh 7600/200 with monitor, keyboard, modem and interface cable	1	112,131.82	112,132	Jan. 12, `1998	REM/S. Ishihara	A
1.57	Printer, Color, LaserJet 6L	1	17,468.65	17,469	Jan. 12, `1998	REM/S. Ishihara	A
1.58	Scanner, JX-250 M3	1	11,023.62	11,024	Jan. 12, `1998	REM/S. Ishihara	A
1.59	Transformer, SVC-1000ND	1	6,707.49	6,707	Jan. 12, `1998	REM/S. Ishihara	A
1.50	Software, MS Office Ver 4.2	1	14,523.18	14,523	Jan. 12, `1998	REM/S. Ishihara	A
1.61	Software, Excel	1	8,748.91	8,749	Jan. 12, `1998	REM/S. Ishihara	A
1.62	Video camera, digital DCR-PC10 SONY and accessories	1	70,399.53	70,400	Feb. 5, 1998	REM/R. Otani	C
1.63	Chapter board, DVBK-W2000 SONY	1	14,873.14	14,873	Feb. 5, 1998	REM/R. Otani	C
1.64	Thermo-hygrometer, Quartz 3-3121 ISUZU with cartridge pen	4	18,664.33	74,657	Mar. 10, 1998	ASD/S. Furuya	C
			Sub-total	***706,717***			
			TOTAL (FY 1997)	***22,388,232***			

ITEM NO.	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	DATE DELIVERED	LOCATION	USAGE
II. FY 1998							
A. Locally Purchased							
2.1	Cold tolerance testing device (design and construction)	1 lot	1,450,000	1,450,000	June 30, 1999	PBBD	C
2.2	Generator, 35 KVA diesel generator set Perkins (USA), 27KW, 3-phase, 220V60Hz, 1800 rpm, driven by a radiator cooled Perkins diesel engine model 3.1524, 3-cylinders in line type coupled to a brushless alternator and installation	1 set	400,000	400,000	June 30, 1999	PBBD	C
2.3	Pump, Service Submersible sewage pump, 300 LPM x 7m TDH EBARRA Brand Model 50DL6.75S	1	34,000	34,000	June 30, 1999	PBBD	C
2.4	Computer, HP Brio PC Intel Pentium II-333 MHz	1	77,500	77,500	March 8, 1999	PBBD	A
2.5	Inkjet Printer, HP Deskject 890C	1	17,500	17,500	March 8, 1999	PBBD	A
2.6	Refrigerator, SANYO 28-OD, 2-door, 8 cu. ft.	1	14,000	14,000	March 8, 1999	PBBD	A
2.7	Incubator, programmable, illuminated, -10 to 50°C, temperature range: ±0.2°C sensitivity, 220VAC. 348 lbs, Cole Parmer 95-96/Cat. No. H-39350-15	1	493,700	493,700	March 8, 1999	PBBD	D(to be installed)
2.8	Showcase refrigerator, CHEE PUCK, with 3-door, adjustable sheet shelves, cooling system air-cooled defrost circulation, 182Wx79Dx206H cm, 60 cu. ft. capacity, 220V 60 cycle	1	137,000	137,000	March 29, 1999	RCFS	A
2.9	Network printer, HP Laserjet 4V	1	71,000	71,000	March 8, 1999	PCPO	A
2.10	Tape Recorder, SONY TCM 353	5	1,650	8,250	March 8, 1999	SED	C
2.11	RISOgraph Digital Duplicator GR3770, Super digital printer with digital scanner, 600 dpi resolution, 60-120 copies per minute (plus delivery)	1	374,500	374,500	March 4, 1999	TPD	C
	- color drum (green and yellow)	2	37,000	74,000			
2.12	Computer parts, motherboard & hard disk for COMPAQ Presario 4190	1	43,184	43,184	June 29, 1998	JICA	A
2.13	Zip drive, Iomega , RAMJ27B3VW	1	7,000	7,000	Sept. 5, 1998	REM	A
2.14	Modulator, PX SA-65	1	7,800	7,800	Dec. 15, 1998	JICA	
2.15	Note-type computer, IBM Think Pad 310-CD and printer	1	80,280	80,280	Feb. 7, 1999	REM	A

ITEM NO.	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	DATE DELIVERED	LOCATION	USAGE
2.16	Seed keeping Chiller, KORIN KRS-130AF	2	23,310	46,620	Feb. 7, 1999	PBBD	A
2.17	Digitizer stand, power lift manual	1	60,000	60,000	Feb. 18, 1999	SED	C
2.18	Hard disk, Seagate 9.1 GB, SCSI drive	1	23,000	23,000	Feb. 18, 1999	PCPO	A
2.19	Software, Windows95	1	8,338	8,338	Jan. 25, 1999	REM	A
2.20	Hi-Lux Double Cab 4x4 TOYOTA, 3L straight diesel engine 2800 cc, 4 cylinder in-line, OHC 8 valves & 5-speed manual transmission, power steering, power windows, power door locks, front suspension	1	858,000	858,000	March 4, 1999	PPD	A
2.21	Hi-Ace Commuter Van, 2L straight diesel engine 2446 cc, 4 cylinder in-line, OHC 8 valves & 5-speed manual transmission	1	609,000	609,000	March 4, 1999	PPD	A
			Sub-total	*4,894,672*			
B. Shipped from Japan							
2.22	Temperature Cycler, Robocycler, Strategene Cat. No. 400982 with: 96, and 40 well interchageable blocks; hot top assembly	1	851,608	851,608	Feb. 3, 2000	PBBD	D (just arrived)
2.23	Power supply, Power Pac3000 electrophoresis, BIORAD with: power output: 1-400 watts; current output: 1-400 milli amperes; temperature probe adopter	1	112,548	112,548	Feb. 3, 2000	PBBD	D (just arrived)
2.24	Nucleic acid eletrophoresis cell system, BIORAD Sequi-Gen GT with accessories: 4 extra outer glass plates, 1 syringe-140 cc, vinyl spacers and comb, extra caster base, 2 caster gasket	2	49,870	99,740	Feb. 3, 2000	PBBD	D (just arrived)
2.25.	Centrifuge, high speed Himac CF15R Hitachi, max. speed 15,000 rpm with angle rotor T15A23, swing rotor T15S21, and bucket	1	410,611	410,611	Feb. 3, 2000	PBBD	A
2.26	Mini-vertical electrophoresis system, P28551-00	1	19,076	19,076	Feb. 3, 2000	PBBD	D (just arrived)
2.27	Sampling thresher, R-7	2	119,225	238,450	Feb. 3, 2000	PBBD	D (just arrived)
2.28	Seed counter, Waver Model IC-1, Index Co. with turn table	2	374,707	749,415	Feb. 3, 2000	PBBD	D (just arrived)
2.29	Altimeter, No. 3263 Sato Keiryoki	1	6,132	6,132	Feb. 3, 2000	PBBD	C

ITEM NO.	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	DATE DELIVERED	LOCATION	USAGE
2.30	Clean bench, Hitachi, PCV-1305BNG3, stand height: over 70cm, width: 130cm, depth: 75 cm, right illumination: 40W x over 3	1	300,447	300,447	Feb. 3, 2000	PBBD	C
2.31	Autoclave, KT-30 LD, Tokyo Thermo Tec, max temp.: 120°C, inner diameter: over 30 cm, depth: 45 cm, plus drainage hose and 3 baskets	1	142,184	142,184	Feb. 3, 2000	PBBD	A
2.32	Incubator, TDH-120S # 119, temperature and humidity control type, temp. range: water temp. +3~ 40°C, volume: 1000 liter, temp. control system: water cooling	1	572,280	572,280	Feb. 3, 2000	PBBD	A
2.33	Incubator, CR41LC Hitachi, with transformer SE600 and spare lamps	3	233,681	701,043	Feb. 3, 2000	PBBD, CPD	A
2.34	Dissolved oxygen meter, MO128-2M with weight for sensor and spare parts	1	71,024	71,024	Feb. 3, 2000	PBBD	D (just arrived)
2.35	Sterilize drying oven. SP 450 with base	1	78,348	78,348	Feb. 3, 2000	PBBD	A
2.36	Seed moisture meter,. SP-1D2, Kett Electric	2	29,295	58,591	Feb. 3, 2000	PBBD	C
2.37	Seed blower, Cat HF-1, Model 757, Fujiwara	2	218,012	436,023	Feb. 3, 2000	PBBD	C
2.38	Plant canopy image analyzer CI-110, CID, Inc. with system and accessories (laptop computer, softwares, power supply, etc.)	1	347,456	347,456	Feb. 3, 2000	ASD	C
2.39	Ion meter, Hitachi, C-141(NO3), C-131 (K+), C-122 (Na+) and standard solutions Y026, Y025, Y024	3	8,857	26,570	Feb. 3, 2000	ASD	C
2.40	Hollow Cathode Lamps for atomic absorption spectrophotometer (AAS) HITACHI, Ca HLA4s, Mg HLA4s, K HLA4s, Zn HLA4s, Fe HLA4s, Cu HLA4s, Mn HLA4s (1 each)	1 set	92,314	92,314	Feb. 3, 2000	ASD	A
2.41	Computer Image analysis system, CI-400 with personal computer, transformer, digital camera C-830L CA media	1 lot	664,254	664,254	Feb. 3, 2000	ASD	A
2.42	Partition plate	200 roll	238	47,690	Feb. 3, 2000	ASD	D (just arrived)
2.43	Platform balance, Ohaus P-01006-42, capacity-200kg; readability-0.1kg; Platform size; 20.5"L x 15.75"W x 2.75"H; 220 VAC, 60 Hz with AC adapter	1	20,439	20,439	Feb. 3, 2000	REM	C

ITEM NO.	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	DATE DELIVERED	LOCATION	USAGE
2.45	Soil Moisture measurement unit, CR-10X Campbell Scientific with power supply, rechargeable battery, softwares, etc.	1	113,093	113,093	Feb. 3, 2000	REM	C
2.46	Printer/Plotter, HP DesignJet 750/C Plus, prints in D/A1-size black or color plots in less than 4 minutes	1	352,225	352,225	Feb. 3, 2000	REM	A
2.47	Ultrasonic thickness gauge, takes non-destructive measurements of most metals and non-metals, Cole Parmer 97-98, Cat. No. E-59785-00	1	68,469	68,469	Feb. 3, 2000	REM	D (just arrived)
2.48	Portable digital pressure gauge, measures pressure with +- 0.15% accuracy, Cole Parmer 97-98, Cat. No. E-68970-10	1	20,950	20,950	Feb. 3, 2000	REM	D (just arrived)
2.49	Digital counter, digital counter for batch counting and control, coil winding and wire cutting, Cole Parmer 97-98, Cat. No. E-08614-30	1	6,813	6,813	Feb. 3, 2000	REM	D (just arrived)
2.50	Eppendorf Reference Pipettor w/ tip-rack, Adjustable-volume pipettors, E-24505-60 with 100-1000µl volume, fixed and adjustable-volume pipettors with 1000µl volume	2	13,966	27,933	Feb. 3, 2000	CPD	B
2.51	Eppendorf Reference Pipettor w/ tip-rack, positive displacement pipettor, E-24551-00, 1 to 20µl, pipettor tips, E-24551-50, 1 to 20µl	2	16,351	32,702	Feb. 3, 2000	CPD	B
2.52	Stereomicroscope, Meiji P-48402-00, 7 to 45 x magnification compatible with photo systems with replacement bulb, P-48402-50	1	70,683	70,683	Feb. 3, 2000	CPD	B
2.53	Microscope, Olympos BX40F4 with photographic system, Camera PM-C35DX	1	312,540	312,540	Feb. 3, 2000	CPD	B
2.54	Rice sample tester for milling, McGill No. 3 Miller, No. 3M/C with 3 HP motor, standard wiring, 220 V, 60Hz, complete with automatic timer and starter	1	367,894	367,894	Feb. 3, 2000	RCFS	C
2.55	Grain shape tester, Model MK-100, Kett Electric	1	6,813	6,813	Feb. 3, 2000	RCFS	C

