THE JICA PROJECT-TYPE TECHNICAL COOPERATION FOR
THE PHILIPPINE RICE RESEARCH INSTITUTE
(August 1992 - July 1997)

REVIEW OF THE PROGRESS FOR THE PAST FOUR YEARS

Presented during the Fifth Meeting of the
Joint Committee for the Implementation of the Project
9:00 a.m., 23 October 1996
DA-NAFC Conference Room

Department of Agriculture
PHILIPPINE RICE RESEARCH INSTITUTE
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I. INTRODUCTION

1. The Philippine Rice Research Institute

The Philippine Rice Research Institute (PhilRice) was created through Executive Order No. 1061 on November 5, 1985, and subsequently strengthened by an amendment through Executive Order No. 60 on November 7, 1986. PhilRice is a government corporation attached to the Department of Agriculture (DA), with the following basic functions: (1) to plan, undertake, coordinate and fund the national research and development (R&D) program for rice and rice-based farming systems; (2) to coordinate the national network of rice R&D stations in the different agro-ecological regions of the country; (3) to verify, package, and transfer economically viable and socially acceptable rice and rice-based technologies; (4) to provide timely information for policy formulation that will stimulate rice production, marketing, and consumption; and (5) to organize, train and develop the rice industry's manpower.

Today, PhilRice coordinates and unifies the rice research and development activities of more than 60 agencies working on rice nationwide. This includes DA experiment stations, state colleges and universities which are strategically located in the country. Thus, the institute is a vital force in achieving and sustaining the country's goal of rice self-sufficiency and in promoting greater access of farmers to agricultural technology.

2. The JICA Grant Aid for PhilRice

In June 1988 the Philippine Government requested a grant aid from the Government of Japan, through the Japan International Cooperation Agency (JICA), to provide the facilities and equipment needed to support the R&D activities of PhilRice. After a year of negotiation and planning, the request was approved on December 21, 1989. The fully-equipped research complex of the PhilRice Central Experiment Station in Maligaya, Muñoz, Nueva Ecija was turned over to PhilRice on March 15, 1991. Indeed, the grant has significantly strengthened the R&D capabilities of PhilRice, and this is considered a lasting legacy of Japan to the Filipino farmers.

3. The Technical Cooperation Project

In support of the mandate of PhilRice and for a fuller utilization of the grant aid project, a second JICA assistance in the form of a Project-type Technical Cooperation was proposed in June 1989 and approved on March 18, 1992. Started in August 1992, the five-year cooperation is designed to promote R&D activities on rice technology at PhilRice and, thus, contribute to the improvement of rice technology in the Philippines.

II. THE JOINT COMMITTEE FOR THE IMPLEMENTATION OF THE PROJECT

The technical cooperation project has three components, namely:

a. dispatch of long-term and short-term Japanese experts who will collaborate with their Filipino counterparts on specific fields related to the program thrusts of PhilRice;

b. training of Filipino scientists and technicians in Japan on specific scientific fields as well as in the utilization and maintenance of the various research equipment to be provided by JICA; and

c. provision of equipment and materials needed by the Japanese experts and their Filipino counterparts in the pursuit of their research and development activities.

The technical cooperation, with these three components, has been smoothly implemented in good condition towards its successful termination on July 31, 1997. Details of the output will be described later.

1. Functions

The project is governed by a Joint Committee to oversee the effective and successful implementation of the project. Specifically, the Joint Committee is tasked to:

a. formulate the Annual Work Plan of the Project in line with the Tentative Schedule of Implementation (TSI) to be prepared under the ramework of the R/D;

b. review the overall progress of the technical cooperation project as well as the achievement of the above mentioned Annual Work Plan; and

c. review and exchange ideas on major issues arising from or in connection with the technical cooperation program.

2. Composition

The Committee is chaired by the Secretary of the Department of Agriculture. Members include concerned officials of the Department of Agriculture, JICA, the National Economic and Development Authority, the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD), and UP Los Baños.

POSITION	NAME
Chairman Secretary, Department of Agriculture (DA)	Hon. Salvador H. Escudero III
Vice Chairman Undersecretary for Research, Training, and Field Operations, DA	Hon. Domingo F. Panganiban
Members:	
1. Executive Director, PhilRice	Dr. Santiago R. Obien
2. Deputy Director, PhilRice	Mr. Ronilo A. Beronio
3. Experts, JICA - Team Leader - Coordinator - Plant Breeding - Soil Fertility	 Dr. Hitoshi Takahashi Mr. Masaru Imamura Mr. Toshio Ito Mr. Teruhisa Motomatsu
4. Resident Representative of JICA, Philippine Office	Hon. Hiroshi Goto
5. Director, DA-Bureau of Agricultural Research	Dr. Jeminiano R. Escaño
6. Chief, Research and Project Development Division, Planning and Monitoring Service, DA	Mr. Edgar M. Sandalo
7. Director, Agriculture Staff, National Economic and Development Authority (NEDA)	Dir. Narcisa Umali
8. Director, Project Monitoring Staff, NEDA	Dir. Rolando G. Tungpalan
9. Deputy Director for Research, Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD)	Dr. Beatriz P. del Rosario
10 Dean, College of Agriculture University of the Philippines Los Baños	Dr. Cecilio R. Arboleda
11 Official(s) of the Embassy of Japan	Hon. Katsuhiko Yamauchi First Secretary
12 Personnel concerned to be dispatched by JICA, if necessary.	

3. **Meeting**

a. February 1, 1993: The first meeting was held to discuss the Tentative Schedule of Implementation (Itemized) and annual activity plan for FY 1993 at DA-NAFC Conference Room with the participation of the JICA Consultation Survey Team.

b. January 18, 1994: The second meeting was held to discuss the 1993 annual report and 1994 workplan at DA-NAFC Conference Room.

c. April 5, 1995: The third meeting was held to discuss the 1994 annual report and 1995 workplan at DA-OSEC Conference Room with the participation of the JICA Technical Guidance Team.

d. May 17, 1996: The fourth meeting was held to discuss the 1995 annual report and 1996 workplan at PhilRice Training Room.

e. October 23, 1996: The fifth meeting is held to review the entire JICA-PhilRice Project at DA-NAFC Conference Room with the participation of the JICA Terminal Evaluation Team.

III. PROGRESS REPORT OF TSI

Tentative Schedule Of Implementation (Itemized) [a]

Field/Item	1992 Aug	1993	1994	1995	1996	1997 July	Remarks
1. Research and Training Plan							
1) Research Planning							
a. Evaluation of present research work	XX	XXXX	XXXX	XXXX	XXX		Analysis was conducted on the present situation and problems of rice production, labor productivity in rice production, relationship between rice yield and meteorological conditions, and future prospects of agro-economical situation of rice production in the Philippines.
b. Emphasis of research subjects				XXXX	XXX		High productivity in rice technology was identified as the most important future research subject, and a proposal for a second project-type technical cooperation was arranged on this basis. Moreover, a recommendation was made on the creation of the research subject and research system for a research planning of PhilRice.
2) Effective Training Design							
a. Effective application of extension materials		X	.....	.....			Video production training course was conducted to improve knowledge and skills on the utilization of video for technology transfer.
b. Efficient transfer of newly developed technology			.....	X	.....	.....	PhilRice-JICA Collaborative Training Program on Rice Production and Promotion for the National Rice R&D Network was implemented.

[a] _____ Master Plan XXX Implementation (as of October 1996) ..... : As needed

Field/Item	1992 Aug	1993	1994	1995	1996	1997 July	Remarks
2. Varietal Improvement							
1) Development of high yielding varieties with excellent grain quality and resistant to pests and diseases for specific agro-climatic conditions in the country							
a. Selection of mother plants and evaluation of crosses	X	XXXX	XXXX	XXXX	XXX		Growth performance was determined at every dry (DS) and wet seasons (WS) on the *Japonica* and *Indica* germplasm transplanted at 3-4 staggered times. Data have been collected and accumulated to facilitate hybridization plans.
b. Hybridization		XXXX	XXXX	XXXX	XXX		A total of 800 or more crosses was made in 8 crop seasons from 1993-1996.
c. F1 raising test		XX	XXXX	XXXX	XXX		A total of ca. 600 F_1 crosses was raised in the 8 crop seasons for verification. Half of them were reverted to further recurrent crossing.
d. Individual and pedigree selection		X	XXXX	XXXX	XXX		Among 100-200 hybrid populations of F_{2-8}, 24 were subjected to single-plant selection, while the rest was generation advanced, eliminating some undesirable traits, in each crop season.
e. Performance test				XXXX	XXX		15 elite lines were initially identified for the 1996 DS test, while in the 1996 WS it was increased to 50 entries. A promising line, PJ3 (Hinohikari/IR64) was developed with high yield performance of 9 t/ha in the 1996 DS, 19% advantage over IR64. It is followed by other promising lines such as PR26673-6A, PR26673-6B and PR26710-B3-20.

Field/Item	1992 Aug	1993	1994	1995	1996	1997 July	Remarks
f. Development of parental lines with tungro resistance		XXXX	XXXX	XXXX	XXX		Tungro-resistant germplasm such as IR22(m)-1, ARC11554, Utri Merah, etc. were used as donors to the leading varieties, generating ca. 15 crosses each in DS and WS at PhilRice Maligaya. On-site breeding: Hybrid populations of 10-20 crosses were subjected to single-plant selection. Selected plants of 50-300 were raised in line-rows for plant and line selection both at tungro-hot spots in Cotabato and Isabela. • Promising resistant lines selected were: PJ(T)4=IR22(m)-1/PSB Rc4 PJ(T)5=IR22(m)-1/PR223399-6(1) which have been tested on-site for their performance since 1996 WS.
2) Development of rice cultivars for cool elevated areas which are high yielding, with excellent grain quality, resistant to shattering, and responsive to low levels of fertilizer							
a. Hybridization by means of recurrent crossing		XXXX	XXXX	XXXX	XXX		Cold-tolerant germplasms of Japanese and Chinese varieties, etc. were used as donors at PhilRice Maligaya generating 10-20 crosses and succeeding F_1s in every crop season.
b. Individual and pedigree selection		XX	XXXX	XXXX	XXX		On-site breeding: Plant/pedigree selections were done on 10-20 hybrid populations and succeeding 100-300 lines at cool-elevated sites in Benguet and Ifugao.

Field/Item	1992 Aug	1993	1994	1995	1996	1997 July	Remarks
c. Performance test				XXXX	XXX		15 elite lines were tested for their performance in 1995 WS, and were trimmed down to 6 in the following DS. A highly cold-tolerant promising line, PJ2, was selected from IR61728-4B-2-1, which has been tested in the multi-location test of the NCT I since 1996 DS.
3. Soils and Fertilizers							
1) Development of fertilizer management technology for various agro-climatic conditions in rice growing areas.							
a. Analysis of past data in main rice production areas.	X	XXXX	XXXX	XX			Data on rice production collected from main rice production areas were analyzed. Central Luzon has the highest total rice production area. Northern and Southern Mindanao have the potential to become the major rice production areas in the future.
b. Classification of the nitrogen uptake patterns of rice plants at different fertilizer levels.	X	XXXX	XXXX	XXXX	XXX		Desirable nitrogen uptake patterns for each yield level were determined. Nitrogen uptake requirement for grain yield of 7 t/ha was 100-110 kg/ha during the dry season.
c. Determination of the nitrogen fertility of soils by biological method.	X	XXXX	XXXX	XXXX	XXX		Nitrogen fertility of soils collected from rice growing areas around the country were determined. Nitrogen mineralization of fresh soils was determined, and their suitability to practical field fertilization use was evaluated.

Field/Item	1992 Aug	1993	1994	1995	1996	1997 July	Remarks
d. Development of simple method of determining the nitrogen fertility of soils.		XX	XXXX	XXXX	XXX		The amount of available N, estimated using the chemical method (pH 7.0 phosphate buffer solution), showed a positive relationship with mineralizable N determined using the biological method.
e. Development of nitrogen fertilization technology			XX	XXXX	XXX		The highest grain yield obtained during the dry season was 8.4 t/ha. During the wet season, highest grain yield was 4.6 t/ha. Analysis of nitrogen fertilizer uptake efficiency and grain production efficiency of N was made in order to correlate with increase in grain yield.
2) Establishment of models that will predict responses of rice growth with different levels of fertilizer application							
a. Analysis of the meteorological data in main rice production areas.		XXXX	XXXX	XX			Meteorological data from 21 locations were analyzed. Yield levels in the different regions were explained in terms of the rate of solar radiation, differences between maximum and minimum temperatures and lower minimum temperature.
b. Determination of the growth parameters of rice	X	XXXX	XXXX	XXXX	XXX		Field studies for growth analysis were undertaken and data gathering for crop model establishment were carried out.
c. Establishment of crop models		X	X				The Development Stage (DVS) model was established. The new model to predict leaf area index (LAI) and dry matter accumulation (DMA) under varying nitrogen (N) applications was developed.

Field/Item	1992 Aug	1993	1994	1995	1996	1997 July	Remarks
4. Agronomy, Plant Protection, Agricultural Machinery, and Other Fields (Short-term experts dispatched)							
1) Improvement of cropping patterns			X		X		Using the Estimation of Nitrogen Mineralization in Soils (ENMS), and Nitrogen Fertilizer Application (NA) and Tillage Depth Recommendation System (TDRS) models, an optimal nitrogen fertilizer management recommendation was established.
2) Integrated insect pest management		X		X	X		Procedures on IPM research were presented. For basic research on IPM, a methodology to study an ovicidal effect of rice cultivars on eggs of white backed planthopper, a guideline for the study of rice insect pest population dynamics, and metal screen and chemicals for effective golden snail management were introduced.
3) Farm mechanization		X	X X	X	X		Prototypes of Maligaya reaper and paddy seeder were developed.
4) Other fields			XX	X X			For sensory and physico-chemical evaluation of grain quality, rapid and more accurate methods were introduced. New methods in rice anther culture with scheme on handling materials were introduced. Mathematical programming software was intoduced for farm management research.

IV. REVIEW OF THE PROGRESS OF THE TECHNICAL COOPERATION

(PAST FOUR YEARS)

1. Dispatch of Japanese Experts

Field	Name	1992 Aug	1993	1994	1995	1996 Oct.	Total M/M [a]
1. Long-term Experts							
1) Team Leader	Dr. H. Takahashi	4.7	12.0	12.0	12.0	10.0	50.7
2) Coordinator	Mr. M. Imamura	5.0	12.0	12.0	12.0	10.0	51.0
3) Varietal Improvement	Mr. S. Mizuno	3.7	12.0	9.3			
	Mr. T. Ito			4.3	12.0	10.0	51.3
4) Soils and Fertilizers	Dr. K. Yoshida	2.6	12.0	12.0	1.4		
	Mr. T. Motomatsu				11.6	10.0	49.6
Sub-Total	6	16.0	48.0	49.6	49.0	40.0	202.6
2. Short-term Experts							
1) Training & Evaluation	Mr. M. Yoshida		0.7				
	Mr. K. Koyama					2.0	2.7
2) Crop Modelling	Dr. M. Yajima			1.4 0.9		0.3	2.6
4) Bio-technology	Dr. M. Aikawa			2.7			2.7
5) Agronomy	Dr. H. Sumida			1.6		1.0	2.6
6) Integrated Pest	Dr. H. Kanno		2.0				
Management	Dr. T. Wada				1.8		
	Mr. M. Tsurumachi					1.2	5.0
7) Farm Machinery	Engr. H.Takahashi		1.5				
	Engr. T. Togashi			1.5		1.5	
	Engr.N.Sawamura			1.7	1.3		7.5
8) Grain Quality	Mr. T. Ogawa			1.5			
	Dr. K. Ohtsubo				1.6		3.1
9) Farm Management	Dr. T. Nanseki				0.9		
	Mr. J. Saito				2.0		2.9
10) Installation	Mr. M. Takagi			0.2			
	Mr. Y. Ohdaira			0.2			0.4
Sub-Total	17	0.0	4.2	11.7	7.6	6.0	29.5
TOTAL	23.0	16.0	52.2	61.3	56.6	46.0	232.1

[a] M/M shows Man/Month

2. Training of Philippine Personnel in Japan

Field	Name/Position	Training Period	Affiliation/Destination
1. FY 1992			
1) Administration (Director)	Dr. Santiago R. OBIEN (Director)	1993.03.29 - 1993.04.15	JICA Head Quarters, National Agriculture Research Center (NARC), etc.
2) Agricultural Machinery	Engr. Manuel Jose C. REGALADO (Sr. Sci. Research Specialist)	1993.02.08 - 1993.10.22	Tsukuba International Agricultural Training Center, JICA (TIATC)
2. FY 1993			
1) Plant Breeding	Ms. Emily R. CORPUZ (Sci. Research Specialist)	1993.05.06 - 1993.11.13	National Agriculture Research Center (NARC)
2) Soils and Fertilizers	Mr. Constancio A. ASIS JR. (Sci. Research Specialist)	1993.05.06 - 1993.12.23	National Agriculture Research Center (NARC)
3) Entomology	Mr. Edgar M. Libetario (Sr. Sci. Research Specialist)	1993.05.13 - 1993.11.13	Kyushu National Agricultural Experiment Station in Kumamoto
4) Grain Quality Evaluation	Ms. Nanette V. ZULUETA (Sci. Research Specialist)	1993.05.26 - 1993.12.03	National Food Research Institute (NFRI)
5) Rice Cultivation Technology	Mr. Fernando D. GARCIA (Sci. Research Specialist)	1994.01.31 - 1994.11.18	Tsukuba International Agricultural Training Center, JICA (TIATC)

Field	Name/Position	Training Period	Affiliation/Destination
3. FY 1994			
1) Information Network	Ms. Virginia F. RECTA (Sr. Sci. Research Specialist)	1994.04.13 - 1994.08.27	Okinawa I nternational Center (OIC), National Agriculture Research Center (NARC), etc.
2) Agricultural Technology Extension	Ms. Zyla C. MACASIEB (Supvg. Sci Res. Specialist)	1994.05.10 - 1994.07.31	Tokyo International Center (TIC)
3) Plant Pathology	Ms. Ma. Rufelie R. SOTES (Sci. Research Specialist)	1994.05.07 - 1994.10.29	National Agriculture Research Center (NARC)
4) Farm Management	Dr. Sergio R. FRANCISCO (Supvg. Sci Res. Specialist)	1994.07.05 - 1995.12.15	National Agriculture Research Center (NARC)
5) Agricultural Machinery Testing and Evaluation	Engr. Artemio B. VASALLO (Sr. Sci. Research Specialist)	1995.02.27 - 1995.06.23	Tsukuba International Agricultural Training Center, JICA (TIATC)
4. FY 1995			
1) Plant Breeding	Mr. John C. DE LEON (Sci. Res. Specialist)	1995.05.16 ~ 1995.11.24	National Agriculture Research Center (NARC)
2) Administration of Institute	Mr. Ronilo A. BERONIO (Deputy Director)	1995.05.24 ~ 1995.06.13	JICA, MAFF, NARC, etc.
3) Plant Physiology	Dr. Pompe C. STA. CRUZ (Chief Sci. Res. Specialist)	1995.06.01 ~ 1995.10.01	National Institute of Agro-Environmental Sciences (NIAES)
4) Audio-visual Education	Ms. Karen E.T. BARROGA (Sr. Sci. Res. Specialist)	1995.08.22 ~ 1995.09.23	Okinawa International Center, JICA (OIC)

Field	Name/Position	Training Period	Affiliation/Destination
5) Agricultural Machinery	Engr. Ricardo F. ORGE (Sr. Sci. Res. Specialist)	1996.02.26 ~ 1996.11.15	Tsukuba International Agricultural Training Center, JICA (TIATC)
5. FY 1996			
1) Grain Quality Evaluation	Mr. James A. PATINDOL (Sr. Sci. Res. Specialist)	1996.05.13 - 1996.10.19	National Food Research Institute (NFRI)
2) Biotechnology	Ms. Ma. Gina V. MARAMARA (Sci. Res. Specialist)	1996.05.13 - 1996.10.05	National Institute of Agrobiological Resources (NIAR)
3) Soils and Fertilizers	Ms. Jocelyn B. BAJITA (Sci. Res. Specialist)	1996.06.03 - 1996.08.24	Obihiro, Hokkaido International Center
4) Plant Protection	Ms. Lina B. FLOR (Sci. Res. Specialist)	1996.06.03 - 1996.09.20	Faculty of Agriculture, Kobe University
5) Farm Management	Mr. Rogelio D. COSIO (Sci. Res. Specialist)	1996.07.15 - 1996.12.15	National Agriculture Research Center (NARC)

3. Provision of Machinery and Equipment

(Pesos)

Year	Purchased in the Philippines	Purchased in Japan	Brought by Experts	Total
FY 1992	3,228,714	5,735,000	632,785	9,596,499
FY 1993	3,695,904	9,825,400	459,559	13,980,863
FY 1994	6,439,923	8,121,500	817,581	15,379,004
FY 1995	5,274,592	4,392,000	722,315	10,388,907
FY 1996 [a]	1,717,000	6,910,000	750,000	9,377,000
TOTAL[a]	20,356,133	34,983,900	3,382,240	58,722,273

[a] Estimate

4. Highlights of the Accomplishment on the TSI

List of Highlights

4.1 Research Planning

1. Regional trends in rice yield increase (1993)
2. Rice yield and meteorological conditions (1994)
3. Labor productivity in rice production (1994)
4. Proposal of R&D on high productivity in rice technology (1995)
5. Recommendation on research planning (1996)

4.2 Varietal Improvement

1. Selection of mother plants and evaluation of crosses (1993)
2. Effect of backcrossing on improving hybrid sterility in *Japonica/Indica* crosses (1994)
3. Selection of elite breeding lines (1994)
4. Selection of promising cold tolerant lines suited to the Cordillera area (1994)
5. Selection of a 9-tonner line (1995)
6. Breeding of a new promising line for the NCT-I (1995)
7. An elite line for cool-elevated areas (1995)
8. Selection of parental donors from *Japonica* varieties for irrigated lowland (1996)
9. Evaluation of introduced *Japonica* varieties in the cool elevated areas (1996)
10. A highly cold-tolerant promising line, PR26670-PJ2, for cool elevated areas (1996)
11. A high yielding promising line, PR26679-PJ3-1, for irrigated lowland (1996)

4.3 Soils and Fertilizers

1. Rice yield and nitrogen fertilization in the Philippines (1993)
2. Nitrogen fertility measurement (1993)
3. Simplified method of nitrogen fertility (1993)
4. Characteristics of rice growth (1993)
5. Rice yield and nitrogen fertilization in the Philippines (1994)
6. Nitrogen fertility measurement (1994)
7. Local difference in climatic condition (1994)
8. Growth characteristics of rice (1994)
9. Modelling development process of the rice plant (1994)
10. Growth, yield and nitrogen of transplanted rice (1995)
11. Assessing soil nitrogen fertility by biological and chemical methods (1995)
12. Improvement of nitrogen fertilization (1996)

4.4 Improvement of Cropping Pattern

1. Recommendation on high yielding rice cultivation on rice-based cropping system (1994)
2. Recommendation on high yielding rice cultivation on rice-based cropping systems (1995)

4.5 Integrated Pest Management

1. Procedures on IPM research presented (1993)
2. Golden apple snail ecology on direct-seeded rice (1995)

4.6 Farm Mechanization

1. Development of Maligaya rice reaper (1993)
2. Development of Maligaya rice reaper (1994)
3. Development of power tiller-mounted direct seeder (1994)
4. Development of Maligaya rice reaper (1995)
5. Development of power tiller-mounted direct seeder (1995)

4.7 Grain Quality Evaluation

1. Sensory and physicochemical evaluation of grain quality (1994)

4.8 Bio-technology

1. Anther culture of rice improvement (1994)

4.9 Farm Management

1. Design and development of mathematical programming for farm management model analysis (1995)

4.10 Training and Extension

1. Training course in video production (1993)
2. Rice production and promotion training program (1995)

4.1 Research Planning

4.1.1 Regional trends in rice yield increase (1993)

As a background to rice research and development, the regional trends in rice yield increase was analyzed using the Regional Rice Statistics from 1970 to 1990.

4.1.2 Rice yield and meteorological conditions (1994)

Rice yield is high in the region where maximum temperature is high, minimum temperature is low, and diurnal range is large. High amount of rainfall generally results in high yield in the rainfed lowland areas where water is deficient.

4.1.3 Labor productivity in rice production (1994)

It was pointed out that the paddy yield per hectare was relatively low, and the farm mechanization level was low compared to those of neighboring countries. In addition, the labor utilization (man-hrs/ha) in rice production is large, which resulted in low labor productivity. From these background, the necessity of research and development strategies targeting a high-yielding mechanized rice production is suggested for the future.

4.1.4 Proposal of R&D on high productivity in rice technology (1995)

From the analysis of the present situation of paddy yield per hectare and the farm mechanization level in rice production, it was pointed out that a focus should be made on productivity of rice technology for future research. Thus, "Research and Development Project for High Yielding and Mechanized Rice Production" was proposed as a second Project-Type Technical Cooperation with the Government of Japan, through JICA.

4.1.5 Recommendation on research planning (1996)

To support the discussion on research planning, several recommendations for the advancement of PhilRice were presented. One recommendation was made on the initial problem that will be solved through R&D, on the technology composition, and on the difference and necessity of research and development in the establishment of a technology. Another was made on the creation of a research subject, and on the research organization for the technology establishment.

Original existence of problem to be solved by R&D

The technological and social problems are being experienced by the farmer and consumer, not within the institute. PhilRice is mandated to solve the problem in the rice industry.

Composition of technology

A technology in rice production is classified into three based on its composition. These are technical element, component technology, and technology system. Each technical element is developed in each specific research field. The component technology consists of several technical elements from several specific research fields and integrated interdisciplinary approach of concerned several specific research fields. The technology system is integrated with concerned technologies also by interdisciplinary approach.

The schematic composition of technology system is illustrated in Fig. 1.

Research and Development

A research is done to know why a certain fact or phenomenon exists or to clarify an unknown mechanism of the existing fact or phenomenon. In other words, a research is to verify the law or rule of the fact or phenomenon theoretically of a specified field. On the other hand, a development is implemented to solve the technical problems. In other words, development is to establish/improve technology.

Furthermore, a research is the basis of development, or development is done based on research, that is, a technology is developed from a theory. Eventually, a technology must gain repeatability and universality.

Research subject

If a certain problem arises in rice industry that needs to be solved, a R&D is needed. To come-up with the R&D, a certain procedure is to be done in creating the subject. First, make sure that the problem approved is clear. Second, analyze the factors of the problem. Then arrange the research subjects on how to approach the problem including both subjects on research and development.

An example of the presumed problem and subject arranged are shown in Table 1.

Research system

As a basic organization, a research unit (Division) shall be of individual specific research field responsible for R&D of technical element. And a project team shall be organized for interdisciplinary approach on the problem of component technology and technology system. Figure 2 illustrates the organizational relationship of the research system

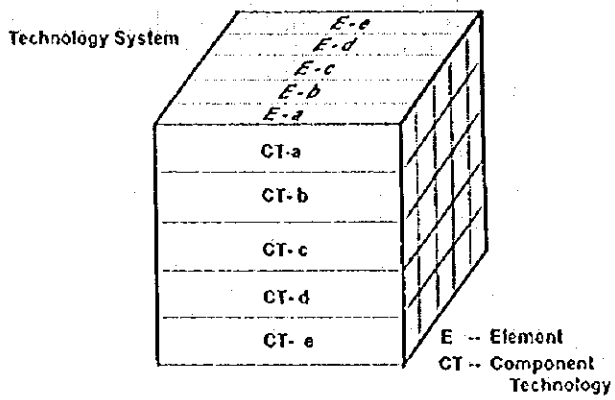


Fig. 1. Schematic Composition of Technology System

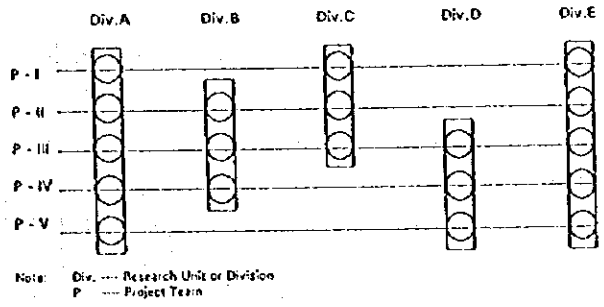


Fig. 2. Organizational Relationship between Research Unit (Division) and Project Team

Table 1. Example of presumed problem and subject arrangement.

Problem 1. Low yield because of lack of technology (low technology)

Analysis on factors for low yield: variety, crop establishment, fertilizer management

Subject 1. Development of High Yielding Technology

1.1 Varietal improvement
- 1.1.1 Search for high yielding gene source
- 1.1.2 Analysis on hereditary characteristics of high yielding gene
- 1.1.3 Development of high yielding variety

1.2 High yielding crop establishment
- 1.2.1 Ideal plant type for high yield
- 1.2.2 Structure of plant community for high yield
- 1.2.3 Raising healthy and vigorous seedling
- 1.2.4 Land preparation for high yielding crop establishment
- 1.2.5 Optimum plant density/spacing for high yield
- 1.2.6 Relationship between yield and weather condition
- 1.2.7 Water management for high yielding crop establishment
- 1.2.8 Development of high yielding crop establishment technology

1.3 Fertilizer management
- 1.3.1 Ideal nutrients uptake pattern of rice plant for high yield
- 1.3.2 Soil fertility management
- 1.3.3 Timing and rate of fertilizer application
- 1.3.4 Development of high yielding fertilizer management technology

1.4 Integration of high yielding technology
- 1.4.1 Economic analysis on the integrated factors of high yielding technology
- 1.4.2 Integration of high yielding prototype technology
- 1.4.3 Integration of high yielding technology for various soil conditions
- 1.4.4 Integration of high yielding technology for different weather conditions.

4.2 Varietal Improvement

4.2.1 Selection of mother plants and evaluation of crosses (1993)

Parental materials were selected from various genetic resources of *Indica*, *Japonica* and *Indica/Japonica* varieties. A total of 114 and 64 crosses were generated in the dry and wet seasons, respectively.

4.2.2 Effect of backcrossing on improving hybrid sterility in *Japonica/Indica* crosses (1994)

The spikelet of F_1 progenies in *Japonica/Indica* (J/I) cross was as high as expected. However, subsequent backcrossing lowered the sterility down to 32% from the initial 77%, suggesting the existence of fertility restoring genes in the Philippines leading varieties. This finding will benefit the J/I rice breeding.

4.2.3 Selection of elite breeding lines (1994)

Eleven elite lines were selected from the *Japonica/Indica* crosses for the first time in the JICA-PhilRice Collaborative Project during the 1994 wet season (WS). These elite lines will be further evaluated in the preliminary performance test during the 1995 DS.

4.2.4 Selection of promising cold-tolerant lines suited to the Cordillera area (1994)

Two promising cold-tolerant lines were selected at a breeding site in the Cordilleras during the 1994 WS. The lines, designated as "PJ 1" and "PJ 2", have growth volume enough for good yielding and high spikelet fertility against low temperature at meiosis stage of the rice plants. Other agronomic traits were also acceptable.

Seed multiplication will be done at PhilRice Maligaya for further line selection and performance tests on-site during the 1995 WS.

4.2.5 Selection of a 9-tonner line (1995)

During the 1995 dry season, performance test of 11 elite lines initially produced from the JICA-PhilRice project for irrigated lowland was conducted. A line PR26669-8 derived from a cross of Habataki/BPI Ri10 produced 9.4 t/ha, outyielding all other entries and check varieties. This indicates the high yielding potential of crosses generated from the *Japonica*/Philippine *Indica* cross. This line, however, was found less resistant to lodging and viviparity, hence, further re-selection is being done as well as being utilized as a germplasm for high yield in the subsequent seasons.

4.2.6 Breeding of a new promising line for the NCT I (1995)

An elite line, from the cross of Hinohikari/IR64, yielded 4.67 t/ha with an advantage of 27% over the check variety, IR64, which produced 3.67 t/ha in the 1995 wet season.

This line resembled variety IR64 in its appearance but was a bit taller with longer panicles and less panicle number. It was resistant to lodging. The kernel quality was excellent with translucency. The line was designated as PR26679-PJ3-1 for further evaluation in the National Cooperative Trials (NCT I).

4.2.7 An elite line for cool-elevated areas (1995)

A cold-tolerant breeding line, designated as PJ 2-B3, recorded the highest yield of 2.98 t/ha among 23 entries in the 1995 wet season at a Benguet site. It outyielded Pinidua (1.0 t/ha), the traditional cold-tolerant cultivar, as well as other highly cold-tolerant lines. This promising PJ 2 line is now included in the multi-location test of the NCT I.

4.2.8 Selection of parental donors from *Japonica* varieties for irrigated lowland (1996)

In the choice of donor parents, 108 *Japonica* germplasms were evaluated. Of these number, eight produced desirable progenies which are now in the 1996 wet season (WS) nurseries. Habataki had the most progenies with 274 followed by Hitomebore, 75, and Koshihikari, 57. The selected lines passed the laboratory screening for kernel quality.

Materials, methods, and results

A total of 108 *Japonica* germplasms has been introduced from Japan since the 1993 dry season (DS) crop. Thorough examination of these candidate parentals was done continuously to document their general characteristics. Careful selection of parents was a rule of thumb and prediction of the successful recombination was observed on the number of selected progenies of these parentals. The list of chosen *Japonica* parentals with the number of derived lines selected under irrigated lowland during the subsequent seasons is shown in Table 1.

Table 1. Chosen parentals and the number of derived lines selected for further evaluation, PhilRice Maligaya. 1996 WS.

Variety (Japonica)	Breeding Line		Yield Trial [a]	
	Single Line	Family Line	AON	PYT
1. Habataki	90	103	75	6
2. Koshihikari	0	30	27	0
3. Sasanishiki	0	34	0	10
4. Toyonishiki	0	27	0	6
5. Kiyonishiki	0	30	5	0
6. Hinohikari	4	17	0	2
7. Koganebare	4	19	6	0
8. Hitomebore	54	18	3	0

[a] AON = Advanced Observation Nursery
PYT = Preliminary Yield Trial

4.2.9 Evaluation of introduced *Japonica* varieties in the cool elevated areas (1996)

Valuable germplasms introduced from other countries proved useful in cold tolerance breeding. During the 1996 DS, of the 62 entries evaluated 8 were selected in Banaue, Ifugao and 9 in La Trinidad, Benguet, based on phenotypic acceptability and selected agronomic traits. Three varieties, namely: Chubo 8, Hexi 25, and Hexi 30 were found suitable in both sites. Further evaluation is being done to confirm the usefulness of the selected germplasms.

(1) Materials and method

Duplicate samples of 62 introduced varieties and breeding lines which had been selected for cold tolerance since 1993 were further evaluated at BSU, La Trinidad, Benguet and Banaue, Ifugao during the 1996 DS. Observations on seedling vigor, phenotypic acceptability and other agronomic traits were made as bases of selection. Table 2 shows the list of the selected materials and their origin.

Table 2. List of selected materials evaluated in the cool elevated areas, 1996 DS.

Variety	Parentage	Origin	Remarks[a]
1. Chubo 8	Silewah/4*Hokkai 241	Japan	CT
2. Aikawa	-	Japan	HY
3. Hexi 15	BL1/Yungen 135	China/Japan	CT, HY
4. Hexi 25	83-81/Koshihikari/Yun Xi 3	China/Japan	CT, HY
5. Hexi 30	Todorokiwase/Zhugen 4	China/Japan	CT, HY
6. PR27402-CR60	C57/Dian Tian	China	CT
7. PR27384-CR76	Dian Yu//KE3/IR28	China	CT
8. PR27387-CR98	Gen Dao	China	CT
9. PR27137-CR153	Dian Ji///Cheng Re//6 KeTa/ Dian Yu	China	CT, HY
10. PR27401-CR183	Dian Yu Bu/Yuziba//6 KeTai	China	CT
11. PR27396-CR192	IR54/Yi Zi Ba//Liu Ke Tai	China	CT
12. Yungen 79-19	-	Korea	CT
13. WanSan 66	-	Korea	CT

[a] CT - Cold-tolerant, HY - High Yielding

(2) Results

Among the *Japonica* entries, 9 were phenotypically acceptable in La Trinidad and only 8 in Banaue (Table 3). Seedling vigor as a measure of cold tolerance in the seedling stage recorded a scale ranging from 1-3 (extra vigorous to vigorous) and leaf color from green to dark green shade. Plant stature ranged from 59.5 to 81.5 cm while number of productive tillers, from 12 to 23.5. Three entries, namely: Chubo 8, Hexi 25, and Hexi 30 were found adaptable in both sites. Other entries were also selected based on one or more traits such as adequate growth volume, fertility and earliness. Further evaluation is being done to confirm the usefulness of the selected germplasm.

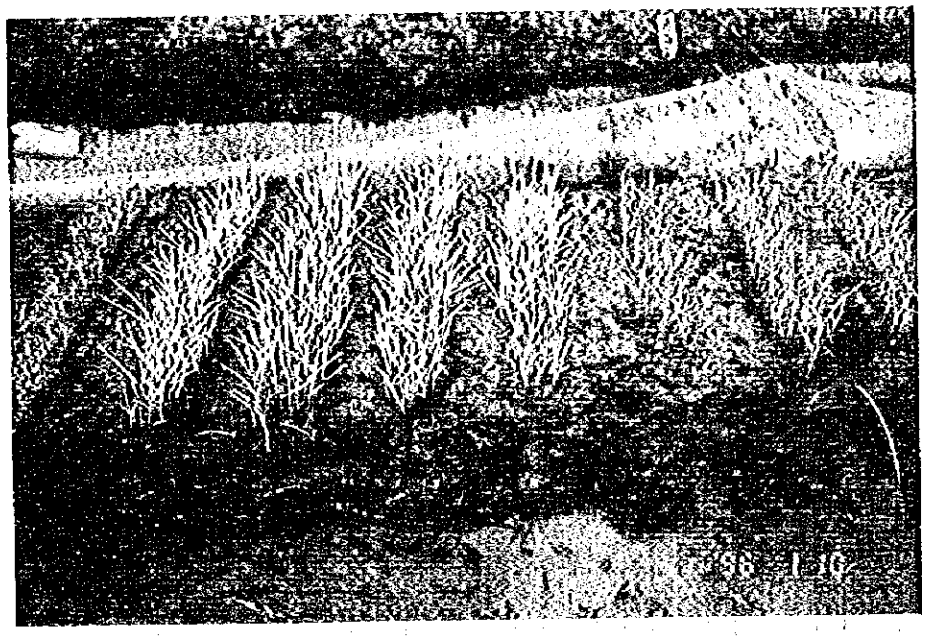


Photo 1. Reaction of Japonica parentals to seedling cold tolerance, Banaue, Ifugao, 1996 DS.