ITEM NO.	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	DATE DELIVERED	LOCATION	USAGE
2.56	Electrophoresis kit with mini electrophoresis cell, power supply and accessories, Vertical electrophoresis cell (P-28551-00); standard power supply (P-28401-05), Cole Parmer 97-98	1	61,316	61,316	Feb. 3, 2000	RCFS	D (just arrived)
2.57	CamCorder, SONY, UVM-100BF with video deck, color mònitor, tripod & other accessories	1	1,027,379	1,027,379	Feb. 3, 2000	TPD	B
2.58	Video scan Converter, SCAN DO Ultra; converts computer graphics to video; up to 1600 x 1280 pixel input; analog output/NTSC, PAL, S-video, CAV; flicker filter; autosync	1	241,857	241,857	Feb. 3, 2000	TPD	D (just arrived)
2.59	Camera back for Polaroid Dgital Palette CI 5000S, Camera back for 35 mm slides for digital palette color film recorder	1	26,570	26,570	Feb. 3, 2000	PCPO	D (just arrived)
			Sub-total	***8,783,480***			
C. Brought by Experts							
2.60	Plasma cutter, FB-50 McMaster	1	132,409	132,409	May 8, 1998	REM/H. Takahashi	A
2.61	Vacuum cleaner, JE-520 JET	1	69,357	69,357	May 8, 1998	REM/H. Takahashi	A
2.62	Rice Grain inspect, KETT	1	599	599	May 8, 1998	REM/H. Takahashi	A
2.63	Strain gage, DPM-601A KYOWA	1	53,279	53,279	May 8, 1998	REM/H. Takahashi	A
2.64	Note type computer and mouse, PC-LV16CWSDAF1 NEC	1	120,113	120,113	May 8, 1998	ASD/S. Furuya	A
2.65	Printer and accessory, BJC-80V CANON	1	18,033	18,033	May 8, 1998	ASD/S. Furuya	A
2.66	Soil Hardness tester, Fujihara	1	17,339	17,339	June 8, 1998	ASD/H. Takahashi	A
2.67	Logging meter, DIK-7400	2	17,654	35,309	June 8, 1998	ASD/H. Takahashi	A
2.68	Gravity meter	1	12,610	12,610	June 8, 1998	ASD/H. Takahashi	A
2.69	Gas rice cocker, PR-100 DF	10	4,224	42,245	June 17, 1998	PBBD/H. Takahashi	A
2.70	Plate and Adhesives for Insects collection	1	29,319	29,319	Nov. 30, 1998	CPD/S. Oya	A
2.71	Standard leaf color note, FUJIHARA	1	5,485	5,485	Jan. 13, 1999	ASD/H. Takahashi	A
2.72	Chrorophyll meter"SPAD-502", MINOLTA	2	31,661	63,323	Jan. 13, 1999	ASD/H. Takahashi	A
2.73	Rubber Boots, Tsukiboshi	1	1,072	1,072	Jan. 13, 1999	ASD/H. Takahashi	A
2.74	Pipette, NICHIRYO NP-5000, 1000, 200, 100, 20	5	7,881	39,405	Feb. 24, 1999	RCFS/T. Sato	A
2.75	Pipette tip and standard chemical, NICHIRYO/SIGMA	1	14,849	14,849	Feb. 24, 1999	RCFS/T. Sato	A

ITEM NO.	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	DATE DELIVERED	LOCATION	USAGE
2.76	Strain gage, KYOWA	1	4,035	4,035	March 15, 1999	REM/H. Takahashi	A
2.77	Bridge box and connection cable, KYOWA	1	8,449	8,449	March 15, 1999	REM/H. Takahashi	A
2.78	Rubber Boots	12	1,261	15,132	March 15, 1999	PBBD/ASD/ H. Takahashi	A
2.79	Scoot meter, YSI 85-10	1	111,917	111,917	March 15, 1999	ASD/Takahashi	A
2.80	Resistant meter cap gauge, DAIKI 7400/9505A	3	42,245	126,735	March 15, 1999	ASD/Takahashi	A
2.81	GIS Software, Map Info Professional	1	69,357	69,357	March 15, 1999	SED/J. Saito	A
2.82	Thermometer, standard, Nihon-Keiryoki, 8387, 8388	2	15,038	30,076	March 29, 1999	PBBD/H. Takahashi	A
2.83	Thermometer, standard, Nihon-Keiryoki, 9011, 9012	2	7,661	15,322	March 29, 1999	PBBD/H. Takahashi	A
2.84	Stapler, H-NF, HL-19, HL-16, Sekisui	3		35,151	March 29, 1999	PBBD/H. Takahashi	A
2.85	Paper cutter, DN31, Kokuyo	1	4,981	4,981	March 29, 1999	PBBD/H. Takahashi	A
2.86	Electronic punch, PNE150 with transformer, spare blade PNE150A, plate PNE150B	1	37,415	37,415	March 29, 1999	PBBD/H. Takahashi	A
2.87	Measuring tape, 100m, GR12-1H	2	3,689	7,378	March 29, 1999	PBBD/H. Takahashi	A
2.88	Measuring tape, 50m, CL-G50	2	1,797	3,594	March 29, 1999	PBBD/H. Takahashi	A
2.89	Counter	2	3,405	6,810	March 29, 1999	PBBD/H. Takahashi	A
2.90	Color printer, BJC-F600 Canon	1	20,177	20,177	March 29, 1999	PBBD/H. Takahashi	A
2.91	Ink cartridge, BC-30 (black), BC31 (color)	25		32,913	March 29, 1999	PBBD/H. Takahashi	A
2.92	Revolution attachment, RJ05	1	3,247	3,247	April 9, 1999	REM/K. Inooku	A
2.93	Ball joint, TU12	2	1,166	2,333	April 9, 1999	REM/K. Inooku	A
2.94	Flying rings, TR05C	1	3,878	3,878	April 9, 1999	REM/K. Inooku	A
2.95	Hook, TH-05C	1	5,139	5,139	April 9, 1999	REM/K. Inooku	A
2.96	Infrared REY moisture meter, FD-600	1	46,595	46,595	April 9, 1999	REM/K. Inooku	A
2.97	Digital video tape, Mini DV60	10	293	2,930	April 9, 1999	REM/K. Inooku	A
2.98	Spare lamp, 185W/220V	1	946	946	April 9, 1999	REM/K. Inooku	A
			Sub-total	***1,249,256***			
			TOTAL (FY 1998)	***14,927,408***			
III. FY 1999							
A. Brought by Experts							
3.1	Personal computer, DynaBook 4050X CDTA with printer, and other accessories	1 lot	149,489	149,489	November 1999	JICA/H. Takahashi	A
3.2	Grain moisture balance, MGMT-1	2	37,412	74,824	Feb. 22, 2000	ASD/ Y. Kawana	A

ITEM NO.	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	DATE DELIVERED	LOCATION	USAGE
3.3	Sprayer, BH565B	4	1,379	5,517	Feb. 22, 2000	ASD/ Y. Kawana	C
3.4	Sprayer, BH568	2	2,254	4,507	Feb. 22, 2000	ASD/ Y. Kawana	C
3.5	Dry cell, #3	20	25	505	Feb. 22, 2000	ASD/ Y. Kawana	C
3.6	Dry cell, #1	20	64	1,282	Feb. 22, 2000	ASD/ Y. Kawana	C
3.7	Micropippette, PG 20, PG200, PG1000 (1 pc each)	1 set	16,317	16,317	Feb. 22, 2000	ASD/ Y. Kawana	B
3.8	Disposable tip for micropippette	2 bxs	2,409	4,817	Feb. 22, 2000	ASD/ Y. Kawana	B
3.9	Label	20 pks	200	6,993	Feb. 22, 2000	ASD/ Y. Kawana	C
3.10	Envelope	77 sets	78	5,983	Feb. 22, 2000	ASD/ Y. Kawana	C
3.11	Wrapping paper	2 packs	233	466	Feb. 22, 2000	ASD/ Y. Kawana	C
3.12	Book	1	13,319	13,319	Feb. 22, 2000	ASD/ Y. Kawana	B
3.13	Softwares (SPSS), Zip drive & disk, RAM board, 63 MB, scanner Canon FB630P, tweezers, aluminum cup	1 lot	113,583	113,583	March 2000	RCFS/H. Okadome	A
3.14	Isotope maker for urea (N^{15})	110 g	97,100	97,100	March 2000	ASD/M. Nishida	B
3.15	Accessories for AAS	1 lot	22,982	22,982	March 2000	ASD/M. Nishida	A
3.16	Softwares (Oracle 8i workgroup server for windows NT R8.1.5 (5 users) and additional 2 users	1 lot	84,521	84,521	March 14, 2000	MIS/T. Aibara	A
3.17	Softwares (Oracle 8i workgroup server for windows NT R8.1.5 (5 users) and additional 2 users	1 lot	59,048	59,048	March 14, 2000	MIS/T. Aibara	A
			TOTAL (FY 1999)	***661,252***			

Note: Converstion rate: 1 Peso = 3.429 Yen (FY 1997)

1 Peso=3.172 Yen (FY 1998)

1 Peso=3.172 Yen (FY 1999)

ANNEX 5. List of Supplementary Fund to cover local costs

Year	Project local budget	Peso (unit: ,000)	Yen (unit: ,000)
1997	common local budget	664	2,486
	sub total	**664**	**2,486**
1998	common local budget	1,169	3,827
	sub total	**1,169**	**3,827**
1999	common local budget	1,250	3,500
	LLDC local budget	467	1,254
	Basic improvement budget	11,050	28,975
	sub total	**12,767**	**33,729**
	Total ('97-99)	**14,600**	**40,042**

ANNEX 6. List of Counterpart Personnel Assigned

FIELD OF EXPERTISE	JAPANESE EXPERT	FILIPINO COUNTERPARTS
A. Long-term		
Management	Dr. Hitoshi Takahashi	Dr. Santiago R. Obien Executive Director Dr. Leocadio S. Sebastian Deputy Executive Director for R&D Mr. Ronilo A. Beronio Deputy Executive Director for Administration
Coordination	Mr. Takanobu Nawashiro	Ms. Teodora L. Briones Development Management Officer III , Planning & Collab. Programs Office (PCPO)
Varietal Improvement	Mr. Takehiko Sasaki	Mr. Hilario C. dela Cruz, Jr. Chief Science Research Specialist (SRS), Plant Breeding and Biotechnology Division (PBBD) Dr. Rodante E. Tabien Chief SRS, PBBD Ms. Thelma F. Padolina Supervising SRS, PBBD Ms. Emily R. Corpuz Senior SRS, PBBD Mr. Jonathan M. Niones SRS, PBBD
Farm Mechanization	Engr. Shuji Ishihara	Engr. Ricardo F. Orge Senior SRS, Rice Engineering and Mechanization Division (REMD) Engr. Eulito U. Bautista Chief Science Res. Specialist, REMD Engr. Caesar Joventino M. Tado Supervising SRS, REMD Engr. Manuel Jose C. Regalado Supervising SRS, REMD
Agronomy	Mr. Shoji Furuya	Ms. Evelyn F. Javier Senior Science Research Specialist (SRS), Soils and Plant Physiology Division (ASPPD) Mr. Fernando D. Garcia Science Research Specialist II, ASPPD Mr. Wilfredo B. Collado Senior SRS, ASPPD

FIELD OF EXPERTISE	JAPANESE EXPERT	FILIPINO COUNTERPARTS
B. Short-term		
Farm Mechanization (Rice Reaper)	Engr. Kunihiko Maeoka	Engr. Manuel Jose C. Regalado Supervising SRS REMD Engr. Eulito U. Bautista Chief Sci. Research Specialist, REMD Engr. Arnold S. Juliano Science Research Analyst, REMD
Farm Mechanization (Rice Reaper)	Mr. Koji Inooku	Engr. Rizaldo E. Aldas Senior SRS REMD Engr. Arnold S. Juliano Science Research Analyst, REMD
Farm Mechanization (Paddy Seeder)	Dr. Ryuji Otani	Engr. Joselito A. Damian SRS, REMD Engr. Ricardo F. Orge Senior SRS, REMD Engr. Eden C. Gagelonia Senior SRS, REMD
Agronomy	Mr. Shoji Furuya	Dr. Rolando T. Cruz Chief SRS, ASPPD Dr. Teodula M. Corton Chief Science Research Specialist, ASPPD Mr. Fernando D. Garcia SRS, ASPPD Ms. Evelyn F. Javier Senior SRS, ASPPD
Weed Science	Mr. Yoshiaki Kawana	Ms. Madonna C. Casimero Supervising SRS, ASPPD Ms. Evelyn F. Javier Senior SRS, ASPPD
Soil Chemistry	Mr. Shigeru Takahashi	Dr. Teodula M. Corton Chief Science Research Specialist, ASPPD Ms. Myrna U. Malabayabas Sr. Science Research Specialist, ASPPD Mr. Jovino L. de Dios Sr. Science Research Specialist, ASPPD

FIELD OF EXPERTISE	JAPANESE EXPERT	FILIPINO COUNTERPARTS
Soils and Fertilizers	Mr. Nizuhiko Nishida	Dr. Teodula M. Corton Chief SRS, ASPPD Ms. Myrna U. Malabayabas Senior SRS, ASPPD Mr. Jovino L. de Dios Senior SRS, ASPPD
Entomology	Dr. Shingo Oya	Dr. Alejandra B. Estoy Supervising SRS, Crop Protection Division (CPD) Ms. Lina B. Flor Senior SRS, CPD
Food Science	Dr. Tetsuo Sato	Mr. James A. Patindol Supervising SRS, Rice Chemistry and Food Science (RCFSD) Ms. Juma Novie A. Ayap Sr. Science Research Specialist, RCFSD Ms. Nanette V. Zulueta Sr. Science Research Specialist, RCFSD
Food Science	Mr. Hiroshi Okadome	Ms. Marissa V. Romero Senior SRS, RCFSD Ms. Juma Novie A. Ayap Sr. Science Research Specialist, RCFSD Ms. Nanette V. Zulueta Sr. Science Research Specialist, RCFSD
Farm Management	Mr. Jinzo Saito	Dr. Sergio R. Francisco Chief SRS, Socio-Economics Division (SED) Ms. Girlie Nora A. Abrigo Senior SRS, SED Ms. Alice M. Briones Senior SRS , SED Ms. Cheryll B. Casiwan Senior SRS , SED
Information Systems	Mr. Tarayuki Aihara	Mr. Roger F. Barroga Information Tech Officer III, Management Information Systems Division (MISD) Ms. Karen Eloisa T. Barroga Senior SRS, Communication Division Mr. Carlo G. Dacumos Computer Operator, Comm. Division Ms. Consolacion D. Domingo Information Systems Analyst, MISD

ANNEX 7. Philippine Rice Research Institute, Corporate Operating Budget, FY 1997-1999.

PARTICULARS	AMOUNT (₱'000)		
	1997	1998	1999
A. General Administration	38,649	43,417	48,825
B. Support to R&D Operations			
1. Seed Production	13,075	7,445	12,787
2. Farm Operations	4,380	2,212	3,197
Sub-total	*17,455*	*9,657*	*15,984*
C. R&D Operations			
Research	66,480	63,673	65,737
Technology Transfer	20,333	11,463	12,677
Sub-total	*86,813*	*75,136*	*78,414*
Support to the Network	10,000	7,500	6,000
Rice Research Extension for Mindanao	24,000 a/	10,000	7,500
Impact Project on High Yield Rice Production for Selected Provinces		7,500	6,000
Rice Seed Production for Municipalities		2,500	2,000
TOTAL	**176,917**	**155,710**	**164,724**

a/ Congressional initiative (net of 20 reserve)

ANNEX 8. Results of the Evaluation on Achievements of the Activities and Output

A. OUTPUT

Expected Output	Verifiable Indicator	Achievement	Evaluation	
1. Varietal Improvement				
1.1 High-yielding and better quality rice varieties suitable for mechanized irrigated lowland	20 promising lines			3
a) Less shattering and lodging resistance		In 1999, PJ18 was selected with less shattering, high yield and good grain quality traits.	3	
b) For direct seeding cultivation		Thirteen F1 populations were produced using ASD1, Arroz de Terra, Italica Livorno, and other donor germplasm for anaerobic tolerance. Out of 88 lines, 20 were selected in the mass screening. Lemont, M401, and Kanto PL11 were introduced as donor varieties for root lodging resistance.	3	
1.2 High yielding cold tolerant rice varieties with good grain quality suitable for cool elevated areas		PJ9, PJ10, and PJ13 were identified with high cold tolerance, stable field resistance to blast and good grain quality.	3	
1.3 Evaluation of local adaptability of promising lines		For irrigated lowland ecosystem, five lines such as PJ3-5, PJ(T)4C, PJ7, PJ17, and PJ18 are in the national cooperative test (NCT). PJ(G)6, a glutinous line, completed the required trials, awaiting further adaptation tests.	3	
		For cool elevated areas, two new entries, PR26402-4B-1 and PR26675-5B-31-4 were elevated to the NCT in 1999 WS and 2000 DS, respectively. PJ2, a cold tolerant line pre-released in the farmers' fields, now awaiting deliberation for possible release.		

Expected Output	Verifiable Indicator	Achievement	Evaluation	
		Local adaptability tests of these elite lines are also being conducted in Ilocos Norte and Nueva Ecija in Luzon, Kanlaon in the Visayas, and Agusan del Norte in Mindanao.		
2. Farm Mechanization				
2.1 Development of machinery for plowing, leveling, and seeding for direct seeding rice cultivation under irrigated lowland paddy condition	4 prototype machines			4
a) Land preparation equipment for direct seeding	Prototype machine	Side Plow. First prototype was designed, fabricated and tested. Initial tests conducted under actual field conditions showed satisfactory performance of the machine. The design is undergoing further refinements.	3	
b) Improvement of performance of hand tractor mounted seeder	Improved machine	Power tiller-mounted drum seeder. Twelve units of the power tiller-mounted drum seeder were fabricated and tested at farmers' fields in various locations of the country. Results in some trials revealed problems associated with machine performance as affected mostly by the condition of the soil in the farmers' fields.	4	
2.2 Development of rice harvesting machinery for small-scale farmers				
a) Improvement of reaper models	Improved machine	Rotary reaper. Further refinements on the design of the rotary reaper had been done after identifying its weak points through series of farmer's field tests. Two models (1.0 and 1.1 model) have been released commercially to two cooperating manufacturers for mass fabrication. One manufacturer has fabricated and sold units of the 1.1 model to the farmers.	4	

Expected Output	Verifiable Indicator	Achievement	Evaluation	
2. Farm Mechanization				
b) Crop gathering equipment	Prototype machine	Reaper gatherer. Two prototypes (vertical and rake types) were designed and fabricated, one after the other. Field test results showed some advantages of the rake type gatherer because it is simpler in design and showed more potential than the vertical type. Further modifications are currently being made on its design.	3	
c) Small combine harvesters for rice	Prototype machine	Rice combine. The fabrication of the self-propelled prototype is ongoing and around 75% complete. The prototype is equipped mostly with surplus car parts for its power and drive components. With a 1.8 m rotary cutting device, it is expected to harvest around 2 – 3 hectares per day. This prototype is expected to be completed for testing during the first harvest season of year 2000 (April-May).	3	
3. Agronomy, Soil Chemistry, Plant Protection				
3.1 Cultivation techniques for labor-saving and high-yielding rice production	Labor-saving at 25% in transplanted and 40% in direct-seeded rice; 10% yield increase			3
a) Search for ideal plant type for direct seeding		Yield of PSB Rc74 increased by 10%, using 120 kg N/ha in 4 splits compared with 2 splits (conventional) during the WS.	3	
b) Improvement of land preparation for better crop establishment		Labor cost reduced by 33% with land preparation of one plowing + one harrowing	3	
c) Development of direct seeding cultivation for increased yield		Seed cost reduced by decreasing seeding rate from 160-200 kg/ha to 40-60 kg/ha.	3	
		Yield increased by 9% during the DS when 120 kg N/ha was applied at 4 splits (60 kg at 10 DAS, 20 kg at 25 DAS, 20 kg at 20 DBH, and 20 kg at 10 DBH)		
		Broadcasting of seeds reduced labor cost by 55% compared to the manual-drawn drum seeder. Drum-seeding of seeds also reduces yield loss due to lodging especially during the WS.		