Table 3. Phenotypic acceptability and other agronomic traits of selected Japonica varieties, 1996 DS.

ENTRY	Seedling Vigor [a]	Phenotypic Acceptability [b]	Leaf Color [c]	Ht (cm) [d]	TL (no) [d]	PnL (cm) [d]	Remarks
La Trinidad, Benguet							
1. Chubo 8	2	1	PG	73.5	23.5	15.0	Adequate growth volume
2. Hexi 15	1	3	DG	80.8	16.8	15.5	Vigorous
3. Hexi 25	2	1	DG	81.5	20.3	16.3	Adequate growth volume
4. Hexi 30	2	1	DG	79.0	15.5	15.5	Adequate growth volume
5. PR27402-CR60	1	3	G	64.3	20.8	16.5	Good fertility
6. PR27384-CR76	3	3	G	59.5	12.0	15.3	-
7. PR27137-CR153	1	1	PG	67.0	14.0	16.3	Good fertility, non-shattering
8. PR27396-CR192	3	3	PG	75.0	20.5	21.0	Good fertility
9. PR27401-CR183	2	3	PG	62.8	16.3	17.3	Good fertility
Banaue, Ifugao							
1. Chubo 8	3	3	PG	75.0	15.3	17.8	Good fertility
2. Aikawa 1	5	5	G	81.0	6.5	19.5	Low tillering
3. Hexi 25	3	3	DG	79.3	16.8	16.3	Adequate growth volume and fertility
4. Hexi 30	3	3	DG	71.8	7.8	16.0	-
5. PR27387-CR98	3	4	G	65.3	24.8	18.3	Panicle weight type
6. PR27396-CR192	5	2	PG	-	-	-	Panicle weight type
7. Yunzen 79-19	3	3	DG	89.8	4.3	20.5	Adequate growth volume
8. Wansan 66	3	3	G	63.0	8.0	17.5	Early, good fertility

[a] 1 to 2 - extra vigorous; 3 - vigorous; 5 - normal
[b] 1 - highly acceptable; 3 - acceptable; 4 to 5 - fair
[c] PG - pale green; G - green; DG - dark green
[d] Ht - plant height; PnL - panicle length; TL - productive tillers

4.2.10 A highly cold-tolerant promising line, PR26670-PJ2, for cool elevated areas (1996)

A highly cold-tolerant line, PR26670-PJ2, which showed promising performance in the previous season trial, also, performed well at selected locations in the Cordilleras during the 1996 DS.

PJ2, which was selected from IR61728-4B-2-1 (Todorokiwase/2*Osok), resembles the mother variety Todorokiwase. It is highly cold-tolerant and has stable high yielding ability. The kernel is translucent *Japonica* type of good quality.

(1) National Rice Cooperative Tests (NCT)

1) Materials and methods

A cold-tolerant line, PR26670-PJ2, was tested for its performance at four locations in the Cordillera Administrative Region (CAR). It was evaluated along with another PhilRice promising line, PR27137-CR153 and two cold-tolerant check varieties in the 1996 DS multi-location test of the NCT I (Tables 4 and 5).

Table 4. Elite lines tested and their origin.

Line/Variety	Origin	Remarks
1. PR26670-PJ2	PhilRice-JICA	Selected from IR61728-4B-2-1
2. PR27137-CR153	Yunnan Agr. Univ. China	Highly cold-tolerant
3. Pinidua (C)	Cordillera's traditional cv.	Cold-tolerant check
4. Gohang (C)	Phil. Seedboard variety	Cold-tolerant check

Table 5. Test locations, elevations and transplanting dates, NCT trials, 1996 DS.

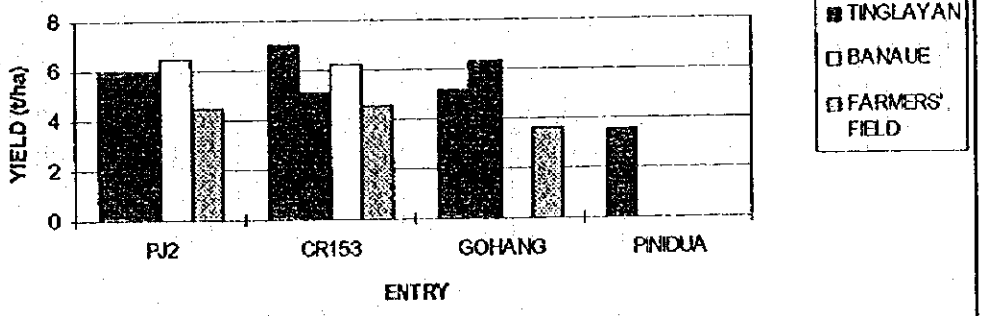
Site	Elevation (m above sea level)	Transplanting date
1. Banaue, Ifugao [a]	(EL >1500m)	Feb. 9, 1996
2. Benguet State University La Trinidad, Benguet	(EL >1500m)	Jan 30, 1996
3. Tublay, Benguet	(EL <1000m)	Feb. 15, '996
4. Tinglayan, Kalinga Apayao	(EL >1500m)	Feb. 19, 1996

[a] also evaluated in Farmer's field (large scale cultivation)
Spacing: 20 x 20 cm

2) Results

In three test locations of the NCT, PR26770-PJ2 and other entries were evaluated for yielding ability. PJ2 showed stable yield across locations ranging from 5.89 to 6.45 t/ha or a mean of 5.96 t/ha. Highest yield was, however, obtained in Banaue (6.45 t/ha). Comparable mean yield was also observed in PR27137-CR153, however, yield was unstable, depicting location-specific performance. Gohang, the cold-tolerant PSB check variety, exhibited better performance over the test entries only in Tinglayan. In the farmers' field, both entries outyielded Gohang by at least 24% (Fig. 1).

Fig. 1. Yield performance of PJ2 and other NCT entries on-site, 1996 DS



(2) Preliminary Yield Trial (PYT)

1) Materials and methods

One set each of cold-tolerant materials were evaluated in Banaue and La Trinidad with 15 and 10 entries, respectively. Table 6 shows the elite lines after selection in each testing location.

Table 6. Elite lines in the PYT, 1996 DS.

Elite Line	Phenotypic Acceptability	Remarks
1. PR26770-PJ2-B1	3	Sister line PJ2
2. PR26770-PJ2-B2	3	Sister line PJ2
3. PR26770-PJ2-B5	1	Sister line PJ2
4. PR26770-PJ2-B6	3	Sister line PJ2
5. PR26770-PJ2-B7	1	Sister line PJ2
6. PR26770-PJ2-B10	3	Sister line PJ2
7. PR27137-CR153	3	Introduced from China
8. Gohang (C)	5	PSB cold-tolerant variety
9. Pinidua (C)	6	Cordillera traditional variety

2) Results

In the 1996 DS, comparison of PJ2 sister lines was made to isolate the master lines. Yield range at La Trinidad was generally lower (4.80 to 5.99 t/ha) due to moderate infection of bacterial leaf blight at maturity. The local check, Pinidua, had a very late maturity, hence, was not harvested. In Banaue, maximum yields were recorded from 5.80 to 7.09 t/ha. The check varieties and PR27137-CR153, another entry, had lower yields than the PJ2 lines. Based on the overall result, only PR26770-PJ2-B5 was discarded among the PJ2 lines.

Table 7. Results of the PYT on PJ2 sister lines, 1996 DS[a].

Line/ Variety	Banaue					La Trinidad			
	Yield (t/ha)	MAT (DAS)	Ht (cm)	PnL (cm)	TL (no)	Yield (t/ha)	Ht (cm)	PnL (cm)	TL (no)
PR26770-PJ2-B1	6.885 (230%)	174	81	16	16	4.797 (130%)	91	16	18
PR26770-PJ2-B2	6.611 (220%)	175	82	17	17	5.760 (156%)	98	19	23
PR26770-PJ2-B5	5.804 (193%)	175	81	18	18	4.876 (132%)	95	19	23
PR26770-PJ2-B6	7.085 (236%)	175	89	19	19	4.975 (134%)	98	21	20
PR26770-PJ2-B7	6.191 (206%)	175	104	17	17	5.985 (162%)	92	18	18
PR26770-PJ2-10	6.154 (205%)	175	94	16	16	5.693 (154%)	91	17	20
PR27137-CR153	5.128 (162%)	175	61	18	9	4.573 (124%)	73	18	23
Gohang (C)	3.167 (100%)	179	72	18	14	3.700 (100%)	88	-	15
Pinidua (C)	very late, not harvested								

[a] MAT-Maturity Ht - Plant height PnL-Panicle length TL-Productive tillers per hill

Photo 2. On-site monitoring of the performance of PR26770-PJ2 in the NCT I, BSU, La Trinidad, Benguet, 1996 DS.

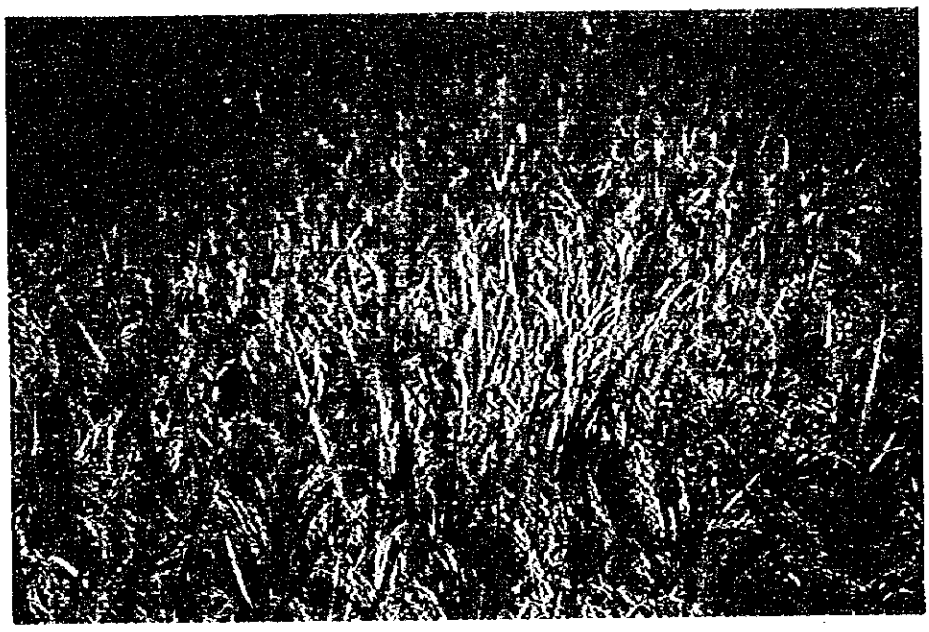


Photo 3. PR26770-PJ2 at maturity at a farmers' field in Banaue.

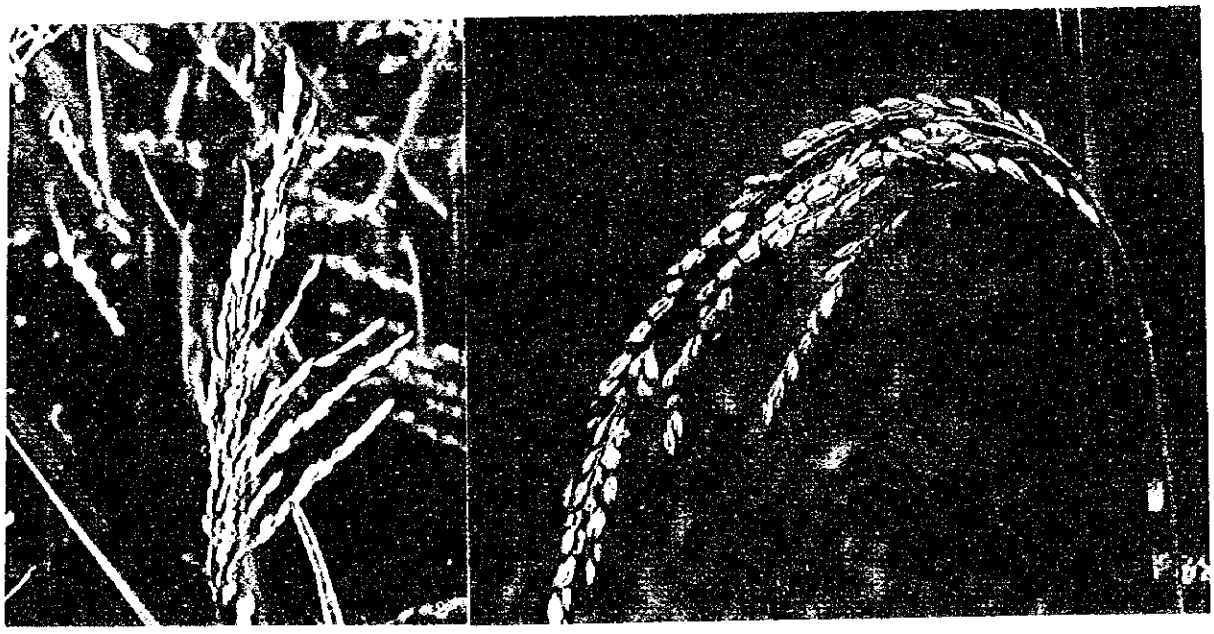


Photo 4. Panicle of PR26770-PJ2 (right photo) exhibiting complete fertility in contrast to the sterile panicle of a cold-susceptible rice (left photo).

4.2.11 A high yielding promising line, PR26679-PJ3-1, for irrigated lowland (1996)

In the 1996 DS results, PR26679-PJ3-1 had 9.14 t/ha in the preliminary yield trial at PhilRice Maligaya, which was comparable to IR72, the high yielding check with 9.30 t/ha. However, the kernel quality of PJ3 was better than IR72. Against IR64, it is of the same kernel quality but the mean yield of PJ3 was higher by 19%.

In the NCT, initial results revealed that PJ3 had a yield higher than IR72 in Nueva Ecija, Isabela, and North Cotabato by 6, 21, 14%, respectively.

(1) NCT

1) Material and methods

PJ3 was tested nationwide in 10 locations (Table 8) along with 77 other entries including maturity checks. PJ3 was under the early maturing group with IR72 as the check variety.

Table 8. Test locations, NCT I, 1996 DS.

Station	Location	Station	Location
1. PRRI	Muñoz, Nueva Ecija	6. CPU	Jaro, Iloilo
2. CVES	San Mateo, Isabela	7. WESVIARC	Hamungaya, Iloilo
3. DES	Dingras, Ilocos Norte	8. CMU	Musuan, Bukidnon
4. UPLB	Los Baños, Laguna	9. USM	Kabacan, N. Cotabato
5. BEST	Pili, Camarines Sur	10.MES	Midsayap, N. Cotabato

2) Results

Initial results of the NCT I 1996 DS were consolidated in six out of 10 test locations only. Comparison of yields between PJ3 and IR72, the maturity check, showed that they had comparable mean performance. However, in three sites, PJ3 outyielded the check by 6% (PRRI), 14% (USM), and 21% (CVES).

Mean maturity of PJ3 ranged from 103 to 118 days in the transplanting culture and only 100 days in the direct seeding method. Plant heights were higher by an average of 8 cm. No lodging was reported. Field pests were recorded only in BEST and USM for bacterial leaf blight, *Cercospora* leaf spot, *Helminthosporium* leaf spot, sheath blight and stemborer but with only moderate reaction.

Table 9. Performance of PJ3 in the NCT I, 1996 DS.

Location	Line/ Variety	Yield (t/ha)	MAT (DAS)[a]	Ht (cm)[a]	TL (no)[a]	Reaction to Pests [b]
PRRI	PJ3	6.679 (106%)	118	99	14	
	IR72	6.291 (100%)	117	91	16	
CVES	PJ3	4.375 (121%)	111	91	19	
	IR72	3.617 (100%)	116	74	22	
BEST	PJ3	3.617 (85%)	114	97	17	
	IR72	4.272 (100%)	118	87	20	blb, cls, hls, shb, sb
CPU	PJ3	4.020 (89%)	104	88	13	
	IR72	4.505 (100%)	112	84	19	
USM	PJ3	4.006 (114%)	103	97	12	blb, hls, dh, wh
	IR72	3.514 (100%)	103	92	12	blb, hls, dh, wh
WESVIARC	PJ3	3.557 (91%)	100	94	489[c]	
(direct-seeded)	IR72	3.892 (100%)	109	90	682[c]	
Average	PJ3	4.376(101%)	108	94	15[d]	
	IR72	4.349 (100%)	113	86	18	

[a] MAT-Maturity Ht-Plant height TL-Productive tillers per hill
[b] BLB(blb)-Batcerial leaf blight, CLS(cls)-*Cercospora* leaf spot, HLS(hls)-*Helminthosporium* leaf spot, ShB(shb)-Sheath blight DH(dh)-deadhearts, WH(wh)-whiteheads. Small letters mean moderate field reaction
[c] Productive tillers per linear meter
[d] TL's in the direct seeding plot are excluded in the computation of average

(2) PYT

1) Materials and methods

Ten entries including maturity checks were evaluated in the PYT, 1996 DS at PhilRice Maligaya. The advanced lines were progenies of Koshihikari, Habataki, Sasanishiki, and Hinohikari. Identified promising lines are intended for multi-location trials. Table 10 shows the selected elite lines, their origin and parentage.

Table 10. Elite lines and check varieties for irrigated lowland in the PYT, 1996 DS.

Line/Variety [a]	Origin	Parentage/Remarks
PR26679-PJ3	PhilRice-JICA	F_5 Hinohikari/IR64
PR26668-29-2	PhilRice-JICA	F_6 Habataki/PSB Rc10
PR26673-6-3	PhilRice-JICA	F_6 Sasanishiki/IR64
IR72 (C)	IRRI	Early maturity check
IR68 (C)	IRRI	Medium-early maturity check
IR64 (C)	IRRI	Kernel quality check

[a] Sown: Dec. 24, 1995 Transplanted: Jan. 16, 1996 Spacing: 25x20 cm Replication: 2

2) Results

Five elite lines, including PR26667-PJ3-1, were evaluated along with IR72, IR68, and IR64 as the check varieties. Among the entries, PR26679-PJ3-1 showed satisfactory agronomic traits. It gave a yield of 9.1 t/ha, comparable to that of IR72 with a yield of 9.3 t/ha. The apparent kernel quality was better by 1.5 points than IR72 and comparable to that of IR64. Moreover, it produced 19% higher mean yield than IR64. PJ3 also exhibited longer panicle, taller stature, and heavier 1000-grain weight than all the other test entries. The other high yielding line but with unacceptable grain size, PR26668-29-2, will be further re-selected in the breeding rows (Table 11).

Table 11. Performance of elite lines in the PYT, 1996 DS[a].

Line/variety	MAT (DAS)	Ht (cm)	PnL (cm)	TL (no)	Yield (kg/ha)	YA		1000 wt (g)	AKQ (SES)
						1)	*2)*		
PR26679-PJ3-1	116	73	24.1	16	9.114	97	119	25.8	5.0
PR26668-29-2	119	68	23.0	20	9.375	100	123	19.0	5.8
PR26673-6-3	117	67	23.0	20	8.854	94	116	24.5	6.0
IR72 (C)	119	65	24.0	19	9.375	100	123	24.4	6.5
IR68 (C)	129	84	29.9	15	8.984	96	117	30.8	6.0
IR64 (C)	119	68	24.8	19	7.651	82	100	26.0	5.0

[a] MAT-Maturity Ht-Plant height PnL-Panicle length TL-Productive tillers per hill
YA- Yield advantage *1)* IR72 = 100% *2)* IR64= 100%
1000 wt- 1000 grain weight AKQ-Apparent kernel quality,
SES- Standard Evaluation Scale: 5-Fair, 6-Poor

Photo 5. PR26779-PJ3-1 at PhilRice Maligaya, 1996 DS.

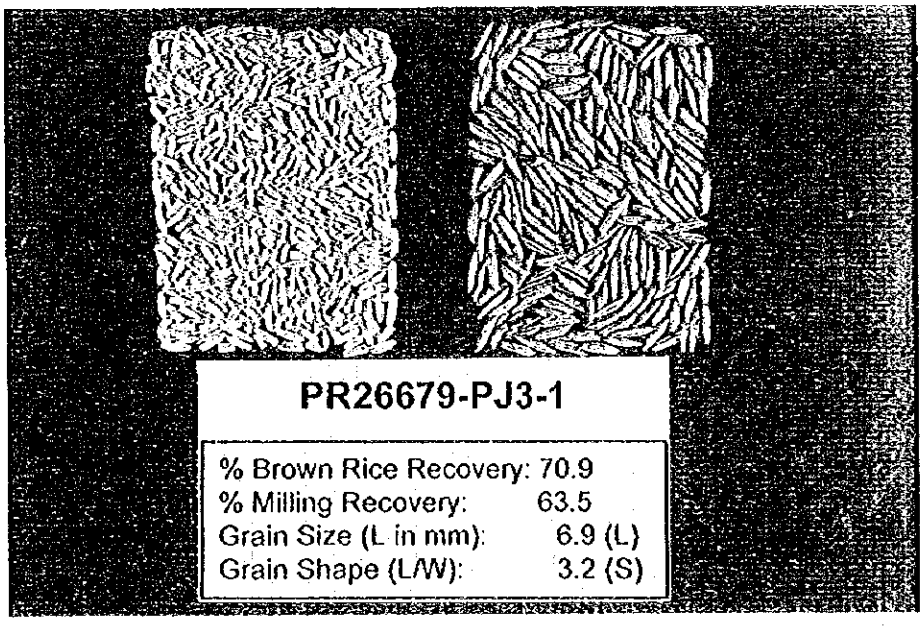


Photo 6. Physical grain quality traits of PR26779-PJ3-1.

4.3 Soils and Fertilizers

4.3.1 Rice yield and nitrogen fertilization in the Philippines (1993)

In Central Luzon, improvement of fertilizer management is more important than increasing the amount of fertilizer.

In Central Visayas, improvement of fertilizer management and increased fertilizer are important.

In Mindanao, rice production is most profitable and yield can be increased by increasing the amount of fertilizer.

The training of farmers in fertilizer management is very important.

4.3.2 Nitrogen fertility management (1993)

Soil nitrogen fertility in Nueva Ecija is comparatively high and the soil can supply 73-101 kg/ha of nitrogen or more.

4.3.3 Simplified method of nitrogen fertility (1993)

Total soil nitrogen was not a criterion of nitrogen fertility of soil.

4.3.4 Characteristics of rice growth (1993)

Growth of PSB Rc2 and PSB Rc6 from the first to the seventh planting were divided into two groups. One group was characterized by the slow increase in plant height and many tillers and panicles. The other group had a higher rate of increase in plant height but low number of tillers with less panicles.

Low yield of PSB Rc2 at the seventh planting could be due to low number of tillers which produced less panicles.

4.3.5. Rice yield and nitrogen fertilization in the Philippines (1994)

(1) Characteristics of regions

Central Luzon, Cagayan Valley, Western Visayas, and Southern Tagalog are currently the main rice production areas. Northern and Southern Mindanao apparently have the potential as main rice production areas in the future.

Nueva Ecija has higher yield during the dry season, while other provinces such as Camarines Sur, Iloilo, Bukidnon, and Davao del Norte have higher yields during the wet season but relatively low yields during the dry season.

(2) Characterization of Central Luzon and the Bicol Region based on cultural management

In Central Luzon, direct-seeded rice generally receives higher amount of nitrogen (N) than transplanted rice but without corresponding yield increase.

N fertilizer efficiency (yield/N applied) did not differ among the different frequency of fertilizer applications or among fertilizer combinations.

In Calumpit, Bulacan, land preparation for dry season cropping is usually done 22 days before transplanting, but actual dates range from October 10 to January 10. Rice yields, regardless of timing of second fertilizer N application, generally do not vary.

4.3.6 Nitrogen fertility measurement (1994)

Nitrogen mineralization patterns and the amount of nitrogen mineralized vary with soil samples of the same soil type but differences were not significant.

Effective use of nitrogen in fertile soil could give higher yield without nitrogen fertilizer application.

Air drying of soils is very important in N mineralization. This could be one of the reasons why rice plants utilize more soil N during the dry season than during the wet season, hence, contributory to high yields.

4.3.7 Local difference in climatic condition (1994)

High yields in Central Luzon could be partly explained by higher solar radiation in the region. High yields in Northern and Southern Mindanao could be partly due to differences between maximum and minimum temperatures and lower minimum temperature.

4.3.8 Growth characteristics of rice (1994)

The duration of green leaf weight accumulation was longer in the dry season than in the wet season. Longer duration of green leaf weight accumulation usually results in greater dry matter accumulation.

Dry matter weight of the rice plant during the growing period could be estimated by using plant height and tiller number.

4.3.9 Modelling development process of the rice plant (1994)

Using the parameters generated from two separate experiments which were conducted in Japan and in the Philippines, a growth model in combination with the Developmental Stage (DVS) model was developed. An added feature of the new model is its capacity to predict leaf area index (LAI) and dry matter accumulation (DMA) under varying nitrogen (N) applications. The estimated LAI and top dry matter values using the new model showed good fitness with actual values obtained at both sites.

4.3.10 Growth, yield, and nitrogen use of transplanted rice (1995)

The use of proper rates and timing of nitrogen (N) fertilizer application could help increase grain yield and N use efficiency. Hence, field studies were conducted to determine the influence of different rates and timing of N application on growth, yield, and N use of PSB Rc2 and PSB Rc6. Results from field studies showed that low grain yield during the wet season can be explained by the low grain production efficiency as influenced by lower solar radiation and low supply of mineralized nitrogen from soil. Nitrogen fertilizer uptake efficiency increased with nitrogen split application. Crop growth rate (CGR) increased with nitrogen fertilizer. Nitrogen content of the plant strongly affected CGR and productivity. Crop growth rate at increased N was influenced more by leaf area development than by net assimilation rate.

4.3.11 Assessing soil nitrogen fertility by biological and chemical methods (1995)

The amount of mineralized soil N by incubation method (biological method) at 30°C increased with decreasing soil moisture content. Nitrogen uptake of rice plant under no N fertilization was almost equivalent to the calculated amount of soil N mineralized by fresh soil incubation. The amount of available N estimated by chemical method showed a positive relationship with mineralizable N obtained with incubation method.

4.3.12 Improvement of nitrogen fertilization (1996)

In order to increase grain yield of PSB Rc6 (early maturing variety), it is important that initial growth is accelerated after transplanting for increased dry matter production and N uptake until panicle initiation stage. For PSB Rc2 (medium maturing variety), it is essential that the N content of the rice plant is maintained until the latter part of the vegetative growth stage to maintain tiller number.

(1) Methods

During the 1996 dry season (DS), nitrogen (N) fertilizer treatments included 6 levels ranging from 0 to 180 kg/ha, and 16 methods of application. In these field studies, N fertilizer was topdressed during the tillering stage in order to increase N fertilizer uptake efficiency and the grain production efficiency as a function of N. Canopy leaf color during the growing period was measured with leaf color scale (Fuji Film Co.)

(2) Results

a) Grain yield of PSB Rc2 was highest at 8.4 t/ha with N fertilizer rate of 180 kg/ha and 5 split applications. Grain yield of PSB Rc6 was highest at 8.0 t/ha with N treatments similar to PSB Rc2 (Fig. 1).

b) Grain yields of PSB Rc2 and PSB Rc6 showed positive relationship with total grain number and panicle number (Figures 2 and 3). To obtain grain yield of 7 t/ha or more, panicle number should be more than 370 per m^2 for PSB Rc2 and 460 per m^2 for PSB Rc6.

c) Topdressing with N fertilizer during tillering stage was effective in achieving a reasonable tiller number. Uptake efficiencies of N fertilizer applied at basal, tillering stage, and panicle initiation stage were 34%, 49%, and 71%, respectively.

d) Grain yield increased with increased N uptake (Fig. 4). For PSB Rc2 and PSB Rc6, the range of N uptake requirement for grain yields of 3, 5, 7, and 8 t/ha were 40, 55-65, 100-110, and 150-160 kg/ha, respectively.

e) To obtain grain yields of 7.5-8.5 t/ha, it is recommended that the leaf color value during tillering stage is maintained at 4.5 or more, and around 4 at the panicle initiation stage (Fig. 5).

f) To achieve grain yield of more than 7 t/ha for PSB Rc2, the above-ground dry weight of the rice plant should be 4-5 t/ha and leaf area index (LAI) is 3-4 at the panicle initiation stage. For PSB Rc6, the above-ground dry weight should be 3 t/ha or more and LAI more than 3 at the panicle initiation stage.

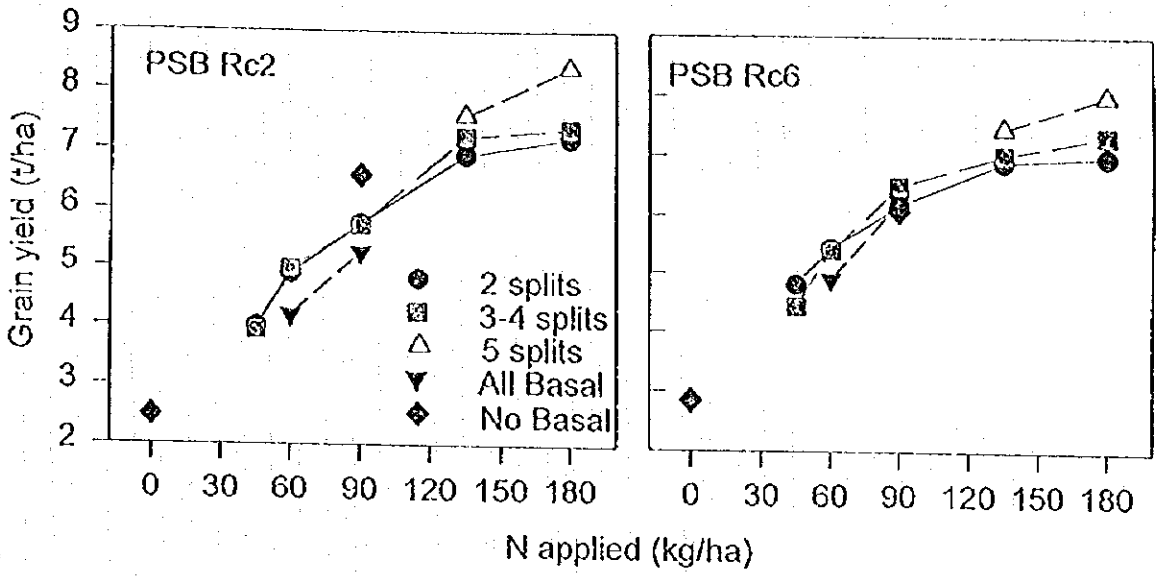


Fig 1. Grain yields of PSB Rc2 and PSB Rc6 during the 1996 DS.

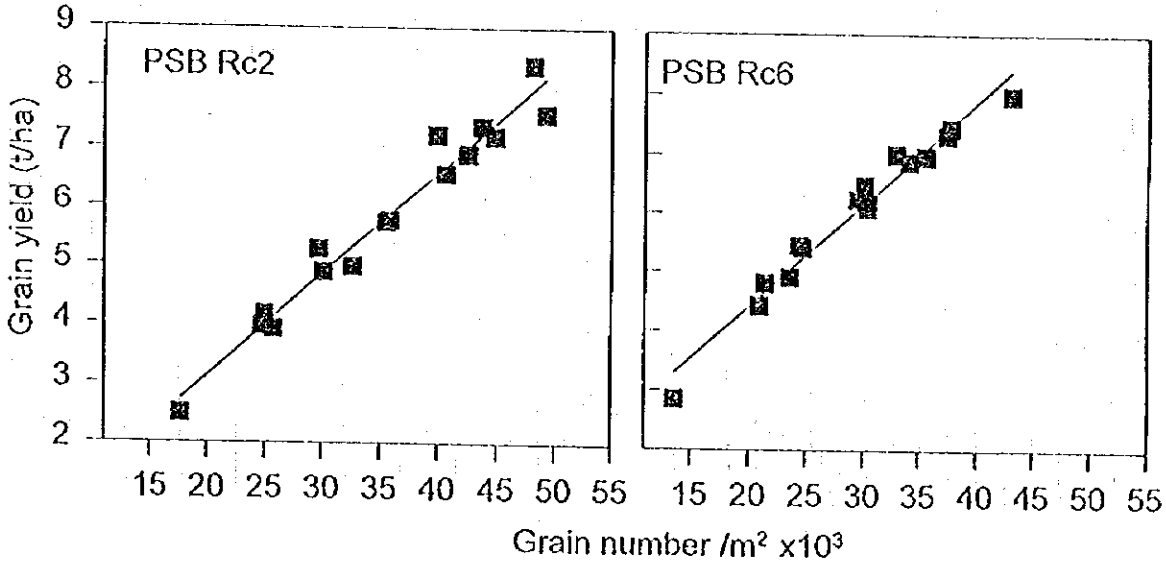


Fig 2. Relation between grain yield and total grain number.

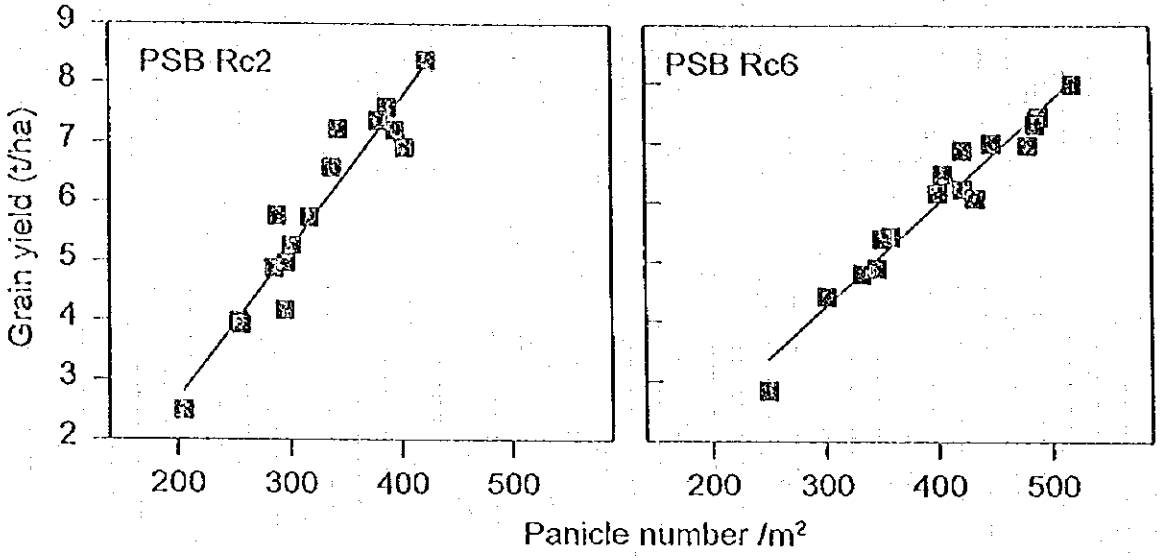


Fig 3. Relation between grain yield and panicle number.

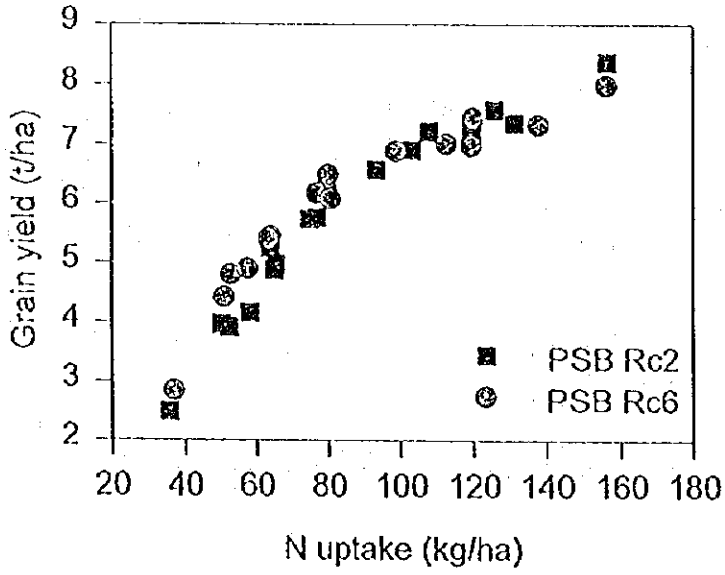


Fig 4. Relation between grain yield and N uptake during the 1996 DS.