Expected Output	Verifiable Indicator	Achievement	Evaluation	
3.2 Improvement of fertilizer application techniques for higher yielding and better quality				3
a). Improvement of nutrient use efficiency		Growth parameters like plant height, tiller number and SPAD values as an estimate of plant's nitrogen status were established in the test variety, PSB Rc14.	3	
3.3 Improvement of techniques for disease and insect pest management				2
a) Synthesis and utilization of nationwide historical data on insect pest incidence in the development of location-specific insect pest profiles		Monitoring of insect pest populations was simplified by using the sticky board method.	2	
b) Development of standard techniques to determine the mechanism of resistance of rice cultivars to rice blast disease		Resistance to blast was verified through natural infection process and artificial inoculation.	2	
		* New lines and machines for wet direct seeded rice are being developed as mentioned in items 1: varietal improvement, and 2: farm mechanization.		
4. Food Science				
4.1 Techniques for rice grain quality evaluation	Faster rice grain quality evaluation techniques (200 samples/day)			2
a) Highly efficient measurement of moisture and nutrient contents of rice grain by Near-Infrared Reflectance (NIR)		Correlation between conventional method and NIR measurements for moisture, crude protein, and apparent amylose content was determined (high correlation for moisture and crude protein content and low correlation for apparent amylose). Determination of moisture and crude protein contents of 200 samples can be done in one day using NIR analyzer.	2	

Expected Output	Verifiable Indicator	Achievement	Evaluation	
b) Establishment of criteria for predicting processing qualities of rice		The physicochemical properties of several Philippine and Japanese rices were evaluated: amylose and crude protein contents, fat acidity, pasting properties (RVA) and texture profile (tensipresser). The physicochemical properties and processing suitability of Philippine and Japanese glutinous rices for *arare* production were compared. Packaging studies on rice were conducted; insect pests and natural enemies of stored-products were identified.		
5. Farm Management and Information System				
5.1 Mechanized rice-based farm management models a) Development of farm management models for evaluating mechanized rice-based farming system	Two times faster evaluation and delivery of developed technologies	Data collection on yield and socio-economics in the farm-level was implemented. Modeling activities will start next year upon arrival of JICA short-term expert.	1	2
b) Development of techniques for monitoring and evaluation of rice-based farming systems using Geographic Information System (GIS) technology		Established the Geographic Information System (GIS).	3	
5.2 Information system for rice and rice-based farming technologies				2
a) Development of database for better transfer of rice technology information		Information on rice technologies ready for conversion to HTML	2	

B. ACTIVITIES

Planned Activities	Evidence of Achievement	Evaluation
1. Varietal Improvement (Development of high-yielding and better quality rice varieties which are suitable for mechanization)		
1.1 Development of high-yielding and better quality promising lines for mechanized farming in irrigated lowland		
(a) Development of high-yielding and better quality lines with less shattering and lodging resistance	PJ18, a new high yielding line with less shattering and better quality was nominated for the 2000 DS trial in the NCT; less shattering lines were also identified for further performance tests: 2 in the AON, 15 in the PYT, and 7 in the GYT. In the breeding lines, 116 lines were also selected with moderate to non-shattering resistance. For lodging resistance with influence of fertilizer treatments, 52 and 44 entries were evaluated during DS and WS, respectively, to search for donor germplasm, and to refine screening methodology. Evaluation was based on visual scoring and by use of push gauge. By visual rating, 18 varieties/lines had strong culm strength; 4, moderate; and 3, weak. By push gauge method, 16 and 44 entries were evaluated in the DS and WS, respectively. Resistance readings ranged from 0.27 to 6.26, indicating wide variation among entries.	3
(b) Development of high-yielding and better quality lines for direct seeding cultivation	Generated 13 hybrid populations by employing backcross method to transfer traits of ASD1, Arroz de Terra, and Italica Livorno, donor germplasm for anaerobic tolerance to popular Philippine varieties such as IR64. Out of 88 lines, 20 were selected in the mass screening. For root lodging resistance, Lemont, M401 and Kanto PI 11 were also used to improve the Philippine varieties.	3
(c) Other related activities		
(c.1) Screening for kernel and eating qualities	Among the 441 lines selected; 182 had excellent kernel quality; 91, very good; 122, good; and 46, fair. For eating quality, the methodology has been set and is now regularly followed using the acquired gas cookers. The more advanced lines in the AON and PYT were evaluated for sensory qualities. As a result 3 lines gave better eating quality than IR64, 29 were comparable, and 40 lines had inferior taste.	4
(c.2) Screening for shattering resistance	By hand grasp method, mass screening of selected breeding lines were classified into: 62 non-shattering (NS), 80 moderate shattering (MS), and 299 shattering (S) lines. In addition, 28 lines were identified as donor germplasm for non-shatterability.	4

Planned Activities	Evidence of Achievement	Evaluation
(c.3) Screening for anaerobic tolerance	Six varieties/lines were repeatedly evaluated to refine the existing screening methodology (Yamauchi method). As a result, consistent tolerant reaction to anaerobic condition based on emergence rate was observed in cultivars Arroz de Terra, ASD1 and Italica Livorno. Using these cultivars as checks, mass screening for 88 breeding lines generated 20 promising lines with anaerobic tolerance.	3
(c.4) Screening for viviparity	Pre-harvest sprouting or viviparity is important for indica/japonica crosses. A total of 610 lines have been subjected for screening. Results indicated 346 or 56% of the materials showed weak viviparity or may exhibit strong dormancy, and 122 lines with moderate viviparity.	3
1.2 Development of cool-temperature tolerant and high-yielding promising lines with good grain quality suitable for cool-elevated areas		
(a) Development of high-yielding lines with strong cool-temperature tolerance	Eight promising lines, PJ9 to PJ16 were initially identified. Repeated evaluation across DS and WS confirmed the strong cold tolerance, stable field resistance to blast and good quality of PJ9, PJ10 and PJ13.	3
(b) Development of high-yielding lines with cool-temperature tolerance and good grain quality	Promising lines with season and location suitability are continuously generated. In the DS, 268 and 414 lines were selected for further tests, 18 and 6 promising lines were elevated in PYT in Banaue and BSU, respectively.	3
(c) Other related activities		
(c.1) Reproductive cold tolerance screening	New cold tolerance screening facility was established to augment on-site breeding activities. Initial trial was done on 41 traditional and 45 breeding lines/varieties by exposure to 18.7°C cold water treatment from booting to heading stage. This test was aimed to investigate proper water temperature to estimate varietal difference of cold tolerance and to identify standard varieties.	3
(c.2) Screening for field or partial resistance to blast	Screening for 47 entries were done along with 24 single resistance gene lines and Japanese blast resistance standard checks at blast nursery in BSU field under natural condition. Among the entries, PJ9, PJ10 and PJ13 were susceptible but the extent was as slight as that of Todorokiwase which is a standard variety for strong field resistance. Their field resistance was, therefore, estimated as strong as that of Todorokiwase.	3

Planned Activities	Evidence of Achievement	Evaluation
(c.3) Field screening for blast	Estimation of the complete resistance gene of 47 entries has to be continued. Acquired some equipment for blast laboratory establishment. A total of 241 breeding lines/varieties were tested along with 24 single gene lines and 22 Japanese blast resistance standard checks. Under serious blast infection, partial resistance may possibly overcome blast disease in hot spot area. Under natural field condition, PJ9, PJ10 and PJ13 showed susceptible reactions in the blast nursery at seedling stage, however, in the field they could tolerate severe blast infection which showed importance of field or partial resistance.	3
1.3 Evaluation of local adaptability of promising lines		
(a) Evaluation of promising lines in the NCT and other local adaptability tests	For the irrigated lowland ecosystem, 5 elite lines PJ3-5, PJ(T)-4, PJ-7, PJ-17 and PJ-18 are in the NCT, PJ(G)-6 completed NCT tests and awaiting final deliberation; PJ3-1 and PJ(T)4 were nominated to the International Network for Genetic Evaluation for Rice.	3
	For the cool elevated areas, two new entries, PR26402-4B-1 and PR26675-5B-31-4 were elevated to the NCT in 1999WS and 2000DS, respectively. PJ2, a cold tolerant line pre-released in the farmer's field now awaiting deliberation for possible varietal release.	3
	Local adaptability tests of these elite lines are also being conducted in Ilocos Norte and Nueva Ecija in Luzon, Kanlaon in Visayas and Agusan del Norte in Mindanao.	3
1.4 Other activity (a) Training	A counterpart staff went to Japan for scientific visit, two staff attended a training on blast resistance screening at IRRI.	4
2. Farm Mechanization (Development of farm machinery for small-scale rice farmers)		
2.1 Development of machinery for plowing, leveling, and seeding for direct-seeding rice cultivation under irrigated lowland paddy condition		

Planned Activities	Evidence of Achievement	Evaluation
(a) Development of land preparation equipment for direct-seeding	One activity, however, which is the development of direct-seeding equipment was decided to be cancelled after thorough discussions with the JICA long-term expert and counterparts. The decision was based from results of the needs assessment survey conducted by one of the counterparts together with other PhilRice staff. It appeared that the original plan of developing a broadcast seeder is not necessary since, according to the results of the survey, the farmers who are practicing direct seeding method prefer a row seeder. The hand tractor-drawn seeder which was successfully developed through this Project and is now commercially-released, is a row seeder hence, it caters to the needs of the farmers who want to mechanize their direct seeding operations. Testing of two existing models of plow attachments for local hand tractor was conducted under two different field conditions. This was done to provide benchmark data/information prior to designing the prototype plow with better performance First prototype of the plow was designed, fabricated and field tested. It is a reversible type mold board plow based from an old Japanese animal-drawn plow. Test results showed satisfactory performance of the prototype Refinements are currently being done to increase structural strength of some parts and to increase its overall operational efficiency	3
(b) Improvement of performance of hand-tractor-mounted seeder	Twelve (12) units of the power tiller-drawn paddy seeder were fabricated by local manufacturers for testing at farmers' fields in various locations of the country. Twelve farmers used the seeders to plant a total area of 17 hectares. Despite the successful results, most farmers are still hesitant to switch to this mechanized seeding technology because of some socio-economic reasons (added cost, no significant increase in yield, etc.) Results in some trials revealed problems associated with machine performance as affected mostly by the condition of the soil in the farmers' fields.	5

Planned Activities	Evidence of Achievement	Evaluation
(c) Development of direct-seeding equipment	Discussions were made as to the viability of the project considering the rationale and the past experiences with mechanical seeders in general. No substantial agronomic advantages could be identified over the row seeded or manually broadcasted crop. Uniform planting density and labor saving which can be realized by mechanical operation may not provide sufficient justification for adopting this technology. With the use of walking type tractors in puddled rice field, the anticipated capacity for labor saving effects is limited because of the slow travel speed (3 km/h or less) and limited width of dispersion (10m at most). Hence, the project was suspended.	-
2.2 Development of rice harvesting machinery for small-scale farmers		
(a) Improvement of reaper models	Series of field tests revealed the points needing improvement and due modifications were made one after another, including the following: • Device for adjusting cutting height for varying operating conditions, such as straw length, soil hardness (sinkage), water presence, user's preferences. • Increasing structural strength of the body frame • The relative speed of the conveyor belt against the travel speed • Increasing the travel speed to realize higher efficiency • Lowering cutter disc speed to reduce wear, power consumption, grain loss • Easy control of machine operation • Prevention of straw blockage around star wheels or rotating components • Minimizing occupational hazard. The design was further refined. Two models were commercially released to 2 cooperating manufacturers: the 1.0 and the 1.1 model.	4