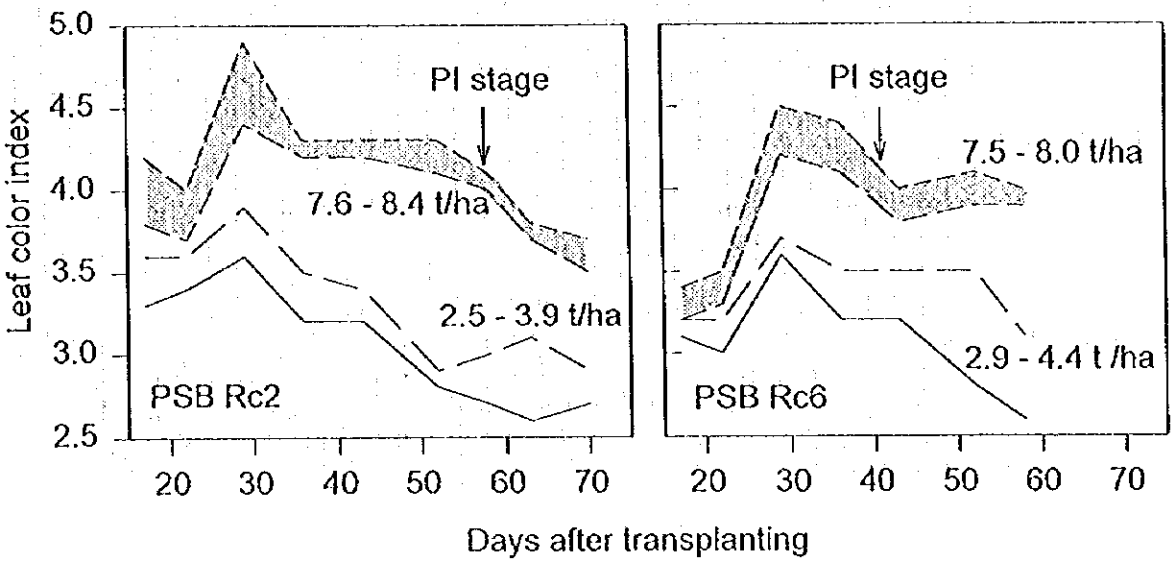


Fig 5. Canopy leaf color during the rice growing period for PSB Rc2 and PSB Rc6. PI is panicle initiation stage. Grain yields in t/ha are indicated.

4.4 Improvement of Cropping Pattern

4.4.1 Recommendation on high yielding rice cultivation in rice-based cropping systems (1994)

Using the Estimation of Nitrogen Mineralization in Soils (ENMS), and Ntirogen Fertilizer Application (NA) and Tillage Depth Recommendation System (TDRS) models, a fertilizer recommendation at different tillage depths was formulated for the RBFS on-station experimental area. The model will be used in other RBFS on-farm research sites.

4.4.2 Recommendation on high yielding rice cultivation on rice-based cropping systems (1994)

Using the mineralization and uptake patterns generated during the 1995 WS as inputs in the ENMS and NA-TDRS models, an optimal nitrogen fertilizer management recommendation at different tillage depths was established for PSB Rc14 planted in Maligaya vertisol. An incubation experiment is currently being conducted to establish nitrogen mineralization patterns of rice-based cropping areas in Ilocos Norte.

4.5 Integrated Pest Management

4.5.1 Procedures on IPM research presented (1993)

Procedures for future research on Integrated Pest Management (IPM) were presented based on the discussion of the present situation of IPM research.

4.5.2 Golden apple snail ecology on direct seeded rice (1995)

Golden snail migration was observed within a few days after introduction of irrigation water. The application of niclosamide suppressed the snail population resulting in less damage to rice seedlings. Metal screen prevented the migration of the marked snails into the rice paddies and also reduced the golden snail population to 0.50 snails/m.

4.6 Farm Mechanization

4.6.1 Development of Maligaya rice reaper (1993)

A new prototype of the rice reaper using rotary cutter was devised and is now under fabrication.

4.6.2 Development of the Maligaya rice reaper (1994)

Fabrication of the first prototype was completed and rice reaping trials were done in the field. Initial tests showed that only single row cutting was satisfactory while clogging and scattering occurred during conveyance and release of the cut plants. Suggestions for improvement, especially on the critical design parameters, were worked out in the second prototype design, the fabrication of which is 90% complete.

4.6.3 Development of power tiller-mounted direct seeder (1994)

A new prototype mechanical seeder attached to the power tiller was conceptualized and is now under fabrication.

4.6.4 Development of the Maligaya rice reaper (1995)

The second prototype of the Maligaya rice reaper was completed for reaping trials and fine-tuning modifications. Performance tests of the working prototype showed that at 2.8 km/h forward speed, it could reap a hectare of standing rice crop in 6 hours. Grain shatter loss ranged from 0.5-3% of field yield. A 100% cutting mechanism efficiency was achieved as percent missed (uncut) hills was reduced from 13 to 0%. A satisfactory windrow with a 90° crop release angle was also attained. Height of remaining stubbles ranged from 120-200 mm.

4.6.5 Development of a power tiller-mounted direct seeder (1995)

Fabrication of the first prototype was completed. Several field trials were conducted to assess the needed refinements to further improve the prototype. From these observations, a second prototype was developed, fabricated and initially tested.

4.7 Grain Quality Evaluation

4.7.1 Sensory and physicochemical evaluation of grain quality (1994)

A sensory evaluation scoring system was designed to profile the eating quality of rice. Rapid and more accurate methods of physicochemical analyses for grain quality were also introduced. These included procedures for moisture content determination, milling degree, rice freshness assessment, and tests for cooking quality.

4.8 Biotechnology

4.8.1 Anther culture for rice improvement (1994)

The rice anther culture project of PhilRice was reviewed and recommendations were made based on the review. New methods in anther culture were introduced. A scheme in handling anther culture materials was also proposed.

4.9 Farm Management

4.9.1 Design and development of mathematical programming for farm management model analysis (1995)

A mathematical programming software called Micro-NAPS was designed and developed from the original Japanese version for the use of PhilRice researchers. This user-friendly pull-down menu software can be used as a decision-aid tool to handle various farm management problems, ranging from simple linear programming problem to a complicated stochastic quadratic programming model. A user's manual and a system reference manual were also written for ease of operation and technical assistance to users.

4.10 Training and Extension

4.10.1 Training course on video production (1993)

Fifteen PhilRice staff have gained/improved their basic knowledge and skills on the utilization of video for the production of technology transfer materials.

4.10.2 Rice production and promotion training program (1995)

A PhilRice-JICA Collaborative Rice Production and Promotion Training Program was conducted on 12-22 February 1996 for 30 participants from the National Rice R&D Network in support to the Gintong Ani Program for rice of the Department of Agriculture (DA). This training was undertaken to update the critical mass of master trainers on the latest breakthroughs in rice production and technology promotion.

V. ANNUAL PLAN OF THE TECHNICAL COOPERATION FOR 1997

1. Technical Cooperation Activities

Tentative Schedule of Implementation (Itemized)

Field/Item	1997							Plans for 1997
	Jan	Feb	Mar	Apr	May	Jun	Jul	
1. Research and Training Plan								
1) Research Planning								
a. Evaluation of present research work								(Completed)
b. Emphasis of research subjects								Direction of research and development and subjects
2) Effective Training Design								
a. Effective application of extension materials								(Completed)
b. Efficient transfer of newly developed technology					.....	.....		Evaluation of technology transfer system
2. Varietal Improvement								
1) Development of high yielding varieties with excellent grain quality and resistant to pests and diseases for specific agro-climatic conditions in the country								
a. Selection of mother plants and evaluation of crosses								Determination of genetic potentials with 160 *Japonica/Indica* varieties in dry season (DS).
b. Hybridization								Hybridization of 25 crosses in DS for the incorporation of desirable genes into the leading varieties focusing on the *Indica/Japonica* crosses.
c. F1 raising test								Verification of ca. 25 F_1s in DS.

Field/Item	1997							Plans for 1997
	Jan	Feb	Mar	Apr	May	Jun	Jul	
d. Individual and pedigree selection								Single-plant selection on 24 $F_{2\sim8}$ hybrid populations. Hybrid bulk nurseries for generation advance on ca. 180 $F_{2\sim8}$ in DS. Pedigree-line selection on the ca. 400 $F_{3\sim8}$ single lines of ca. 25 crosses and ca. 400 $F_{4\sim8}$ family lines of 30 or more crosses in DS.
e. Performance test								Tests of growth/yield performance on ca. 50 elite lines in DS, with special regards on such traits as plant type, diseases/insects occurrence, yield, kernel quality, etc.
f. Development of parental lines with Tungro resistance								Hybridization of ca. 15 crosses in DS, aiming to incorporate the Tungro resistance genes into leading varieties. Verification of 10 or more F_1 plants in DS. Some of the F_1s will be used for further recurrent crossing. On-site breeding in Tungro-hot spots in Cotabato and Isabela: Tungro screening on ca. 10 hybrid populations of F3~7 and ca. 100 pedigree lines of F4~8 in DS. Performance tests on ca. 5 elite Tungro-resistant lines on-site in DS.
2) Development of rice cultivars for cool elevated areas which are high yielding, with excellent grain quality, resistant to shattering, and responsive to low levels of fertilizer								
a. Hybridization by means of recurrent crossing								Hybridization of ca. 20 crosses in DS, featuring highly cold-tolerant Japanese and Chinese varieties as donors. Verification of ca. 20 F1s in DS. Some of the F1 will be used for further recurrent crossing.
b. Individual and pedigree selection								On-site breeding at cool elevated sites in Banaue, Ifugao and La Trinidad, Benguet: single-plant selection on ca. 5 segregating populations and line selection on ca. 100 breeding lines in DS.
c. Performance test								Tests on several elite lines at cool elevated sites in DS.

Field/Item	1997							Plans for 1997
	Jan	Feb	Mar	Apr	May	Jun	Jul	
3. Soils and Fertilizers								
1) Development of fertilizer management technology for various agro-climatic conditions in rice growing areas.								
a. Analysis of past data in main rice production areas.								(Completed)
b. Classification of the nitrogen uptake patterns of rice plant at different fertilizer levels.								(Completed)
c. Determination of the nitrogen fertility of soils by biological method.								(Completed)
d. Development of simple method of determining the nitrogen fertility of soils.								(Completed)
e. Development of nitrogen fertilization technology								Field trials on different nitrogen fertilizer management to attain higher grain yield will be undertaken during the dry season. Emphasis will be on dry matter production and nitrogen uptake pattern during the vegetative growth stage.
2) Establishment of models that will predict responses of rice growth with different levels of fertilizer application								
a. Analysis of the meteorological data in main rice production areas.								(Completed)
b. Determination of the growth parameters of rice								(Completed)
c. Establishment of crop models								Continuation of the development of crop models. The new model to predict rice yield under varying nitrogen (N) applications will be developed.

Field/Item	1997							Plans for 1997
	Jan	Feb	Mar	Apr	May	Jun	Jul	
4. Agronomy, Plant Protection, Agricultural Machinery, and other fields (Short-term experts dispatched)								
1) Improvement of cropping patterns								(Completed)
2) Integrated insect pest management								Computerization of data concerned to IPM.
3) Farm mechanization								Development of paddy seeder.
								Development of rice reaper.
4) Other fields								Improvement of farm management.

2. Dispatch of Japanese Experts

Month	1997 Jan	Feb	Mar	April	May	June	July
1. Long-term Experts							
1) Team Leader	———	———	———	———	———	———	———
2) Coordinator	———	———	———	———	———	———	———
3) Varietal Improvement	———	———	———	———	———	———	———
4) Soils and Fertilizers	.....	.....	.....	.....	.....	.....	.....
2. Short-term Experts in the field of							
1) Agricultural Machinery (Rice Reaper) ●		O	———	———			
2) Agricultural Machinery (Paddy Seeder) ●	O ___	———	———				
3) Entomology ●	O ___	———	———				
4) Farm Management ●	O ___	———	———				
5) Agricultural Extension ●				O	———	———	

● : Submit A1 Form O : Agreement ___ : Assignment Period ..... :Extension or Replacement

3. Training of Philippine Personnel in Japan

Proposal will be prepared for two participants.

4. Provision of Machinery and Equipment in FY 1997

Month	1997 Jan	Feb	Mar	April	May	June	July
1. Purchased in Japan							
2. Purchased in the Philippines							
3. Brought by Short-term Experts	O——X	O——X					
	O——X						
	O——X						
				O——X			

O : Purchase order O : Shipping X : Arrival at PhilRice

VI. APPENDICES

Appendix 1. Japanese experts and their Filipino counterparts in the technical cooperation project.

FIELD OF EXPERTISE	JAPANESE EXPERT	FILIPINO COUNTERPARTS
A. Long-term		
Research and Training Planning	Dr. Hitoshi Takahashi	Dr. Santiago R. Obien Executive Director Mr. Ronito A. Beronio Deputy Director
Research and Training	Mr. Masaru Imamura	Ms. Eleanor L. Retales [a] Chief, Administrative Division Ms. Virginia F. Recta [b] Head, Planning & Collaborative Programs Office (PCPO) Engr. Eulito U. Bautista Chief Science Research Specialist and Scientist I PCPO
Plant Breeding	Mr. Susumu Mizuno Mr. Toshio Ito	Mr. Hilario C. dela Cruz, Jr. Chief, Plant Breeding and Biotechnology Division (PBBD) Ms. Thelma F. Padolina Senior Science Research Specialist, PBBD Mr. Renando O. Solis Senior Science Research Specialist, PBBD Ms. Emily R. Corpuz Science Research Specialist, PBBD
Soils and Fertilizers	Dr. Koji Yoshida Mr. Teruhisa Motomatsu	Dr. Rolando T. Cruz Head, Agronomy and Soils Division (ASD) Dr. Pompe C. Sta. Cruz Chief Science Research Specialist, ASD Dr. Teodula M. Corton Supervising Science Research Specialist, ASD Mr. Wilfredo B. Collado Science Research Specialist, ASD

FIELD OF EXPERTISE	JAPANESE EXPERT	FILIPINO COUNTERPARTS
		Mr. Rino R. Valdez [c] Science Research Specialist, ASD Ms. Jacqueline A. Prudente Science Research Analyst, ASD Mr. Fernando D. Garcia Science Research Specialist, ASD
B. Short-term		
Agricultural Machinery	Engr. Hiroyuki Takahashi	Engr. Eulito U. Bautista Head, Rice Engineering and Mechanization Division (REMD) Engr. Bernardo D. Tadeo Senior Science Research Specialist, REMD
Audiovisual Technology	Mr. Masao Yoshida	Ms. Karen Eloisa T. Barroga Senior Science Research Specialist Technology Transfer Department (TTD) Mr. Roger F. Barroga Supervising Science Research Specialist, TTD
Entomology	Dr. Hiroo Kan'no	Dr. Victor P. Gapud Program Leader, Integrated Pest Management (IPM) Mr. Arthur R. Baria [d] Science Research Specialist Crop Protection Division (CPD) Mr. Vic V. Casimero Senior Science Research Specialist, CPD
Biotechnology	Mr. Munetoshi Aikawa	Dr. Nenita V. Desamero Supervising Science Research Specialist, PBBD Ms. Cynthia B. Andaya Senior Science Research Specialist, PBBD
Agricultural Machinery (Rice Reaper)	Engr. Tatsushi Togashi	Engr. Eulito U. Bautista Head, REMD Engr. Manuel Jose Regalado Senior Science Research Specialist, REMD

FIELD OF EXPERTISE	JAPANESE EXPERT	FILIPINO COUNTERPARTS
Grain Quality Evaluation	Mr. Toshio Ogawa	Mr. James A. Patindol Head, Rice Chemistry and Food Science Division (RCFS) Ms. Nanette V. Zulueta Science Research Specialist, RCFS Ms. Evelyn M. Herrera Science Research Analyst
Crop Modelling/Physiology	Dr. Masaharu Yajima	Dr. Pompe C. Sta. Cruz Chief Science Research Specialist Agronomy and Soils Division (ASD)
Instrumentation	Mr. Mikio Takagi	Dr. Teodula M. Corton Supervising Science Research Specialist, ASD
Agronomy	Dr. Hirokazu Sumida	Mr. Rolando O. Retales Senior Science Research Specialist, ASD Ms. Madonna C. Casimero Science Research Specialist, ASD
Instrumentation	Mr. Yoshimitsu Oodaira	Engr. Evangeline B. Sibayan Senior Science Research Specialist, REM
Agricultural Machinery (Paddy Seeder)	Engr. Noboyuki Sawamura	Engr. Bernardo D. Tadeo Senior Science Research Specialist, REMD Engr. Joselito A. Damian Science Research Specialist, REMD
Grain Quality Evaluation	Dr. Ken'ichi Ohtsubo	Mr. James A. Patindol Head, Rice Chemistry and Food Science Division (RCFS) Ms. Nanette V. Zulueta Science Research Specialist, RCFS
Entomology	Dr. Takashi Wada	Dr. Hilario D. Justo Head, Crop Protection Division (CPD) Mr. Vic V. Casimero Senior Science Research Specialist, CPD

FIELD OF EXPERTISE	JAPANESE EXPERT	FILIPINO COUNTERPARTS
Farm Management	Dr. Teruaki Nanseki	Dr. Segfredo R. Serrano Chief, Social Science and Policy Research Division (SSPR) Dr. Sergio R. Francisco Supervising Science Research Specialist, SSPR
Agricultural Extension	Mr. Kunio Koyama	Ms. Zyla C. Macasieb Chief, Training Division Ms. Matilde Corazon A. Puerto Science Research Analyst, Training Division
Entomology	Mr. Masaichi Tsurumachi	Dr. Hilario D. Justo Head, Crop Protection Division(CPD) Mr. Gerardo F. Estoy Senior Science Research Specialist, CPD
Agro-economics	Mr. Jinzo Saito	Mr. Ronilo A. Beronio Deputy Director Dr. Segfredo R. Serrano Chief, Social Science and Policy Research Division (SSPR) Dr. Jacinto F. Fabiosa Research Fellow, SSPR

[a] retired, March 30, 1996
[b] on study leave
[c] transferred, December 15, 1994
[d] resigned, May 1, 1995

Appendix 2. Equipment and Supplies under the Technical Cooperation.