Planned Activities	Evidence of Achievement	Evaluation
(b) Development of crop gathering equipment	Analysis done on manual harvesting and gathering. After gathering benchmark information on manual reaping and gathering, two prototypes of gathering attachments (the vertical type and the rake type gatherer) were designed, fabricated, and tested. The rake type gathering attachment was found to be simpler and showed better potential than the vertical type hence, it is undergoing further study. The performance of the first unit of the rake type gatherer was too dependent on field condition. To address this problem, another prototype was designed and fabricated. The new prototype has a raking fork made from round bar which is pointed at the end and curved in a concave way to cause an upward movement for the gathered straw. It has four sets of raking fork which are spaced 90 degrees apart. With this design, it is expected that raking will be easier and the load will also be lighter than with only two sets of fork since a smaller pile will be developed during its use.	3
(c) Development of small combine harvester for rice	Fabrication of a self-propelled prototype of the rice combine for small farms is undergoing and is around 75% complete. The prototype employs a rotary type cutting component similar to that used in the rotary reaper. Its effective cutting width is 1.8m and is expected to harvest 2-3 hectares/day. The prototype is targeted to be ready for testing during the month of April or May, 2000	3
3. Agronomy, Soil Chemistry, Plant Protection (Improvement of cultivation techniques for labor-saving and high-yielding rice production)		
3.1 Development of techniques for direct-seeding cultivation (a) Search for the ideal plant type for direct seeding	The varieties and lines with high germinability in anaerobic condition were selected on pot experiment. These varieties also showed good seedling establishment on the field condition. The relationship between the leaf color value (LCV) at each stage by SPAD and lodging degree was verified. Lodging occurred when LCV is greater than 36 at 34 DAS and 33 at booting stage. The method of measurement on lodging resistance was done by push gauge instrument. The varieties PSB Rc74 and PSB Rc34 were suited for wet direct-seeding in terms of lodging resistance and yield performance.	3

Planned Activities	Evidence of Achievement	Evaluation
(b) Improvement of land preparation for better crop establishment	In dry season, seedling establishment in labor-saving land preparation as almost as good as that in conventional one. Seedling establishment was better when seeded on the same day with land leveling rather than 2-3 days later. Seedling establishment was better in one day soaking + two day incubation pretreatment as compared to the shorter soaking and incubation duration. The difference in emerged weed species in accordance with water depth was clarified. The deep water treatment (5-7 cm) from 8 days after seeding could control the weeds fairly well without affecting seedling establishment. The effectiveness of Pretilachlor on weeds was not stable especially in the wet season. The combined use of Pretilachlor and Bispyribac Sodium was more effective in controlling weeds.	3
(c) Development of direct-seeding cultivation for increased yield	There was no significant difference in yield between broadcast- and drum-seeded rice although lodging resistance was greater in drum-seeded. There was no significant difference among seeding rates (40, 60, 80, and 160 kg/ha) in yields. Seeding rate of 40-50 kg/ha in DS and 50-60 kg/ha in WS is recommended for higher lodging resistance and cost-efficiency. Nitrogen rate of 120 kg/ha applied at 4 splits (60 kg at 10 DAS, 20 kg at 25 DAS, 20 kg at 20 DBH, and 20 kg at 10 DBH) increased yield by 9% in DS.	3
3.2 Improvement of fertilizer application techniques for higher yielding and better quality rice		
(a) Improvement of nutrient-use efficiency	Growth parameters like plant height, tiller number and SPAD values as an estimate of plant's nitrogen status were established in the test variety, PSB Rc14. Use of N^{15} labelled nitrogen fertilizer to determine efficiency of applied fertilizer at different growth stages (10 DAS, 35 DAS, PI, flowering) in direct-seeded rice.	3

Planned Activities	Evidence of Achievement	Evaluation
3.3 Improvement of techniques for disease and insect pest management		
(a) Synthesis and utilization of nationwide historical data on insect pest incidence in the development of location-specific insect pest profiles	Researchers and field workers were trained to monitor the insect pest populations using the sticky board method Monitoring of insect population using the sticky board adapted in other areas	2
(b) Development of standard techniques to determine the mechanisms of resistance of rice cultivars to rice blast disease	Rice varieties resistant to blast were verified through natural infection process and artificial inoculation. Reactions were compared to susceptible checks. Leaf clearing techniques and microscopic examination of the leaf tissues revealed differences in spore germination of the pathogen in susceptible and resistant varieties.	2
4. Food Science (Improvement of rice quality evaluation techniques)		
4.1 Improvement of techniques for rice grain quality evaluation		
(a) Highly efficient measurement of moisture and nutrient contents of rice grain by Near-Infrared Reflectance (NIR)	Wavelength combinations used in the NIR analyzer were verified to get minimum standard error of prediction. Calibration, validation and rechecking of NIR formula for moisture content, protein and amylose determination were made. Major constitutents of rice such as moisture, crude protein and apparent amylose were determined for 50 rice samples using both conventional methods and NIR measurements. Correlation between conventional methods and NIR measurements for moisture, crude protein, apparent amylose, and content was established. So far, can analyze 200 samples/day for moisture and crude protein contents using NIR analyzer.	2

Planned Activities	Evidence of Achievement	Evaluation
(b) Establishment of criteria for predicting processing qualities of rice	The physicochemical properties of 12 Philippine rice varieties were determined: amylose content, crude protein content, pasting properties (RVA) and texture profile (tensipresser). The physicochemical properties and processing suitability of Philippine and Japanese glutinous rices for *arare* production were compared. The physicochemical properties of several Philippine and Japanese rices were evaluated: moisture content, apparent amylose content, crude protein content, fat acidity, gelatinization properties (RVA) and physical properties (tensipreser). Packaging studies on rice noodles were conducted. Insect pests and natural enemies of stored-products such as rice were identified.	2
(c) Other related activites	Two counterpart staff were trained on food processing (March 31 – Nov. 22, 1998), and on food science (March 30 - September 11, 1999) in Japan. Two short-term experts in NIR spectrosopy, and in food processing were dispatched to PhilRice.	
5. Farm Management and Information System (Development of mechanized rice-based farm management systems)		
5.1 Development of models of mechanized rice-based farm management		
(a) Development of farm management models for evaluating mechanized rice-based farming systems	• Data collection on yield and socio-economics in the farm-level was implemented.	1
(b) Development of techniques for monitoring and evaluation of rice-based farming systems using Geographic Information Systems (GIS) technology	• Technical Report on "Application of Geographic Information Systems (GIS) in Farm Management Analysis and Land Use Planning" • Digitized maps of barangay Maligaya, municipality of Muñoz, and province of Nueva Ecija • Socioeconomic database of rice farming in barangay Maligaya (field level) and Nueva Ecija • Calculated cost and returns of the different major rice-based cropping patterns in the Philippines	3

Planned Activities	Evidence of Achievement	Evaluation
	• Access program for easy encoding and calculation of cost structure and profitability analysis • Trained personnel on GIS basic skills and its application to spatial and temporal analysis • Formulated crop suitability analysis methodology • Developed ex-ante impact evaluation methodology	
5.2 Development of an information system for rice and rice-based farming technologies (a) Development of database for better transfer of rice technology information	• Building-up the information structure - installation of 600 m fiber optic cable (Lucent AT&T 4-core) - construction of a data center/server room & cquisition of one unit server, HP LH4 Pentium II Xeon 400 MHz - cabling of the CES buildings and the Farmers' Training and Information Center - Linking-up of the branch stations to the internet • Content - organized information for uploading in the **PhilRice Website** - databases/information system are being organized (rice doctor, rice seed network and project monitoring	2

C. RESULTS OF THE DISCUSSION ON CAUSES OF THE PROBLEMS

Activities/Output	Problems	Causes	Recommendations
1. Varietal Improvement			
1.1 High-yielding and better quality rice varieties suitable for mechanized farming in irrigated lowland	• Short viability of *japonica* rice seeds under tropical condition.	• Dormancy of *japonica* rice seeds is shorter under tropical condition.	• Search for better germplasm and strengthen screening of viviparity
1.2 Cool temperature tolerant, high yielding with good grain quality lines	• Breeding objectives became difficult to attain due to many emerging related problems	• Wide climatic variation between seasons and among locations	• Clarify target areas and season, and focus on breeding objectives to fit to season and location specific problems.
	• Delayed and poor growth at vegetative stage at the rice terraces	• Low water temperature of natural irrigation water source.	• Improve water and nutrient management
2. Farm Mechanization			
3. Agronomy, Soils & Fertilizer, Crop Protection			
3.1 Direct-seeding	• Difficulty in good rice establishment	• Occurrence of natural calamities like heavy rainfall, prolonged rainy days especially during crop establishment	
4. Food Science			
4.1 Measurement of moisture and nutrient contents of rice grain by NIR	• Low correlation between conventional method and NIR measurement was obtained for apparent amylose content	• NIR instrument used was a wavelength filter type that gave discrete wavelengths resulting in limited information gathered	• Use of scanning type NIR with continuous wavelength (new unit of NIR instrument is expected to be provided by JICA)

Activities/Output	Problems	Causes	Recommendations
5. Farm Management and Information System			
5.1 Farm management/GIS	• Delays in geo-referencing of farmers' fields • Delays in replicating rice-corn-mungbean suitability analysis in other provinces	• GPS instrument not yet available • Inadequate agro-climatic data in other provinces	• Quick action on requested instruments • Establish agromet stations in other provinces
5.2 Information system	• Lack of database program to access information	• Existing manpower has limited capability on database programming	• Request for counterpart training in Japan

D. RESULTS OF THE DISCUSSION ON THE EFFICIENCY

Inefficient Input/Activities	Situation of the Inefficiency	Recommendations
1. Varietal Improvement		
1) The conditions of the experimental sites were more adverse than expected.	• The target of developing high yield with cool temperature tolerance and good grain quality could not be immediately attained due to related constraints affecting varietal performance. Wide climatic variation between seasons and among locations contributed to the inefficiency because the focus of breeding has been dispersed. Serious problems on blast were observed in Benguet while in Ifugao, water temperature and climatic factors such as cloudiness and nutrient deficiencies. Moreover, traditional cultural management practices also affect the efficiency situation	• The problems should be addressed based on season and location specificity. • Varietal improvement should be focused on few traits at a time and then employ pyramiding later which will require longer period of time. • For the improvement of traditional practices on water and nutrient management, interdisciplinary approach should be strengthened.
2. Farm Mechanization	-	-
3. Agronomy, Soils & Fertilizer and Crop Protection		
1) Methodologies to determine the mechanisms of resistance of rice cultivars to rice blast disease still undefined	• Most of the methodologies found in literatures require ultrastructural observations	• Simple microscopic examinations shall be done.
4. Food Science		
1) Measurement of moisture and nutrient contents of rice grain by NIR	• Apparent amylose content of rice obtained by NIR technique was poorly correlated with the conventional method	• Use a more suitable NIR instrument
5. Farm Management and Information System		
1) Farm management/GIS	-	-
2) Information System	-	-

ANNEX 9 Revised Project Design Matrix (PDM) for the Research and Development Project on High Productivity Rice Technology (Version 3)