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
I.	**FY 1992**				
A.	**Locally Purchased**				
1.	Cold water source system,				
	- water bath, BL-31	1 unit	224,685	224,685	PBBD
	- throughs , CTB12S	6 units	13,053	78,318	PBBD
2.	Platform balance, 50-100 kg	1 unit	7,330	7,330	PBBD
3.	Push cart/pallet truck, Seedburo 800SS	1 unit	27,830	27,830	PBBD
4.	Hand-held pH conductivity meter, L-01484-44	1 unit	19,270	19,270	PBBD
5.	Portable grain moisture meter, SS-5, 10-40%	2 units	8,725	17,450	ASD
6.	Top shelves for laboratory tables, ECB3-305R	1 unit	43,687	43,687	ASD
7.	Top shelves for laboratory tables, ECB3-365R	1 unit	43,687	43,687	ASD
8.	Cabinet for acid storage, OC 129	1 unit	28,600	28,600	ASD
9.	Gradient density maker, peristaltic pump, Fisher 13-875-200	1 unit	23,000	23,000	CPD
10.	Water activity test apparatus, Conway OSK 10507	1 unit	12,675	12,675	RCFS
11.	MacIntosh computer, LC 11 4/40, RGB monitor Image writer, 11 printer, Kit-DINB	1 lot	111,836	111,836	SSPR
12.	Laptop computer, IBM PS/2	2 units	121,011	242,022	SSPR, PCPO
13.	Transparency maker machine	1 unit	31,815	31,815	TPD
14.	Local Area Network	1 lot			
	- Computer, file server, IBM PS/2 Model 90XP-OKF	1 unit	363,857	363,857	PCPO
	- IBM type 1 cable, shielded, twisted	500 m	76	38,000	PCPO
	- 9 pin male connector	26 pcs	55	1,430	PCPO
	- Data connector	26 pcs	663	17,238	PCPO
	- IBM multi-station access unit (P/N 6091014)	2 pcs	22,007	44,014	PCPO
	- IBM token ring network adapter/A 16/4 #16F1133	6 pcs	30,083	180,498	PCPO
	- IBM token ring network for AT bus 16/4 #25F7367	7 pcs	29,944	209,608	PCPO
	- LAN software, Novell Netware 386 v3.11	1 set	100,723	100,723	PCPO
15.	Hewlett Packard Plotter, HP 7550B	1 unit	167,651	167,651	PCPO
16.	Uninterruptible power supply, American Power Conversion, Smart UPS, 900	2 units	30,000	60,000	PCPO JICA
17.	Cellular mobile phone, OKI CDL-691 with accessories	1 unit	22,500	22,500	JICA

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
18.	Cellular mobile phone, facsimile machine, OKI CDL-691, OF-5, Fax Interface	1 unit	71,300	71,300	JICA
19.	Van, Mitsubishi L300, 2.5 li diesel	1 unit	493,000	493,000	Park
20.	Double cab pick-up, Mitsubishi L200, 2.5 li diesel	1 unit	470,000	470,000	Park
21.	Motorcycle, 100 cc, YAMAHA RS100T	1 unit	44,700	44,700	Park
22.	Motorcycle, 50 cc, HONDA PF50	2 units	15,995	31,990	Park
	Total (FY 1992: Locally Purchased)			3,228,713.00	
B.	**Shipped from Japan**				
1.	Seed grader/thickness width grader, SATAKE WS-10A	1 unit	45,088	45,088	PBBD
2.	Wagner pots for upland rice, Everwell 171-B 1/5000 a (159 x 190 mm)	200 pcs	300	60,000	ASD
3.	Wagner pots for paddy rice, Everwell 171 1/5000 a (159 x 190 mm)	200 pcs	275	55,000	ASD
4.	Voltage regulator, MATSUNAGA output 0-30A, 0-240 V, Input: 220 V, 60Hz	1 unit	46,000	46,000	CPD
5.	Polycorder and accessories, KAYE Data Fielder 200 V 6005	1 lot			
	- Data fielder 200, V6005	1 unit	303,750	303,750	REM
	- Ni-cad battery, M3273	1 unit	3,750	3,750	REM
	- Field carrying case, M3279	1 unit	2,750	2,750	REM
	- 12V cigarrete adapter, M3274	1 unit	4,875	4,875	REM
	- Cable, W6030	1 unit	3,500	3,500	REM
6.	Texture meter, Auto Penetrometer Digital	1 unit	380,000	380,000	REM
7.	Camcorder, SONY EVO-150 TR, NP-77H, AC-V55, VCT-1000	1 unit	144,788	144,788	TPD
8.	Printer for word processor, TOSHIBA L-400 II, Laser Printer	1 unit	230,000	230,000	JICA
9.	Printer interface, JWT-2096 D	1 unit	11,500	11,500	JICA
10.	Wagon, Mitsubishi, Pajero High Roof Wagon, Model V34VHNDL	1 unit	660,000	660,000	JICA
11.	Videocasette recorder/player, SONY Hi8 EVO-9700, AT-1000 Box, PVM 1444 QM, P6-60HMP	1 unit	321,625	321,625	TPD
12.	Torque transducer, Lebow				

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	LOCATION
	1114-100 (100 in -lb; 16,000)	1 unit	210,000	210,000	REM
	1104-1k (1000 in-lb; 9,000)	1 unit	210,000	210,000	REM
	1105-5K (10,000 in-lb; 8,500)	1 unit	212,500	212,500	REM
13.	Chlorophyll meter, MINOLTA SPAD-502	4 units	33,000	132,000	ASD
14.	Automatic multi-seed sample divider), Seedburo, Boerner modified multiple divider No. 291	1 unit	90,000	90,000	PBBD
15.	Grain triers, Food Agency Type), Everwell 100-5, 12 x 300mm	1 unit	4,500	4,500	PBBD
16.	Testing rice husker for one ear, Everwell 114, 100 x 40mm	5 units	1,750	8,750	PBBD
17.	Seed sample pans, Everwell 105, R-180W, 180 x 30mm	50 pcs	138	6,875	PBBD
18.	Label, 2 x 10cm	1000 pcs	0.75	750	JICA
19.	CN Corder, SHIMADZU NC-90A System	1 unit	2,220,000	2,220,000	ASD
20.	Pressure transducer, Kyowa				
	PGM -1kg Cap: 1.0 kg/cm , in/output resi. 12 ohms, oupt. sensi. 1.25mv/v	1 unit	18,250	18,250	REM
	PG -2 KU Cap: 20 kg/cm , in/output resi. 350 ohms, oupt. sensi. 2.00mv/v	1 unit	20,000	20,000	REM
	PG -100 KU Cap: 100 kg/cm , in/output resi. 350 ohms, oupt. sensi. 2.00mv/v	1 unit	11,250	11,250	REM
	LU -50 KE Cap: 50 kg/cm , in/output resi. 350 ohms, oupt. sensi. 2.00mv/v	1 unit	29,000	29,000	REM
	LU -200 KE Cap: 200 kg/cm , in/output resi. 350 ohms, oupt sensi. 2.00mv/v	1 unit	29,000	29,000	REM
	LU -500 KE Cap: 500 kg/cm , in/output resi. 350 ohms, oupt sensi. 2.00mv/v	1 unit	34,000	34,000	REM
21.	Micro-cassette recorder, SONY M770V	10 units	3,550	35,500	SSPR
22.	Micro-cassette tape, SONY MC-60A	100 pcs	150	15,000	SSPR
				5,560,000	
			plus 3% tax	166,800	
	Total (FY 1992: Shipped from Japan)			5,726,800	
C.	**Brought by JICA Experts**				
1.	Personal word processor sets	1 unit	81,275	81,275	JICA

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
2.	Personal word processor sets	1 unit	61,075	61,075	JICA
3.	Personal word processor sets	1 unit	61,425	61,425	PBBD
4.	Personal word processor sets	1 unit	87,120	87,120	ASD
5.	Image input equipment	1 unit	9,000	9,000	JICA
6.	Computer commnunication sets	1 unit	8,750	8,750	JICA
7.	Cassette recorder with adapter, SONY TCM-55V/AC-E30L	1 unit	3,650	3,650	JICA
8.	Camera, Canon EOS 100QD with lens	1 unit	25,250	25,250	ASD
9.	Censor, Koito IKS-25 (Cord/10m)	1 unit	10,625	10,625	ASD
10.	Digital multimeter, CDM-15	1 unit	2,625	2,625	ASD
11.	Testing rice husker, TR-200 w/ transformer	1 unit	11,125	11,125	PBBD
12.	Testing rice polisher w/ transformer	1 unit	15,100	15,100	PBBD
13.	Electric balance, EL-600S	1 unit	16,088	16,088	PBBD
14.	Scale	1 unit	3,175	3,175	PBBD
15.	Straw fracture tester, TR-2S	1 unit	61,950	61,950	PBBD
16.	Portable multi thermometer, 2423A17	1 unit	65,250	65,250	REM
17.	Clip on AC power meter, 2433	1 unit	26,950	26,950	REM
18.	Hybrid anemometer, DP70B	1 unit	37,875	37,875	REM
19.	Tachometer, TM-300	1 unit	6,825	6,825	REM
	Total (FY 1992: Brought By Experts)			595,133	
	TOTAL (FY 1992)			**9,550,646**	
II.	**FY 1993**				
A.	**Locally Purchased**				
1.	Camera lens, Nikon				

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
	- AF-28, f28	1 unit	4,450	4,450	CPD
	- Micro 105 mm, f2.8	1 unit	13,985	13,985	CPD
	- Macro-Zoran, 35-105 mm	1 unit	9,396	9,396	CPD
2.	Uninterruptible power supply, Americam Power Conversion, SMART UPS 900	10 units	25,800	258,000	All Divisions
3.	Station Wagon, Mitsubishi Lancer 1500GXL	1 unit	405,000	405,000	Director
4.	Plain paper copier, SHARP 8870	1 unit	151,380	151,380	Director's Office
	- 15-bin sorter, SF-S11	1 unit	37,021	37,021	Director's Office
	- Auto Document Feeder, SF-AF12	1 unit	44,631	44,631	Director's Office
	- Auto Duplex, SF-D11	1 unit	38,714	38,714	Director's Office
5.	Analytical balance, A&D ER-180A; Capacity: 0-180 g; Sensitivity: 0.1 mg	1 unit	110,800	110,800	PBBD
6.	Carbon dioxide incubator, Cole Parmer G-39200-15	1 unit	246,780	246,780	CPD
7.	Hectonic test weight kit, ELE EL-560-115/118	1 unit	85,500	85,500	PBBD
8.	Leaf area meter, portable LI-COR LI-3000A, w/ belt conveyor, LI-3050A	1 unit	448,800	448,800	ASD
9.	Fraction collector, BIO-RAD 2110	1 unit	64,000	64,000	CPD
10.	Platform truck, Seedburo No. 361-9 w/ floor lock Seedburo No. 361-A; & w/ foot operated brake Seedburo No. 361-B	2 units	77,880	155,760	PBBD
11.	Transparency maker machine, 3M 4550	1 unit	36,000	36,000	TPD
12.	Microphone discussion system, Philips CCS 400	1 unit	525,000	525,000	TPD
13.	Software program				
	- Statistical Package for Social Sciences (SPSS)	1 set	9,699	9,699	PCPO
	- SPSS PC+/Base Package	1 set	25,673	25,673	PCPO
	- SPSS Trends	1 set	24,550	24,550	PCPO
	- SPSS Statistics	1 set	22,550	22,550	PCPO

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
	- SPSS Advance Statistics	1 set	22,550	22,550	PCPO
	- SPSS PC Graphics	1 set	29,407	29,407	PCPO
	- SPSS Data Entry IV	1 set	22,550	22,550	PCPO
	- SPSS Tables	1 set	22,550	22,550	PCPO
	- Harvard Graphics for Windows v3.0	1 set	18,493	18,493	PCPO
	- Quattro Pro V4.0 Server Edition for Network	1 set	14,500	14,500	PCPO
	- Quattro Pro for Workstations	10 sets	4,200	42,000	PCPO
	- Windows v3.1	1 set	5,200	5,200	PCPO
	- Autocad R12 for Windows w/o AME	1 set	111,000	111,000	PCPO
	- WordPerfect for SU/Server V6.0 Edition	1 set	12,765	12,765	PCPO
	- WordPerfect for Workstations Node Edition	10 sets	5,900	59,000	PCPO
	- Correl Draw v4.0	1 set	27,500	27,500	PCPO
	- Lotus 1-2-3 for 10 workstations	1 set	110,700	110,700	PCPO
14.	L-200, Mitsubishi	1 unit	480,000	480,000	
	Total (FY 1993: Locally Purchased)			3,695,904	
B.	**Shipped from Japan**				
1.	Books	1 lot	494,225	494,225	Library
2.	Slip ring for strain gage and thermocouple, Lebow				
	- 6118-4 (1/2", No. of ring: 4, max speed: 8,000)	1 unit	52,500	52,500	REM
	- 6118-12 (1/2", No. of ring: 12, max speed: 8,000)	1 unit	168,250	168,250	REM
	- 6105-4 (1/2", No. of ring: 4, max speed: 8,000)	1 unit	124,750	124,750	REM
3.	Strain gauge input card, Model: EXP-GP	1 unit	77,500	77,500	REM
4.	Multi-function Analog & Digital I/O card, Model: DAS1600	1 unit	70,750	70,750	REM
5.	Strain gage	1 lot			

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
	- KFG-30-120C 1-11	2 units	900	1,800	REM
	- KFG-20-120C 1-11	2 units	725	1,450	REM
	- KFG-10-120C 1-11	2 units	725	1,450	REM
	- KFG- 5-120C 1-11	2 units	525	1,050	REM
	- KFG-10-120D16-11 (LxW:10x3)	2 units	1,675	3,350	REM
	- KFG- 5-120D16-11	2 units	1,375	2,750	REM
	- KFG- 2-120D16-11	2 units	1,375	2,750	REM
	- KFG- 1-120D16-11	2 units	2,150	4,300	REM
6.	Elisa Microplate Reader, BIORAD 3550, #170-6602	1 unit	507,500	507,500	CPD
	replacement lamp, 170-6610	2 units	3,250	6,500	CPD
	printer interface cable, 170-6611	1 unit	4,125	4,125	CPD
	dot matrix printer, 170-V550	1 unit	56,500	56,500	CPD
7.	Water bath for crossing, Ozawa Model: 702	1 unit	221,250	221,250	PBD
8.	Digitizer, Model: 33180SER, with transformer	1 unit	47,500	47,500	ASD
9.	Hot air rapid drying oven, Model: SF-216AS	1 unit	547,500	547,500	ASD
10.	Manometer and air velocity gauge, McMaster-CARR 4019K71	1 set	157,500	157,500	REM
11.	Gage cement kit, BCK-77	1 unit	13,750	13,750	REM
12.	Gage cementing tool kit, GTK-77	1 unit	25,500	25,500	REM
13.	Manual sprayer, Lodle-shaped, Model: 256	2 units	875	1,750	PBBD
14.	Grain crack inspection apparatus, Model:133-C	2 units	575	1,150	PBBD
15.	Haemocytometer, Model: A-103	1 unit	8,250	8,250	PBBD
16	Digital caliper, Model: SCD-20	2 units	5,750	11,500	PBBD
17.	Vitascope	1 unit	235,000	235,000	PBBD
18.	Low temperature programmable incubator, Model: ILD-110HM	3 units	187,500	562,500	ASD
19.	Specimen set, Model: L-55-1300	2 units	4,500	9,000	CPD
20.	Electronic balance, Model:FB-2000	2 units	24,250	48,500	CPD

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
	Electronic balance, Model:FB-2000	1 unit	24,250	24,250	San Mateo
	Electronic balance, Model:FB-2000	1 unit	24,250	24,250	Midsayap
21.	Optical character reader, EPSON GT-6500	1 lot	39,500	39,500	PCPO
	interface board, GT65RSPRB	1 unit	5,000	5,000	PCPO
	interface board, GTATSPIFS, for PC/AT	1 unit	3,750	3,750	PCPO
22.	Cast alloy square tool bits, McMaster-CARR	1 lot			
	- 3203A11 (1/4" x 21/8")	5 set	375	1,875	REM
	- 3203A24 (5/16" x 3")	5 set	650	3,250	REM
	- 3203A27 (3/8" x 4")	5 set	1,125	5,625	REM
	- 3203A15 (1/2" x 4")	5 set	1,900	9,500	REM
	- 3203A16 (5/8" x 4 1/2")	5 set	2,425	12,125	REM
23.	Keyway broach set, McMaster-CARR, 315A29 (1/8", 3/16", 1/4", 3/8")	5 set	12,875	64,375	REM
24.	Square/hexagon broach, McMaster-CARR	1 lot			
	- 315A15 (1/4")	5 units	4,225	21,125	REM
	- 3156A17 (5/16")	5 units	4,300	21,500	REM
	- 3156A19 (3/8")	5 units	5,500	27,500	REM
	- 3156A24 (1/2")	5 units	8,050	40,250	REM
	- 2875A24 (1/2")	5 units	8,000	40,000	REM
	- 2875A26 (5/8")	5 units	11,050	55,250	REM
	- 2875A28 (3/4")	5 units	12,850	64,250	REM
25.	Tap and die sets	1 lot			
	- McMaster-CARR 2640A4 (1/4"-1/2", 24 pcs.)	5 sets	14,400	72,000	REM
	- McMaster-CARR 2646A12, 3-12mm, 31 pcs)	5 sets	10,875	54,375	REM
26.	MagnaByte computer projection system	1 lot	114,500	114,500	TTP
	Model: 5090-230, with power supply				
	carrying case, 5397	1 unit	12,025	12,025	TTP
	over head projector HP-A305S	1 unit	5,975	5,975	TTP

ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
27. Image recorder, Digital Pallette, Model CI-5000S complete w/ accessories	1 lot	325,000	325,000	SSPR
28. Gas chromatograph, Model: GC-14BPTF	1 lot	447,050	447,050	RCFS
air compressor w/ transformer	1 unit	57,500	57,500	RCFS
Carrier gas pipe, 5m	2 units	2,250	4,500	RCFS
Hydrogen gas pipe, 5m	1 unit	2,250	2,250	RCFS
Air pipe	1 unit	1,250	1,250	RCFS
Air dryer	1 unit	4,000	4,000	RCFS
Soapfilm flowmeter with stand	1 unit	5,000	5,000	RCFS
Gas filter	2 units	7,500	15,000	RCFS
High purity gas pressure regulator for He	1 unit	17,000	17,000	RCFS
High purity gas pressure regulator for N2	1 unit	17,000	17,000	RCFS
High purity gas pressure regulator for H2	1 unit	17,000	17,000	RCFS
Gas cylinder for He	1 unit	23,750	23,750	RCFS
Gas cylinder for N2	1 unit	17,500	17,500	RCFS
Gas cylinder for H2	1 unit	17,500	17,500	RCFS
Glass column 1.1 m	4 units	1,125	4,500	RCFS
Glass column 2.1 m	4 units	1,625	6,500	RCFS
Glass column 3.1 m	4 units	2,375	9,500	RCFS
Packing material set	1 set	37,500	37,500	RCFS
Data processing unit, C-R7Ae	1 unit	272,500	272,500	RCFS
Split/splitness sample injector, SPL-14	1 unit	62,500	62,500	RCFS
Column packing accessories	1 unit	13,750	13,750	RCFS
Capillary column 25m, OV-1	1 unit	21,750	21,750	RCFS
Capillary column 25m, SE-52	1 unit	21,750	21,750	RCFS
Capillary column 25m, OV-1701	1 unit	21,750	21,750	RCFS
Capillary column 25m, PEG-20M	1 unit	21,750	21,750	RCFS
Small-sized soapfilm flowmeter	1 unit	2,500	2,500	RCFS

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	LOCATION
	Micro syringe, 1 micro liter	2 units	3,750	7,500	RCFS
	Micro syringe, 5 micro liter	2 units	4,500	9,000	RCFS
	Micro syringe, 25 micro liter	2 units	3,000	6,000	RCFS
	Electro capture cell, ECD-9	1 unit	85,250	85,250	RCFS
	Electro capture detector	1 unit	82,500	82,500	RCFS
	Spare & consumable parts:	1 set			
	injection rubber septum	5 units	150	750	RCFS
	o-ring for glass column 20 pc/set	5 sets	125	625	RCFS
	glass column joint	10 units	500	5,000	RCFS
	silica wool	5 units	500	2,500	RCFS
	chart paper 10pc/set	3 sets	8,750	26,250	RCFS
	graphic ferrule 4pc/set	10 sets	500	5,000	RCFS
	glass insert for split	5 units	875	4,375	RCFS
	glass insert for splitless	5 units	750	3,750	RCFS
	glass insert for glass column	5 units	625	3,125	RCFS
	nut for capillary column 10 pc/set	3 sets	1,125	3,375	RCFS
	graphite ferrule for capillary column 10pc/set	3 sets	1,500	4,500	RCFS
	graphite ferrule for capillary column 0.8 10pc/set	3 sets	1,500	4,500	RCFS
	nozzle for FID	4 units	1,250	5,000	RCFS
	floppy disk, 10pc/set	2 sets	3,000	6,000	RCFS
	TCD detector	1 unit	14,750	14,750	RCFS
	standard sample for FID	1 unit	2,000	2,000	RCFS
	standard sample for TCD	1 unit	2,000	2,000	RCFS
	standard sample for ECD	1 unit	2,000	2,000	RCFS
	oxygen trap	1 unit	11,750	11,750	RCFS
29.	Oven dryer, Yamato, DN 910	1 unit	266,000	266,000	San Mateo
	Oven dryer, Yamato, DN 910	1 unit	266,000	266,000	Midsayap