Cooperation term: August 1, 1997 – July 31, 2002 | Implementing organization: PhilRice, Department of Agriculture

Drafted by the Japanese Advisory Team and Project Team | Target group: Small-scale rice farmers

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Overall Goal High quality rice is supplied in sufficient quantity and farm management is stabilized through high productivity rice technologies which are sustainable for the conditions in rice growing areas.	Rice self-sufficiency stabilized as a result of improved rice-based farm management practices.	National Statistics report on agriculture information from DA.	1. Agricultural policy on rice production does not change considerably. 2. Abnormal weather patterns do not occur and unexpected diseases and pests do not appear.
Specific Objective High productivity rice technologies for small-scale rice farmers are developed through the project implementation by the Philippine Rice Research Institute.	Rice productivity at the experimental level increased by 10% in both irrigated lowlands and cool-elevated areas. Labor requirements in rice cultivation decreased by 25% in transplanted and 40% in direct-seeded rice resulting from developed agricultural machinery and labor-saving cultivation techniques.	Farm management survey by PhilRice	1. Abnormal weather patterns do not occur and unexpected diseases and pests do not appear. 2. Small-scale farmers adopt the technology developed by PhilRice. 3. The Philippine government maintains a high priority for food security through increased rice production 4. Economic and social conditions remain stable in the Philippines.
Outputs of the Project 1) High-yielding and better quality rice varieties which are suitable for mechanization are developed. 2) Farm machinery for small-scale rice farmers are developed. 3) Cultivation techniques for labor-saving and high-yielding rice production are improved. 4) Rice quality evaluation techniques are improved. 5) Mechanized rice-based farm management systems are developed.	1) Twenty promising lines with: (a) higher yield than and comparable grain quality with IR64 developed for irrigated lowlands; (b) yield of cold-tolerant lines, increased 10% higher than that of locally grown varieties. 2) Three prototype machines for plowing, harvesting, and gathering with 25% labor saved in transplanted, and 35% in direct-seeded rice as compared with existing practices. 3) Labor requirements in wet direct-seeded rice cultivation reduced by 5% and yield increased by 10%. 4) Rice grain quality evaluation capacity increased from 100 to 200 samples. 5) Evaluation and impact assessment model for new technologies developed; and a database for more reliable transfer of rice technology information produced.	1) Project record on rice varietal improvement 2) Project record on machinery 3) Project record on rice cultivation 4) Project record on rice grain quality evaluation 5) Project record on Farm management systems	1. Abnormal weather patterns do not occur and unexpected diseases and pests do not appear. 2. Research activities and PhilRice commitment to the Project are maintained. 3. The financial conditions of PhilRice remain stable. 4. The relevant research and experimental facilities of PhilRice are utilized efficiently.

Activities of the Projects	Inputs <PHILIPPINE SIDE>	1. The relevant research facilities including experimental fields are improved continuously and administered appropriately by PhilRice.
1-1) To develop high-yielding and better quality promising lines for mechanized farming in irrigated lowlands. 1-2) To develop cool-temperature tolerant and high-yielding promising lines with good grain quality suitable for cool-elevated areas. 1-3) To evaluate local adaptability of promising lines. 2-1) To develop machinery for plowing, leveling, and seeding for direct-seeding rice cultivation under irrigated lowland paddy condition. 2-2) To develop rice harvesting machinery for small-scale farmers. 3-1) To develop techniques for direct-seeding cultivation. 3-2) To improve fertilizer application techniques for high-yielding and better quality rice. 3-3) To improve techniques for disease and insect pest management. 4-1) To improve techniques for rice grain quality evaluation. 5-1) To develop models of mechanized rice-based farm management. 5-2) To develop an information system for rice and rice-based farming technologies.	1. Philippine counterpart personnel 1.1 Project Director 1.2 Project Manager 1.3 Counterpart personnel for Japanese Experts 1.4 Administrative and other staff to support the Project activities 2. Physical facilities 2.1 Building, facilities, experimental fields, and other space for the Project 2.2 Space for the machinery and equipment 2.3 Electricity, water, and communication facilities 2.4 Other land, buildings and facilities necessary for the Project 3. Running expenses 3.1 Travel Cost for Field study and Supervision 3.2 Budget for research and extension activities 3.3 Maintenance and operating expenses 4. Others Management of the Joint Coordination Committee. <JAPANESE SIDE> 1. Japanese Experts Long-term (1.1 Team Leader; 1.2 Coordinator; 1.3 Varietal Improvement; 1.4 Farm Mechanization; 1.5 Agronomy) Short term (if necessary) 2. Technical Training of Philippine counterpart personnel in Japan. 3. Equipment and Machinery 3.1 Agricultural machinery, equipment, and spare parts; 3.2 Teaching materials and communication equipment including audio-visual equipment; 3.3 Technical instrument and equipment; 3.4 Vehicles for Field Survey; 3.5 Other equipment necessary for Project activities	2. Customs formalities do not hinder the delivery of Equipment. 3. The PhilRice's budget is available for the implementation of the Project. 4. The trained PhilRice's researchers and technician continue to work with the Project. PRE-CONDITION 1. PhilRice continues as an established rice research center in the Philippines. 2. Relevant research institutions such as IRRI, SRDC, etc. and agricultural machinery manufacturers actively participate and support the Project. 3. Small-scale rice farmers in the Philippines agree with the objectives of the Project.

ANNEX 10. Revised Detailed Tentative Schedule of Implementation

TENTATIVE SCHEDULE OF IMPLEMENTATION (TSI) (revised)

Item/Activity	Year				
	1	2	3	4	5
1. Development of high-yielding and better quality rice varieties which are suitable for mechanization					
(1) Development of high-yielding and better quality promising lines for mechanized farming in irrigated lowland					
(a) Development of high-yielding and better quality lines with less shattering and lodging resistance					
(b) Development of high-yielding and better quality lines for direct seeding cultivation					
(2) Development of cool-temperature tolerant and high-yielding promising lines with good grain quality suitable for cool-elevated areas					
(a) Development of high-yielding lines with strong cool-temperature tolerance					
(b) Development of high-yielding lines with cool-temperature tolerance and good grain quality					
(3) Evaluation of local adaptability of promising lines					
(a) Evaluation of promising lines in the NCT and other local adaptability tests					
2. Development of farm machinery for small-scale rice farmers					
(1) Development of machinery for plowing, leveling, and seeding for direct-seeding rice cultivation under irrigated lowland paddy condition					
(a) Development of land preparation equipment for direct-seeding					
(b) Improvement of performance of hand- tractor -mounted seeder					
(c) Development of direct-seeding equipment					
(2) Development of rice harvesting machinery for small-scale farmers					
(a) Improvement of reaper models					
(b) Development of crop gathering equipment					
(c) Development of small combine harvester for rice					

Item/Activity	Year				
	1	2	3	4	5
3. Improvement of cultivation techniques for labor-saving and high-yielding rice production					
(1) Development of techniques for direct-seeding cultivation					
(a) Search for the ideal plant type for direct seeding					
(b) Improvement of land preparation for better crop establishment					
(d) Development of direct-seeding cultivation for increased yield					
(2) Improvement of fertilizer application techniques for higher yielding and better quality rice					
(a) Improvement of nutrient-use efficiency					
(3) Improvement of techniques for disease and insect pest management					
(a) Synthesis and utilization of nationwide historical data on insect pest incidence in the development of location-specific insect pest profiles					
(b) Development of standard techniques to determine the mechanisms of resistance of rice cultivars to rice blast disease					
4. Improvement of rice quality evaluation techniques					
(1) Improvement of techniques for rice grain quality evaluation					
(a) Highly efficient measurement of moisture and nutrient contents of rice grain by Near-Infrared Reflectance (NIR)					
(b) Establishment of criteria for predicting processing qualities of rice					
5. Development of mechanized rice-based farm management systems					
(1) Development of models of mechanized rice-based farm management					
(a) Development of farm management models for evaluating mechanized rice-based farming systems					
(b) Development of techniques for monitoring and evaluation of rice-based farming systems using Geographic Information System (GIS) technology					
(2) Development of an information system for rice and rice-based farming technologies					
(a) Development of farm database foe better transfer of rice technology information					

ANNEX 11. Plan of Operation

Plan of Operation in latter half for Rice Varietal Improvement
Project Outputs: High-yielding and better quality rice varieties which are suitable for mechanization are developed.

Items/Activities	Targets	Schedule					Responsible persons in the project	Inputs	Remarks
		2000		2001		2002			
		DS	WS	DS	WS	DS			
(1) Development of high-yielding and better quality promising lines for mechanized farming in irrigated lowland							Long term expert, counterparts, research assistants	Labor, seed storage, greenhouse, cold tolerance screening facility, experimental field	
(a) Development of high-yielding and better quality lines with less shattering and lodging resistance	Select high-yielding and better quality lines with less shattering and lodging resistance from the breeding lines and hybrid populations Screen for lodging resistance Clarify the most favorable degree of shattering resistance								
(b) Development of high-yielding and better quality lines for direct seeding cultivation	Select breeding lines with anaerobic tolerance and root lodging resistance. Pyramid these traits and other favorable traits . Intensify mass screening and confirm under field condition								
(2) Development of cool-temperature tolerant and high-yielding promising lines with good grain quality suitable for cool-elevated areas									

DS: dry season WS: wet season

Items/Activities	Targets	Schedule					Responsible persons in the project	Inputs	Remarks
		2000		2001		2002			
		DS	WS	DS	WS	DS			
(a) Development of high-yielding lines with strong cool-temperature tolerance	Evaluate and select breeding lines in the target sites Evaluate site and compare with the general conditions Improve water and nutrient management technologies Establish practical screening technique for efficient use of the cold tolerance screening facility Establish screening methods for partial or field resistance to blast								
(b) Development of high-yielding lines with cool-temperature tolerance and good grain quality	Implement as in Item (2)(a). Search *japonica* germplasm with resistance to viviparity and long viability under tropical condition								
(3) Evaluation of local adaptability of promising lines									
(a) Evaluation of promising lines in the NCT and other local adaptability tests	Evaluate elite lines across sites and seasons in the NCT trials for yield and other agronomic traits, insect and disease resistance, and grain quality Strengthen monitoring activities								

DS: dry season WS: wet season

Plan of Operation in latter half for Farm Mechanization
Project Outputs: Farm machinery for small scale farmers are developed.

Items/Activities	Targets	Schedule					Responsible persons in the project	Inputs	Remarks
		2000		2001		2002			
		DS	WS	DS	WS	DS			
(1) Development of machinery for plowing, leveling, and seeding for direct-seeding rice cultivation under irrigated lowland paddy condition							Long term expert, counterparts	Technician, labor, mechanization center, test field	
(a) Development of land preparation equipment for direct-seeding	Develop equipment for plowing the portion of land adjacent to levees								
(b) Improvement of performance of hand-tractor -mounted seeder									accomplished
(c) Development of direct-seeding equipment									cancelled
(2) Development of rice harvesting machinery for small-scale farmers									
(a) Improvement of reaper models	Monitor and improve commercialized models								Extension
(b) Development of crop gathering equipment	Modify rake-type and vertical straw gathering devices								
(c) Development of small combine harvester for rice	Fabricate and improve self-propelled combine harvester model								

DS: dry season WS: wet season

Plan of Operation in latter half for Agronomy, Soils and Fertilizer, Plant Protection
Project Outputs: Cultivation techniques for labor-saving and high-yielding rice production are improved.