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
30.	Multi-auto counter	1 unit	245,000	245,000	San Mateo
	Multi-auto counter	1 unit	245,000	245,000	Midsayap
	Multi-auto counter	1 unit	245,000	245,000	ASD
31.	Infrared digital moisture meter, Model:FD-1(A)	1 unit	32,500	32,500	San Mateo
	Infrared digital moisture meter, Model:FD-1(A)	1 unit	32,500	32,500	Midsayap
32.	Seed blower, Seedburo Model:HF-1	1 unit	136,750	136,750	San Mateo
	Seed blower, Seedburo Model:HF-1	1 unit	136,750	136,750	Midsayap
	Seed blower, Seedburo Model:HF-1	1 unit	136,750	136,750	ASD
33.	Sampling thresher, Model:190-C	1 unit	161,250	161,250	PBBD
34.	Herbarium presser, Model SG-618	6 units	10,000	60,000	CPD
35.	Insect collection cabinet, Model:SG-481	2 units	123,000	246,000	CPD
36.	Digital vibration meter, 8534T21	1 unit	72,500	72,500	REM
37.	Drafter, MUTHO/RES2-12G	1 unit	37,500	37,500	REM
38.	Drafting table, Model: MUTHO/TH-20, with Drafting Board, Model: BM-12	1 set	30,500	30,500	REM
39.	Video projection system, consisting of:	1 set			
	Video projector, Model:VPH-1042QM	1 unit	408,000	408,000	TPD
	Remote control unit, Model:VPR-722S	1 unit	22,325	22,325	TPD
	Projector stand	1 unit	25,500	25,500	TPD
	Carrying Case, Model:VLC-1040	1 unit	26,250	26,250	TPD
	100" Flat screen, Model: VPS-100FH	1 unit	28,000	28,000	TPD
	Ceiling Fittings, Model:PSS-722	1 set	11,425	11,425	TPD
	Ceiling Fittings, Model:PSS-10	1 set	17,850	17,850	TPD
	Projector Cable, 25m, Model: CCQ-25BRS	1 unit	17,325	17,325	TPD
	Operation Manual (English), for VPH-1042QM	3 units	1,500	4,500	TPD
	Operation Manual (English), for VPR-722S	3 units	1,500	4,500	TPD
40.	Miniature thresher, Model: 191-B	1 unit	110,000	110,000	San Mateo
	Miniature thresher, Model: 191-B	1 unit	110,000	110,000	Midsayap

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
41.	pH meter with transformer, Model: PH-838	1 unit	50,000	50,000	San Mateo
	pH meter with transformer, Model: PH-838	1 unit	50,000	50,000	Midsayap
42.	Moisture meter, Model: PB-1D2	1 unit	52,500	52,500	San Mateo
	Moisture meter, Model: PB-1D2	1 unit	52,500	52,500	Midsayap
43.	Knapsack power sprayer, Model:250	1 unit	10,000	10,000	San Mateo
	Knapsack power sprayer, Model:250	1 unit	10,000	10,000	Midsayap
44.	Insect display case, Model:SG-422	10 units	2,750	27,500	CPD
45.	Lighting moth collector, Model:217-B	1 unit	95,250	95,250	CPD
46.	Rubber Boots	1 lot			
	23.0 cm	1 pr	2,525	2,525	PBBD
	24.0 cm	2 prs	2,625	5,250	PBBD
	25.0 cm	6 prs	2,625	15,750	PBBD
	25.5 cm	2 prs	2,625	5,250	PBBD
	26.0 cm	3 prs	2,625	7,875	PBBD
	27.0 cm	3 prs	2,625	7,875	PBBD
	28.0 cm	2 prs	2,750	5,500	PBBD
	29.0 cm	4 prs	2,750	11,000	PBBD
				9,503,900	
			plus 3% tax	285,117	
	Total (FY 1993: Shipped from Japan)			9,789,017	
C.	**Brought by JICA Experts**				
1.	Video camera sets, HI8 Handycam PROCCD-VXI, SONY	1 unit	104,625	104,625	TPD
2.	Printed base for GA-5 leaf area meter	1 unit	42,500	42,500	ASD
3.	Lighting moth collector	1 unit	94,750	94,750	CPD
4.	Chemical for Biotechnology	1 set	70,084	70,084	PBBD

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
5.	Accessories for "Kaye" Data Filder, 200V6005	1 lot			
	- Software X8035	1 pc	43,000	43,000	REM
	- Compact sensor interface V6015	1 pc	16,200	16,200	REM
	- Compact sensor interface cable (1 ft) W6005	1 pc	5,975	5,975	REM
	- RS-232 serial cable adapter, H0060	1 pc	975	975	REM
	- 25-pin cover, E0029	1 pc	1,700	1,700	REM
	- System battery charger, M3275	1 pc	4,250	4,250	REM
	- User's guide	1 pc	4,250	4,250	REM
6.	Personal Computer	1 set	71,250	71,250	ASD
	Total (Fy 1993: Brought by Experts)			459,559	
	TOTAL (FY 1993)			**13,944,480**	
III.	**FY 1994**				
A.	**Locally Purchased**				
1.	Micro-Centrifuge, Refrigerated, Tomy Seiko MRX-152	2 units	176,500	353,000	PBBD
2.	Heating Block, Yamato 213181	2 units	7,000	14,000	PBBD
3.	Vacuum Pump, Yamato PD-102	1 unit	60,000	60,000	PBBD
4.	PC Board Control Assembly, Yamato GA5A	1 unit	60,000	60,000	ASD
5.	Soil Cation Exchange Capacity Determination Apparatus, Harada-Yoshida Type, Ogawa Seiki OSK10319	4 units	44,750	179,000	ASD
6.	Soil Sampler for 100ml Cylinder, Ogawa Seiki OSK10678A	3 units	29,000	87,000	ASD
7.	Mill Laboratory, Yamato UT22	2 units	190,500	381,000	ASD

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
8.	Air Blast Seed Counter Cleaner, Seedburo SABSC/B	2 units	45,500	91,000	ASD
9.	Digital Lux meter, Ogawa Seiki OSK1138OR	1 unit	8,000	8,000	ASD
10.	Optional Gradient Maker with gradient gel adapter, Atto SJ-1220	1 unit	76,000	76,000	CPD
11.	Multiple Dialyzer, Cole-Parmer Spectra/Por 2	1 unit	45,000	45,000	CPD
12.	Micro Pipetter with tips, Nichiryo 800	1 unit	112,000	112,000	CPD
13.	Water Purification System, Millipore Mospuf	1 unit	305,000	305,000	CPD
14.	Cryogen Shippers, Iuchi 45-404-01	1 unit	60,000	60,000	CPD
15.	Blue Printing Machine, Diazit XL-120	1 unit	130,135	130,135	REM
16.	Diesel Engine, Yanmar LAODAE-SE	2 units	78,500	157,000	REM
17.	Portable Moisture Meter, Kett PM-600	1 unit	32,000	32,000	REM
18.	Near Infrared Reflectance Spectro., Perten 8620	1 unit	1,050,000	1,050,000	RCFS
19.	Camera, Nikon F801S	1 unit	93,000	93,000	SSPR
20.	Desktop Publishing System, IBM Compatible 486-DX	1 unit	483,938	483,938	TPD
21.	Process Camera, Dianippon Screen C-6500-D	1 unit	531,000	531,000	TPD
22.	Plate Maker, Polygraphics Graph X 1000	1 unit	227,950	227,950	TPD
23.	Slide Projector, Cabin AFII-2500	4 units	30,000	120,000	TPD
24.	Internal Diskette Drive, Teac 1.2 MB 3.5"	1 unit	4,000	4,000	PCPO
25.	Software Programme, SAS Institute Ver 6.04/DOS	1 unit	85,000	85,000	PCPO
26.	Tape Back-Up System, Mountain 1.0 CB SCSI	1 unit	152,000	152,000	PCPO
27.	Camera, Canon Autoboy Zoom 105	1 unit	13,000	13,000	PCPO
28.	Journals and Books	1 lot	750,000	750,000	Library
29.	Seed Counter, Manual, Ogawa Seiki OSKIO200A	4 units	750	3,000	Midsayap, San Mateo
30.	Brush Cutter, Ryobi EK-325	10 units	18,000	180,000	Midsayap, San Mateo
31.	Seed Blower, Seedburo 757 etc.	2 units	66,000	132,000	Midsayap, San Mateo

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
32.	Handy Tally Counter, Seedburro HT	20 units	1,200	24,000	Midsayap, San Mateo
33.	Reaper, Kubota AR120	2 units	174,500	349,000	Midsayap, San Mateo
34.	Spare Parts and consumables for Mitsubishi L-200	1 lot	91,900	91,900	Supply
	Total (FY 1994: Locally Purchased)			6,439,923	
B.	**Shipped from Japan**				
1.	T-shape manifold for FD-81, PMH-24	1 set	74,000	74,000	PBBD
2.	Adapter, Y-TB-12	24 units	1,075	25,800	PBBD
3.	Freezer, U-21M, w/ transformer	1 set	115,750	115,750	PBBD
4.	Ion Chromatograph, LC-10A	1 lot			
	- Liquid pump, LC-10AD	1 unit	170,000	170,000	ASD
	- Automatic washer kit	1 unit	6,375	6,375	ASD
	- Degassing unit, DGU-4A	1 unit	88,250	88,250	ASD
	- System controller, SCL-10A	1 unit	270,000	270,000	ASD
	- Auto injector, SIL-10A	1 unit	94,500	94,500	ASD
	- Manual injector, 7725	1 unit	37,500	37,500	ASD
	- Column oven, CTO-10A	1 unit	152,000	152,000	ASD
	- Electric conductivity detector, CDD-6A	1 unit	148,250	148,250	ASD
	- Reservoir box	1 unit	12,250	12,250	ASD
	- Data processing apparatus, C-R7Aplus	1 unit	305,000	305,000	ASD
	- Optical fiber cable	1 pc	980	980	ASD
	- SUS pipe, 1.6 x 0.1 2m	1 pc	980	980	ASD
	- CO2 gas trap	1 pc	4,125	4,125	ASD
	- Column, Shim-pack, IC-A1	1 pc	41,750	41,750	ASD
	- Column, Shim-pack, IC-C1	1 pc	41,750	41,750	ASD
	- Column, Shim-pack, IC-A3	1 pc	56,350	56,350	ASD

ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
- Column, Shim-pack, IC-C2	1 pc	56,350	56,350	ASD
- Guard column for above, Shim-pack IC-GA1	1 pc	15,925	15,925	ASD
- Guard column for above, Shim-pack IC-GC1	1 pc	15,925	15,925	ASD
- Guard column for above, Shim-pack IC-GA3	1 pc	18,875	18,875	ASD
- Guard column for above, Shim-pack IC-GC2	1 pc	18,875	18,875	ASD
- Micro syringe, 25/50/100 microliter (each 2 pcs/set)	1 set	13,650	13,650	ASD
- Option box, L	1 pc	105,850	105,850	ASD
- Spare part & consumables:				
Thermal printing paper	3 pcs	8,825	26,475	ASD
Plunger assy	1 pc	2,035	2,035	ASD
Plunger seal	10 pcs	1,575	15,750	ASD
Check valve, in	1 pc	3,825	3,825	ASD
Check valve, out	1 pc	4,050	4,050	ASD
Suction filter	1 pc	1,900	1,900	ASD
Halogen lamp	1 pc	2,975	2,975	ASD
D2 lamp	1 pc	14,700	14,700	ASD
Ferrule 1.6 Teflon 5pcs/box	1 box	810	810	ASD
Nut, 1.6FN	1 pc	175	175	ASD
Plug, 1.6 assy	1 pc	930	930	ASD
Male tee, 1.6MT	1 pc	1,128	1,128	ASD
Ferrule 1.6F, 10pcs/box	1 box	550	550	ASD
Union, 1.6U	1 pc	400	400	ASD
Adapter, 0.4	1 pc	588	588	ASD
Plug, 1.6P, 10pcs/box	1 box	1,625	1,625	ASD
Coupling, 0.4	1 pc	600	600	ASD
Male nut, 1.6MN, 10 pcs/nut	1 box	888	888	ASD
Female tee, 1.6FT	1 pc	1,600	1,600	ASD

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
	Teflon tube, 1.6x0.4	1 pc	980	980	ASD
	Floppy disk, 10 pcs/box	1 box	3,925	3,925	ASD
5.	Lighting moth collector, 217-B	5 units	107,500	537,500	CPD
6.	Noxious insect rearing box, 235-B	5 pcs	9,500	47,500	CPD
7.	Band saw, L-300, with standard accessories,	1 set	170,500	170,500	REM
	spare blade (6mm x 30m)	5 pcs	2,400	12,000	REM
8.	Combination press brake, slip roll & shear with stand, 2384A73/2384A78 (SBR-24/SRS-24)	1 set	58,500	58,500	REM
9.	Arbor press, 2426A67 (3A)	1 set	93,750	93,750	REM
10.	Rotary sheet metal forming machine, 2435A74 (164006221)	1 unit	33,175	33,175	REM
	Single beading rolls, 2435A79 (35000029)	1 set	2,525	2,525	REM
	Slitting & trimming rolls, 2435A82 (350700068)	1 set	6,700	6,700	REM
11.	Floor model box and pan hand bending brake, 2437A32 (HBU48-12)	1 set	129,250	129,250	REM
12.	Single blade cutter, 3090A15 (Type: 00)	5 pcs	10,500	52,500	REM
	Single blade cutter, 3090A24 (Type: 422)	10 pcs	1,263	12,625	REM
13.	Hand tractor and accessories:				
	- Hand tractor, ISEKI Model: KVA90KGRVM	4 units	142,000	568,000	Midsayap
	S/No. 000604 E/No. 154564				
	S/No. 000605 E/No. 154560				
	S/No. 000606 E/No. 154552				
	S/No. 000607 E/No. 154559				
	with 4 sets of front weight & implements				
	- Harrow, No. 208	4 sets	8,850	35,400	Midsayap
	- Plow, NIPLO (MATSUYAMA) Model: MR-83N	4 sets	11,625	46,500	Midsayap
	- Wheel, Paddling 4-4F70-7	4 sets	9,600	38,400	Midsayap

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	LOCATION
14.	Accessories for auto analyzer				
	- Glass fitting, 178-G202-01	1 pc	3,105	3,105	RCFS
	- Splitter saphire, 3-points, 116-B332-01	1 pc	8,250	8,250	RCFS
	- Heating bath assy, 157-B273-32	1 pc	60,600	60,600	RCFS
	- Temperature controller, AA2-3002-01	1 pc	20,908	20,908	RCFS
	- HB thermometer, 157-0283-10	1 pc	4,850	4,850	RCFS
	- Glass fitting A2 modified, 116-0200-Pt	1 pc	7,120	7,120	RCFS
	- Filter, (600nm), 112-0340-24	1 pc	7,575	7,575	RCFS
	- Standard tube, 12pcs/set, 116-0549-PO3	1 set	1,525	1,525	RCFS
	- Standard tubing, 116-0536-04	1 m	305	305	RCFS
	- Air bar tube, (40cm x 6), 116-0581-PO1	1 set	5,555	5,555	RCFS
	- Transmission tube, 562-2009-01	3 m	380	1,140	RCFS
	- Transmission tube, 562-2000-01	1 m	380	380	RCFS
15.	Rotary shaker & flask stand, KR-3N with standard accessories, metal ring for flask	1 set	45,500	45,500	RCFS
16.	Quadrat sampling winnower, B-2 with standard accessories	4 sets	83,000	332,000	CPD
17.	Quadrat sampling winnower, 188 (PS) with standard accessories	2 sets	161,000	322,000	CPD
18.	Centrifugal pump, YANMAR Model: YKS-2DFW, Suction hose, 5m (4), S/No.50723160 Delivery hose, 30m (4), S/No. 50723163	4 units	75,750	303,000	Midsayap
19.	Hollow cathode lamp for atomic abosorption spectrophotometer,				
	Hollow cathode lamp, Mo HLA 4S	1 pc	11,125	11,125	ASD
	Hollow cathode lamp, Mo HLA 4S	1 pc	10,625	10,625	ASD
	Hollow cathode lamp, Mo HLA 4S	1 pc	12,625	12,625	ASD
	Hollow cathode lamp, Mo HLA 4S	1 pc	10,625	10,625	ASD

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
	Hollow cathode lamp, Mo HLA 4S	1 pc	10,625	10,625	ASD
	Hollow cathode lamp, Mo HLA 4S	1 pc	12,625	12,625	ASD
20.	Rice insect collecting case, 209-E	5 pcs	18,950	94,750	CPD
21.	Digimatic caliper,				
	500-152, 200mm	1 pc	3,663	3,663	REM
	500-303, 300mm	1 pc	4,675	4,675	REM
22.	Digital stopwatch, SVAD009	5 pcs	1,900	9,500	REM
23.	Digital micrometer,				
	- 293-721-30	1 pc	5,680	5,680	REM
	- 293-722-30	1 pc	6,625	6,625	REM
24.	Pocket tachometer, TM-300	1 pc	7,500	7,500	REM
25.	Platinum crusible, 091-33-66-25	3 pcs	70,668	212,003	ASD
26.	Quadrat sampling hulier, 185-D(H-25M)	1 unit	161,750	161,750	ASD
27.	Motor, HO7129-40, AC230V, 60Hz, 1-PH, 1.0HP	1 unit	27,500	27,500	REM
28.	Motor, HO7129-50, AC230V, 60Hz, 3-PH, 1.5HP	1 unit	22,500	22,500	REM
29.	Open reel tape deck, TEAC ATR-60-2NCM, AC 220V, 60Hz, 1-PH, w/ console rack	1 unit	375,000	375,000	TPD
30.	Slide file cabinet, FUJI color P-5400 w/ hunger 270 pcs, fungicide 15 pcs additional slide file (35mm); 3pcs AC100V Model	2 units	47,500	95,000	TPD
31.	Transformer, for slide cabinet, TOEI TD-1.5 input 220-240V, output 100V, capacity 150VA	2 units	1,000	2,000	TPD
32.	Quadrat sampling winnower, EVERWELL 188 (PS) AC 220V, 60Hz, 1-PH	1 unit	152,500	152,500	PBBD
33.	Gasoline engine, FUJI-Robin ECO8S 2200 rpm, 3.3 HP, 2 cycle	2 units	7,250	14,500	REM
34.	Gasoline engine, FUJI-Robin EY20B 2000 rpm, 5.0 HP, 4 cycle	2 units	7,500	15,000	REM