Items/Activities	Targets	Schedule					Responsible persons in the project	Inputs	Remarks
		2000		2001		2002			
		DS	WS	DS	WS	DS			
(1) Development of techniques for direct-seeding cultivation							Long term expert, counterparts, research assistants	Labor, fertilizer, crop service building, experimental field	
(a) Search for the ideal plant type for direct seeding	Evaluate more varieties and lines for their suitability for wet-direct seeding Determine lodging resistance and yield performance of these varieties								
(b) Improvement of land preparation for better crop establishment	Study further labor-saving land preparation and pre-germinated seed treatment for best seedling establishment								
(c) Development of direct-seeding cultivation for increased yield	Establish proper nitrogen and water management to attain high yield potential without encountering problem of lodging Study integration of land preparation, water management, and herbicide application for a comprehensive or integrated weed control								

DS: dry season WS: wet season

Items/Activities	Targets	Schedule					Responsible persons in the project	Inputs	Remarks
		2000		2001		2002			
		DS	WS	DS	WS	DS			
(2) Improvement of fertilizer application techniques for higher yielding and better quality rice							Short term expert, counterpart, research assistant	Labor, fertilizer, experimental field, crop service building, laboratory equipment	
(a) Improvement of nutrient-use efficiency	Establish optimal N content of rice plants for high yield of different modern varieties								
	Introduce the N^{15} labelled nitrogen method for the determination of nitrogen fertilizer efficiency								
(3) Improvement of techniques for disease and insect pest management							Short term expert, counterpart, research assistant	Labor, laboratory equipment	
(a) Synthesis and utilization of nationwide historical data on insect pest incidence in the development of location-specific insect pest profiles	Monitor pest using the sticky board								
(b) Development of standard techniques to determine the mechanisms of resistance of rice cultivars to rice blast disease	Conduct preliminary studies to determine the mechanisms of resistance of selected rice cultivars to blast disease								
	Define goals/targets/ methodology for the mechanism of resistance to blast								

DS: dry season WS: wet season

Plan of Operation in latter half for Rice Chemistry and Food Science
Project Outputs: Rice quality evaluation techniques are improved.

Items/Activities	Targets	Schedule					Responsible persons in the project	Inputs	Remarks
		2000		2001		2002			
		DS	WS	DS	WS	DS			
(1) Improvement of techniques for rice grain quality evaluation							Short term expert, counterpart, research assistant	Laboratory equipment	
(a) Highly efficient measurement of moisture and nutrient contents of rice grain by Near-Infrared Reflectance (NIR)	Determine rice grain properties other than moisture, amylose and protein using NIR Identify milled rice samples as authentic or adulterated using NIR spectra profiles								
(b) Establishment of criteria for predicting processing qualities of rice	Identify critical combination of rice properties necessary for the production of high quality products like *tapuy* and rice cakes								

DS: dry season WS: wet season

Plan of Operation in latter half for Farm Management and Information System
Project Outputs: Mechanized rice-based farm management models are developed.

Items/Activities	Targets	Schedule					Responsible persons in the project	Inputs	Remarks
		2000		2001		2002			
		DS	WS	DS	WS	DS			
(1) Development of models of mechanized rice-based farm management							Short term expert, counterpart		
(a) Development of farm management models for evaluating mechanized rice-based farming systems	Georeference farmers' fields for monitoring Monitor labor-use and other input-use								
(b) Development of techniques for monitoring and evaluation of rice-based farming systems using Geographic Information System (GIS) technology	Digitize map of rice areas of the Philippines desegregated by province Acquire thematic maps on slope, soil texture, soil type, rainfall, and groundwater								
(2) Development of an information system for rice and rice-based farming technologies							Short term expert, counterpart	Computer facilities	
(a) Development of farm database for better transfer of rice technology information	Convert information to HTML Write in CD-ROM Develop databases								

DS: dry season WS: wet season

ANNEX 12. Plan of Monitoring and Evaluation

Research and Development Project on High Productivity Rice Technology
Duration of Cooperation: August 1, 1997 – July 31, 2002

I. Project Structure and Activities

1. Project Design Matrix (PDM: Annex 1)

The PDM was prepared by the Japanese Implementation Study Team and the Philippine Authorities concerned the "Research and Development Project on High Productivity Rice Technology" in May 1997, and the PDM was improved by discussion between the Japanese Consultation Team and the concerned Philippine Authorities in March 1998.

Moreover, the Project Team (which consists of the Japanese experts and the Philippine counterparts in charge), and the Japanese Advisory Team reviewed the existing PDM for the purpose of revising the PDM by setting up verifiable indicators corresponding to the overall goal, purpose, and output.

Based on the revision of the existing PDM, the revised PDM as the PDM version 3 was jointly formulated by the Project Team, in consultation with the Japanese Advisory Team.

2. Plan of Operations (PO: Annex 2)

The PO is Detailed Tentative Schedule Implementation (DTSI) with supplementary notes on the project activities, responsible persons in the project, inputs and remarks for the latter half of the Project. The PO was prepared by Japanese experts and Philippine counterparts and endorsed by the Joint Coordination Committee in March 2000.

II. Monitoring and Evaluation Activities

1. Monitoring

In accordance with the monitoring schedule (III.), the Project holds regular meetings chaired by Project Manager to monitor the progress of project activities.

Sufficient data for monitoring should be provided by the responsible person for each activity. Monitoring reports should be prepared following the format "Project Achievement Chart" as shown in ANNEX 13.

2. Evaluation

In accordance with the evaluation schedule (III.), an evaluation mission will be dispatched by JICA at mid-term and termination of the Project. The Project will be evaluated by JICA mission at mid-term, and by the Joint Evaluation Team composed of the mission and the Philippine authorities concerned at termination, based on "Items of evaluation" (ANNEX 14.).

An evaluation report will be prepared, which should be signed by both (Japan and Philippine) sides.

III. Schedule of Monitoring and Evaluation (Provisional)

Time	Types of monitoring and evaluation	Conducted by	Reported by
May 1997 August 1997	Agreement on cooperation Commencement of cooperation		R/D, Minutes
For the Joint Coordination Committee			
March 1998	1st monitoring	Counterparts and JICA experts	1997 Annual Report
March 1998	Review	Japanese Consultation Team	Minutes
March 1999	2nd monitoring	Counterparts and JICA experts	1998 Annual Report
March 2000	3rd monitoring	Counterparts and JICA experts	Mid-term Review Report
March 2000	Monitoring and evaluation	Japanese Advisory Team	Minutes
March 2001	5th monitoring	Counterparts and JICA experts	Monitoring, and 2000 Annual Reports
December 2001	Terminal evaluation	Joint Evaluation Team	Minutes
July 2002	Final Review	Counterparts and JICA experts	Terminal Report
For the self-monitoring inside the project			
Sept. 1998	1st Field Day	Counterparts and JICA experts	Field Day Report
Oct. 1999	2nd Field visit and meeting	Counterparts and JICA experts	Field Visit and Meeting Report
Sept. 2000	4th monitoring, 3rd Field visit and meeting	Counterparts and JICA experts	Monitoring, and Field Visit and Meeting Reports
Sept. 2001	6th monitoring, 4th Field visit and meeting	Counterparts and JICA experts	Monitoring, and Field Visit and Meeting Reports
For the self-monitoring inside the JICA expert team			
Every month through five years	Regular expert meeting	JICA experts	Activity Report (Japanese)

IV. Criteria and Items for Monitoring and Evaluation

1. Criteria for Monitoring

   R/D, PDM and PO should be utilized for monitoring.

2. Criteria for Evaluation

   The list of criteria for evaluation is shown in ANNEX 14 "Items of Evaluation".

ANNEX 13. Project Achievement Chart

Project Outputs

Items/Activities	Targets/Indicators	Schedule*					Progress %	Distinguished Achievement	Problems and Countermeasures
		2000		2001		2002			
		I	II	I	II	I			
1. **Development of high-yielding and better quality rice varieties which are suitable for mechanization**	20 high yielding promising lines							By the end of 1999, 10 promising lines have been developed	
(1) Development of high-yielding and better quality promising lines for mechanized farming in irrigated lowland (a) Development of high-yielding and better quality lines with less shattering and lodging resistance (b) Development of high-yielding and better quality lines for direct seeding cultivation	7 promising lines with high yield and comparable grain quality with IR64						50%	PJ18, new high yielding line with less shattering and better quality. Additional several lines were identified with specific traits: 140 less shattering lines 18 donor varieties with strong culms 20 lines with anaerobic tolerance 3 donor germplasm for root lodging resistance	Short viability of japonicas will be overcome by clarification of dormancy of japonicas under tropics and acquire new donor germplasm
(2) Development of cool-temperature tolerant and high-yielding promising lines with good grain quality suitable for cool-elevated areas (a) Development of high-yielding lines with strong cool-temperature tolerance	3 promising lines with yield 10% higher yield than locally grown varieties						50%	Three lines: PJ9, PJ10 and PJ13 confirmed with strong cold tolerance, stable field resistance to blast and good quality. Additional lines with season and location specific were identified: DS:268 lines (Banaue and La Trinidad) WS: 74 lines (La Trinidad)	Location and season specific problems were more adverse than expected. To implement efficiently; a. Employ focus breeding and apply pyramiding later b. Pursue more vigorously interdisciplinary collaboration

Items/Activities	Targets/Indicators	Schedule*					Progress %	Distinguished Achievement	Problems and Countermeasures
		2000		2001		2002			
		I	II	I	II	I			
(b) Development of high-yielding lines with cool-temperature tolerance and good grain quality (3) Evaluation of local adaptability of promising lines (a) Evaluation of promising lines in the NCT and other local adaptability tests	Promising lines in the multi-location trials						50%	**Irrigated Lowland** 5 elite lines, PJ3-5, PJ(T)4, PJ7, PJ17, PJ18 and PJ(G)6 in the NCT. PJ3-1 and PJ(T)4 in INGER **Cool elevated** PJ2, in 16 sites for variety promotion Two new entries in the NCT **Additional location tests** Ilocos Norte –8 entries Negros – 9 Agusan del Norte– 8	
2. Development of farm machinery for small-scale rice farmers (1) Development of machinery for plowing, leveling, and seeding for direct-seeding rice cultivation under irrigated lowland paddy condition a) Development of land preparation equipment for direct-seeding	Develop equipment for plowing the portion of land adjacent to levees						50%	Existing designs surveyed and evaluated. First prototype designed fabricated and field tested.	