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
35.	Crude fiber apparatus, Fiber-matic Mitamura CFM-6, AC 220V, 60Hz, 1-PH w/ standard accessories - Melting pot: 6 pcs - Water tank for boiler, 20 1:1 pc - Waste water collectiing bottle, 13.25 1:1pc	1 unit	712,500	712,500	RCFS
36.	Quadrat sampling huller, Everwell 185-D (H-25M) AC 220V, 60Hz, 1-PH	1 unit	155,000	155,000	PBBD
37.	Diesel engine, YANMAR L48AE-S, 1800 rpm, 4.2 HP, air cooling	1 unit	40,000	40,000	REM
38.	Diesel engine, YANMAR L70AE-S, 1800 rpm, 6.0 HP, air cooling	1 unit	44,500	44,500	REM
39.	Quadrat sampling huller, Everwell 186 B-2	2 units	80,000	160,000	Midsayap, San Mateo
40.	Salt analyzer, TOA SAT-210 w/ standard accessories, AC 220V, 60Hz, 1-PH	2 units	150,000	300,000	Midsayap, San Mateo
41.	Digital conductivity meter, HORIBA DS-14RS, AC220V, 60Hz	2 units	75,000	150,000	Midsayap, San Mateo
42.	Soil auger, EVERWELL 300-F, post hole type, MSDE of steel	2 units	22,500	45,000	Midsayap, San Mateo
43.	Grain sieves, EVERWELL 107, round perforations	2 units	10,000	20,000	Midsayap, San Mateo
44.	Grain sieves, EVERWELL 106, slot perforations	2 units	17,000	34,000	Midsayap, San Mateo
45.	Meteograph, LPH-100-RD w/ transformer	1 unit	203,500	203,500	PBBD
	Total (FY 1994: Shipped from Japan)			8,088,500	
			plus 3% tax	242,655	
				8,331,155	
C.	**Brought by JICA Experts**				

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
1.	Logger, KADEC-US TSET	1 unit	45,900	45,900	ASD
2.	Sunshine Recorder, KDC-ST63	1 unit	56,700	56,700	ASD
3.	Personal Computer, COMPAQ PRESARIO 433	1 set	101,385	101,385	JICA
4.	Thermometer solar radiation sensor Type A "Model No.OW-6", all weather type	1 unit	83,400	83,400	Weather Station
5.	Dyna vane converter, Model No.64-R1	1 unit	23,575	23,575	Weather Station
6.	Stereo microscope, Nikon SMZ-2T-2	1 set	65,000	65,000	CPD
	- F-mount photograph adapter	1 pc	8,500	8,500	CPD
	- Lens, CF PL-5X	1 pc	3,400	3,400	CPD
	- Spare lamp	2 pcs	425	850	CPD
7.	Bag for rice insect	1 unit	11,250	11,250	CPD
8.	Seed tray	300units	74	22,200	PBBD
9.	Grain moisture tester, PM-700	1 unit	33,000	33,000	RCFS
10.	Grain moisture tester, PB-1D2	1 unit	46,200	46,200	RCFS
11.	Testing rice polisher, Pearliest	1 unit	12,100	12,100	RCFS
12.	Testing rice husker, TR110	2 units	1,300	2,600	RCFS
13.	Rice diaphanoscope	2 sets	875.00	1,750.00	PBBD
14.	Nitrogen distilation apparatus, Kiriyama	2 sets	24,325	48,650	ASD
15.	Electronic balance, Mettler PM200	1 unit	51,213	51,213	ASD
16.	Conductivity meter, B-173	1 unit	6,170	6,170	ASD
17.	Twin pH meter, B-211	1 unit	5,050	5,050	ASD
18.	Personal mill with transformer, SCM-40A	2 sets	5,250	10,500	ASD
19.	Soil water extractor, Easy Type DIK-3960	2 units	3,238	6,476	ASD
	Total (FY 1994; Brought by Experts)			645,869	
	TOTAL (FY 1994)			15,416,947	

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
IV.	**FY 1995**				
A.	**Locally Purchased**				
1.	Miniature thresher, Everwell 191-B JR-7	1 unit	172,600	172,600	PBBD
2.	Film processor, Kodak M35 X-OMAT	1 unit	470,600	470,600	PBBD
3.	Ultrasonic cleaner, Cole Parmer H-08894-15,	1 unit	84,555	84,555	PBBD
	perforated tray, Cole Parmer H-08854-42	1 unit	9,510	9,510	PBBD
4.	Photosynthesis analyzer, Licor LI-6400	1 unit	1,041,032	1,041,032	ASD
5.	Data logger, Licor LI-1000-32 with accessories	1 unit	67,350	67,350	ASD
	- AC adapter, LI-1000-03-3630	1 unit	3,630	3,630	ASD
	- Communication software, LI-1000-90-2921	1 unit	2,921	2,921	ASD
	- Carrying case, LI-1000-07-2158	1 unit	2,158	2,158	ASD
6.	Small light quantum sensor, Licor LI-190SA	1 unit	25,200	25,200	ASD
7.	Small solar radiation sensor, Licor LI-200SA	1 unit	15,000	15,000	ASD
8.	Ion meter, Jenway 3040/P with	1 unit	53,765	53,765	ASD
	- Sulphide electrode, 924104	1 unit	5,241	5,241	ASD
	- Nitrate electrode, 924113	1 unit	5,474	5,474	ASD
9.	Mixer for small containers, Yamato MT-51	1 unit	30,000	30,000	ASD
	Mixer for small containers, Yamato MT-51	1 unit	30,000	30,000	CPD
10.	Microwell module and frame, Iwaki 431077	1 unit	26,500	26,500	CPD
11.	Multiple dializer, Thomas Scientific 3782-H20	1 unit	28,000	28,000	CPD
12.	Microplate washer, Dynatech 000-0060-14	1 unit	168,130	168,130	CPD
13.	Cryogenic safe box, Iwaki NL5055-5005	10 units	750	7,500	CPD
	Iwaki NL5055-5015	10 units	750	7,500	CPD
14.	Fume adsorber, NK system VET-850G	1 unit	62,000	62,000	CPD
15.	Gasoline engines, Robin EY 15B	2 units	19,000	38,000	REM
	Gasoline engines, Robin EY 28B	2 units	29,500	59,000	REM
	Gasoline engines, Robin EY 40B	2 units	40,900	81,800	REM

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
16.	Air velocity and temperature meter, Cole-Parmer H-05710-02	2 units	29,550	59,100	REM
17.	Miniature anemometer, Cole-Parmer H-10270-22	1 unit	23,415	23,415	REM
18.	Electric motors	1 lot			
	- 1/2 Hp 3450rpm 60Hz 115/208-230 V	1 unit	5,000	5,000	REM
	- 1 1/2 Hp 1750rpm 60Hz 115/208-230 V	1 unit	7,300	7,300	REM
	- 1 1/2 Hp 3450rpm 60Hz 115/208-230 V	1 unit	7,300	7,300	REM
	- 5 Hp 1750rpm 60Hz 115/208-230 V	1 unit	10,800	10,800	REM
	- 1/2 Hp 1725rpm 60Hz 115/208-230 V	1 unit	5,000	5,000	REM
	- 1 Hp 1725rpm 60Hz 115/208-230 V	1 unit	5,600	5,600	REM
	- 3/4 Hp 1725rpm 60Hz 115/208-230 V	1 unit	5,500	5,500	REM
	- 2 Hp 3450rpm 60Hz 115/208-230 V	1 unit	7,900	7,900	REM
	- 3 Hp 1750rpm 60Hz 115/208-230 V	1 unit	9,400	9,400	REM
	- 1/3 Hp 1725rpm 60Hz 115/208-230V	1 unit	4,900	4,900	REM
19.	Clip-on wattmeter, Yokogawa 2433 11	1 unit	38,300	38,300	REM
20.	Electric angle wheel grinder, Makita 952-NB	1 unit	4,200	4,200	REM
21.	Electric drill, Makita 6013BR	1 unit	7,100	7,100	REM
22.	Blind rivet gun, Lubster	2 units	3,300	6,600	REM
23.	Computer for Near Infrared Reflectance, Philips ES400	1 unit	63,679	63,679	RCFS
24.	Extrusion cooking system, Italgi Gina	1 unit	158,700	158,700	RCFS
25.	Accessories for Hitachi U-3210 Spectrophotometer				
	- Cuvette, Hitachi 123-1004	3 units	20,500	61,500	RCFS
	- Deuterium lamp, Hitachi 239-0354	2 units	12,500	25,000	RCFS
	- Tungsten-iodine lamp, Hitachi 151-1009	2 units	3,500	7,000	RCFS
28.	Accessory for TECATOR 1030	1 unit	23,845	23,845	RCFS
	- Printer circuit card for steam generator control circuit, TECATOR 10002904				

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
29.	Casette deck, TEAC V-1010	1 unit	23,700	23,700	TPD
30.	Microphone discussion system, Philips CCS400	1 set	4,900	4,900	TPD
	- Power supply unit, LBB 3300/05	1 unit	92,690	92,690	TPD
	- Chairman's unit, LBB 3351/04	1 unit	30,393	30,393	TPD
	- Delegate's unit, LBB 3350/04	15 units	25,166	377,490	TPD
	- Extension cable	1 unit	5,000	5,000	TPD
31.	File server, ACER Altos 700/id Pentium	1 unit	191,800	191,800	PCPO
32.	SAS for Windows, SAS Institute	1 lot	5,300	5,300	PCPO
	Base SAS	1 set	19,610	19,610	PCPO
	SAS/Graph	1 set	18,285	18,285	PCPO
	SAS/Assist	1 set	18,285	18,285	PCPO
	SAS/AF	1 set	16,324	16,324	PCPO
	SAS/FSP	1 set	16,324	16,324	PCPO
	SAS/ETS	1 set	15,026	15,026	PCPO
	SAS/IML	1 set	15,026	15,026	PCPO
	SAS/STAT	1 set	15,026	15,026	PCPO
	SAS/OR	1 set	15,026	15,026	PCPO
33.	Seed germinator, Fujiwara TG-20	1 unit	236,900	236,900	SPHD
34.	Books and journals	1 lot	389,574	389,574	Library
35.	Incubator, Yamato IC800	1 unit	141,000	141,000	Midsayap
	Incubator, Yamato IC800	1 unit	141,000	141,000	San Mateo
36.	Compound microscope, Galen III	1 unit	71,580	71,580	Midsayap
	Compound microscope, Galen III	1 unit	71,580	71,580	San Mateo
37.	Reaper, Kubota AR120	1 unit	196,500	196,500	Agusan
38.	Top loading balance, Cole Parmer H-11001-42	1 unit	60,300	60,300	Agusan
39.	Moisture meter, Motomco 919	1 unit	41,350	41,350	Agusan
	Total (FY 1995: Locally Purchased)			5,274,594	

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
B.	**For Purchase in Japan**				
1.	Grain classifier/Seed grader	1 unit			PBBD
2.	Attachment to existing microscope	1 unit			PBBD
3.	Leaf press	1 unit			CPD
4.	Density gradient fractionator	1 unit			CPD
5.	Air-screen cleaner and grader	1 unit			SPHD
6.	Distiller	1 unit			Midsayap
		1 unit			San Mateo
7.	Clean bench	1 unit			Midsayap
		1 unit			San Mateo
8.	Autoclave	1 unit			Midsayap
		1 unit			
	Total (FY 1995: For Purchase in Japan)			4,392,000	
C.	**Brought by JICA Experts**				
1.	Personal computer, Gateway 2000	1 set	53,250	53,250	SSPR
2.	Computer softwares, MS-Basic, MS-Visual, IBM OS/2 Warp, IBM C++	1 set	52,975	52,975	SSPR
3.	Cone penetrometer, DIK-5520	1 unit	55,000	55,000	ASD
4.	Record paper and ceramic pens	1 lot	6,845	6,845	ASD
5.	Overdrive processor, JBOXDX4ODPR100	1 set	19,050	19,050	REM
	- Memory unit, VMB-8M & mouse				REM
6.	Consumables for printer, Canon BJ600J	1 lot	2,070	2,070	REM
7.	Motor driven sprayer, MG-471	1 unit	21,675	21,675	REM
8.	Hand duster, G-9	1 unit	1,950	1,950	REM
9.	Data recorder, cables, softwares KADEC-US	1 lot	61,275	61,275	REM

	ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (In Pesos)	LOCATION
10.	Stereo microscope, SMZ-2B-2	1 lot	57,325	57,325	CPD
11.	Boots, diff. sizes	1 lot	21,600	21,600	PBBD
12.	Chlorophyll meter, SPAD-502	1 unit	29,500	29,500	ASD
13.	Cone penetrometer, DIK-5520	1 unit	68,250	68,250	ASD
14.	Consumables for penetrometer	1 lot	2,475	2,475	ASD
15.	Soil water extractor, Easy type DIK-3960	1 lot	9,750	9,750	
16.	Video camera, Sony CCD-RV100 & accessories	1 lot	57,825	57,825	REM
17.	Grinding machine, THU35A	1 unit	148,250	148,250	PBBD
18.	Camera w/ accessories, EOS 5	1 lot	35,750	35,750	TPD
19.	Monitor interface, 5328 for Magnabyte computer projection	1 unit	17,500	17,500	
	Total (FY 1995: Brought by Experts)			722,315	
	TOTAL (FY 1995)			**10,388,909**	

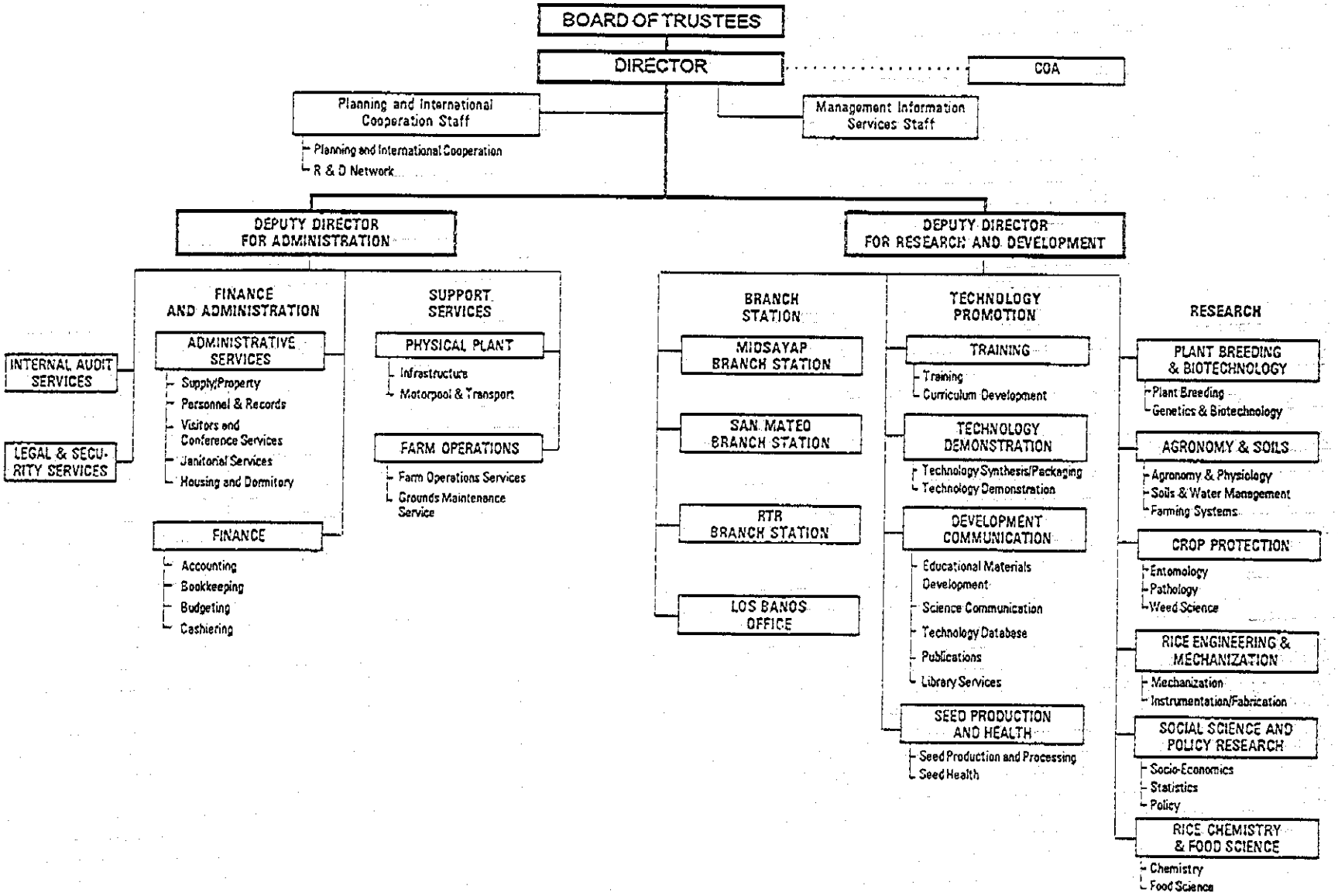
PBBD: Plant Breeding and Biotechnology Division ASD: Agronomy and Soils Division
CPD: Crop Protection Division REM: Rice Engineering and Mechanization Division
RCFS: Rice Chemistry and Food Science Division SSPR: Social Science and Policy Research Division
TPD: Technology Promotion Department SPHD: Seed Production and Health Division
Midsayap: PhilRice Midsayap Branch San Mateo: PhilRice San Mateo Branch
Agusan: PhilRice Agusan Branch

Appendix 3. Philippine Rice Research Institute, Corporate Operating Budget, FY 1992-1996.

PARTICULAR	AMOUNT (₱ '000)				
	1992	1993	1994	1995	1996
A. General Administrative & Support Services	16,575	23,902	24,069	26,623	25,110
B. Support to Operations					
Seed Production & Health	5,114	6,347	4,737	7,821	14,778
Farm Operations	1,743	1,913	2,600	2,475	2,713
Sub-total	6,857	8,260	7,337	10,296	17,491
C. Operations					
Research:					
Rice Varietal Improvement	12,697	11,613	15,804	16,606	21,092
Planting & Fertilizer Management	5,703	5,827	10,045	9,839	9,800
Rice-Based Farming Systems	1,281	1,145	2,165	1,485	1,820
Integrated Pest Management	4,859	4,451	8,912	11,255	11,694
Rice Engineering & Mechanization	2,892	2,539	4,924	4,727	6,516
Social Science & Policy Research	2,081	1,994	3,972	2,491	4,335
Rice Chemistry & Food Science	1,668	1,502	4,450	2,547	4,968
Sub-total	31,181	29,071	50,272[a]	48,950	60,225[a]
Technology Transfer					
Technology Demonstration				8,283	5,193
Training				3,457	6,767
Communication & Publication				4,909	6,696
Sub-total	7,281	9,460	23,438[b]	16,649	18,656
Support to the Network		1,800	34,299[c]	5,541	10,014
TOTAL	61,894	72,493	139,415	108,059	131,496

[a] Includes congressional initiative of ₱8.5 M (Net of 15% reserve)
[b] Includes congressional initiative of ₱8.5 M (Net of 15% reserve)
[c] Includes congressional initiative of ₱17.0 M (Net of 15% reserve)
[d] Includes congressional initiative of ₱16.0 M (Net of 20% reserve)

4. PhilRice Organizational Structure

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