Items/Activities	Targets/Indicators	Schedule*					Progress %	Distinguished Achievement	Problems and Countermeasures
		2000		2001		2002			
		I	II	I	II	I			
(b) Improvement of performance of hand-tractor -mounted seeder (c) Development of direct-seeding equipment	(accomplished)						100%	The design was perfected and initially mass fabricated for farmers' evaluation	
(2) Development of rice harvesting machinery for small-scale farmers									
(a) Improvement of reaper models	Monitoring and improvement of commercialized models						80%	The design was further improved to make the machine easier to operate and adapt it to a wide range of field and crop conditions	
(b) Development of crop gathering equipment	Modify and test rake-type and vertical straw gathering devices						50%	Two design options were fabricated and field-tested. Data gathered and experiences gained showed the potentials of both designs for further testing and improvement	
(c) Development of small combine harvester for rice	Fabrication and improvement of self-propelled combine harvester model						50%	Improved design using rotary cutting mechanism under fabrication	

Items/Activities	Targets/Indicators	Schedule*					Progress %	Distinguished Achievement	Problems and Countermeasures
		2000		2001		2002			
		I	II	I	II	I			
3. Improvement of cultivation techniques for labor-saving and high-yielding rice production									
(1) Development of techniques for direct-seeding cultivation									
(a) Search for the ideal plant type for direct seeding	Evaluated at least 5 varieties and lines suitable for direct seeding cultivation						60%	PSB Rc 74 & PSB Rc34 are lodging resistant and gave high yield when direct seeded IR62141 have high seedling emergence under anaerobic condition and is a potential variety for direct seeding.	
(b) Improvement of land preparation for better crop establishment	Saved labor in land preparation by 5% from existing land preparation						50%	Modified land preparation (1 plowing, 1 harrowing and rough leveling)	Establishment is difficult during the wet season because of the occurrence of storms or continuous rainfall.
	Stable seedling establishment						60%	One day and two-days incubation gave better seedling establishment	
	Determined the best seeding rates and methods for best establishment						75%	In DS, sowing is done right after land leveling and in WS, sowing is done 1 to 3 days after land leveling. Seeding rate of 40-50 kg/ha In DS and 50-60kg/ha in WS is recommended Broadcast seeding or drumseeding can be employed The field should be drained right before sowing or 1 day after sowing	

Items/Activities	Targets/Indicators	Schedule*					Progress %	Distinguished Achievement	Problems and Countermeasures
		2000		2001		2002			
		I	II	I	II	I			
(c) Development of direct-seeding cultivation for increased yield	Determined the best nitrogen rate and time of application that gave the high yield and high lodging resistance						60%	Nitrogen rate of 120 kg/ha applied at 4 splits (60kg at 10 DAS, 20kg at 24 DAS, 20 kg at 20 DBH, and 20 kg at 10 DBH) increased yield by 9% in DS To avoid lodging, the leaf color values should not exceed 36 at 34 days after sowing and LCV of 34 at 46 to 62 days after sowing Deep water (5 to 7 cm) introduced at 8 days after seeding can fairly control the weeds without affecting seedling establishment Four herbicides were found to be effective in controlling the weeds: Pretilachlor, Bispyribac Na, Priminobac-methyl + Bensulfuron-methyl+mefenacet and Butachlor+propanil Combined use of Pretilachlor and Bispyribac Na was more effective in controlling weeds	
	Determined the proper water management for direct seeded rice						40%		
	Developed a comprehensive weed control using water management and herbicides						50%		

Items/Activities	Targets/Indicators	Schedule*					Progress %	Distinguished Achievement	Problems and Countermeasures
		2000		2001		2002			
		I	II	I	II	I			
(2) Improvement of fertilizer application techniques for higher yielding and better quality rice	Establish optimal N content of rice plants for high yield of early and medium maturing varieties						20%	Estimate nondestructive dry matter yield from agronomic parameters (plant height x tiller number) for one variety Estimate of nitrogen content from SPAD values x plant height x tiller number for one variety	
(a) Improvement of nutrient-use efficiency	Introduce the N^{15} labelled nitrogen method for the determination of nitrogen fertilizer efficiency						10%	Established methodology for N^{15} analysis Applied N^{15} labelled fertilizer at different growth stages of direct seeded rice	
(3) Improvement of techniques for disease and insect pest management									
(a) Synthesis and utilization of nationwide historical data on insect pest incidence in the development of location-specific insect pest profiles	Conduct monitoring of insect pest incidence at selected location sites in Mindanao, Visayas and Luzon						40%	Determine seasonal fluctuations of major insect pests of rice in the different identified locations	Has just started this year and identified locations so far is limited due to lack of manpower and facilities. No location yet identified in the Visayas island.

Items/Activities	Targets/Indicators	Schedule*					Progress %	Distinguished Achievement	Problems and Countermeasures
		2000		2001		2002			
		I	II	I	II	I			
(b) Development of standard techniques to determine the mechanisms of resistance of rice cultivars to rice blast disease	Conduct preliminary studies to determine the mechanisms of resistance of selected rice cultivars to blast diseases Mechanisms of risistance to blast disease determined						70%	Rice varieties resistant to blast were verified through natural and artificial inoculation. Reactions compared to susceptible checks. Leaf clearing technique and microscopic examination of leaf tissues revealed difference in spore germination between susceptible and resistant varieties Faster determination of mechanism of resistance to blast disease.	Project has just started last July 1999. Most of the methodologies found in literatures require ultrasturctural observations which we could not do at PhilRice due to lack of facilities and chemical supplies. Do only methodologies that do not require ultrasturctural observations at PhilRice. Only simple microscopic examinations should be done.
4. Improvement of rice quality evaluation techniques (1) Improvement of techniques for rice grain quality evaluation (a) Highly efficient measurement of moisture and nutrient contents of rice grain by Near-Infrared Reflectance (NIR)	Faster rice grain quality evaluation techniques (200 samples per day)						50%	High correlation between conventional and NIR for moisture content (0.94) and protein (0.96)	Low correlation for amylose content (0.61) Request for a scanning type NIR

Items/Activities	Targets/Indicators	Schedule*					Progress %	Distinguished Achievement	Problems and Countermeasures
		2000		2001		2002			
		I	II	I	II	I			
(b) Establishment of criteria for predicting processing qualities of rice	Critical combination of rice properties necessary for production of high quality products						10%	The physico-chemical properties of several Philippine and Japanese rices were evaluated The processing suitability of Philippine and Japanese rices (waxy) for arare production was compared	Product quality of arare from Philippine glutinous rice is lower than arare from Japanese rice Slight modifications in the production process
5. Development of mechanized rice-based farm management systems									
(1) Development of models of mechanized rice-based farm management	Evaluation and impact assessment model for new technologies developed								
(a) Development of farm management models for evaluating mechanized rice-based farming systems							10%	Ex-ante impact evaluation methodology developed	
(b) Development of techniques for monitoring and evaluation of rice-based farming systems using Geographic Information System (GIS) technology							25%	Crop suitability methodology formulated Calculated cost and returns of the different major rice-based cropping patterns in the Philippines	Delays in georeferencing of farmers' fields -- quick action on requested GPS instrument Delays in replicating the rice-corn-mungbean suitability analysis in other provinces -- establish agromet stations in other provinces

Items/Activities	Targets/Indicators	Schedule* 2000 I	2000 II	2001 I	2001 II	2002 I	Progress %	Distinguished Achievement	Problems and Countermeasures
(2) Development of an information system for rice and rice-based farming technologies									
(a) Development of farm database foe better transfer of rice technology information									
(a-1) Infrastructure	1. Local area network Installed	—						Connected 5 buildings and 200 computers inside	Internet gateway still slow - (Microware & VAST) –
	2. Systems Development		—	—			85%	PhilRice Campus Installed	
	3. Improve LAN of Branch Stations			—	—			Installed e-mail system of all branch stations	
(a-2) Database Content	1. Convert technology information into HTML	—						Launching of PhilRice Website	Lack of software and programs - (Proposed project to BAR)
	2. Create Website	—					85%	(http://www.philrice.net)	
	3. Launch and update Website	—	—	—	—	→			
	1. gather photos/graphics	—	—	—	—	→	60%	Visual resources in CD	
	2. Write in CD and update								
(a-3) Database Program	1. Create database structure	—						Database structure organized by short term expert	PhilRice gateway to internet still slow - (install microwave and VSAT)
	2. Input variety database		—						
	3. Create link databases			—			10%		
	4. Input all technology					—			
	5. Web-enable the database					—			
(a-4) Manpower Training	1. Counterpart trained in Japan		—				–	Short-term JICA expert arrives	Needs browser to easy search - (used shareware browser)

ANNEX 14. Item of Evaluation

Items of Evaluation		Indicators
1. Effectiveness	1-1. Achievement of Project purpose	1. Rice yield and quality in both irrigated lowlands and cool-elevated areas 2. Rice cultivation labor using developed agricultural machinery
	1-2. Contribution of outputs to achieve project purpose	1. Number of high-yielding rice promising lines 2. Number of prototype machines 3. Amount of labor saved using rice cultivation techniques developed 4. Number of samples analyzed per day 5. A model for evaluation and impact assessment of new technologies developed and a database 6. Constraint to achievement of project purpose
	1-3. Contribution of activities to achieve output	1. Number of technical reports 2. Number of research activities, volume of information * Detail indicators are shown in P.O. 3. Constraint to achievement of output
2. Efficiency	2-1. Timing, quality and quantity of inputs to produce outputs	1. Input for planned activities is provided as planned 2. Sufficient quality and quantity of input is provided to produce output * Input from Japanese side: experts, C/P training, equipment, and supplement if project management cost * Input from Philippine side: C/P, land, building, and local running costs 3. A sufficient output produced as planned
	2-2. Linkages with other types of cooperation	1. Grant aid program 2. Number of collaborative research activities with other relevant institutions
3. Impact	3-1. Direct impacts on project purpose level	1. Number of rice promising lines to be developed 2. Amount of labor to be saved using rice cultivation techniques 3. Demand of technical assistance from small-scale farmers
	3-2. Indirect impacts on overall goal level	1. Developed rice varieties and rice production technologies are disseminated, through various extension channel 2. Extension workers and rice farmers surrounding the Project adopted rice production technologies developed
4. Rationale	4-1. Rationale of overall goal	1. Priority of rice production on the National Development Plan and Mid-term Development Plan, as well as other relevant plans 2. Needs of small-scale rice farmers on labor-saving rice production
	4-2. Rationale of project purpose	1. Relations between project purpose and overall goal 2. Needs/interests of small-scale rice farmers
	4-3. Rationale of project design	1. Relations among overall goal, project purpose, output, activities and input described in PDM
5. Sustainability	5-1. Institutional aspects	1. Research function on rice production is maintained / strengthened 2. Organization of PhilRice is maintained / strengthened 3. Project counterparts settle into PhilRice and continue to work for research programs regarding rice technology 4. Maintenance system of facilities and equipment is established and works well
	5-2. Financial aspects,	1. A sufficient budget is allocated to continue PhilRice's activities 2. An additional source of research funding (such as the sales of seeds and agricultural processed goods) is increased.
	5-3. Technical aspects	1. Research capabilities of PhilRice staff are improved 2. Promising rice lines are further developed as varieties in the Philippines 3. Research activities on rice production are further activated by the Philippine initiative 4. Promising rice lines and farm machinery to be developed are increased