付属資料②　合同委員会（95年４月）資料

THE JICA TECHNICAL COOPERATION FOR THE
PHILIPPINE RICE RESEARCH INSTITUTE

1994 ANNUAL REPORT
and
1995 WORKPLAN

Presented during the

Second Annual Meeting of the
Joint Committee for the Implementation of the Project

05 April 1995
DA-OSEC Conference Room
Department of Agriculture, Diliman, Quezon City

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I. INTRODUCTION

1. *The Philippine Rice Research Institute*

The Philippine Rice Research Institute (PhilRice) was created on November 5, 1985 through Executive Order No. 1061, 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 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. The request was granted 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 and has significantly strengthened the R&D capabilities of PhilRice, as a lasting legacy of Japan to the Filipino farmers.

3. *The Technical Cooperation Project*

In support of the mandate of PhilRice and the grant aid project, a second JICA assistance in the form of a Project-type Technical Cooperation was proposed in June 1989 and was 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.

The technical cooperation project has three components:

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.

II. THE JOINT COMMITTEE FOR THE IMPLEMENTATION OF THE PROJECT

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 formulated under the framework of the R/D;

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

c. review and exchange views 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, 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. Roberto S. Sebastian
Vice Chairman		
	Undersecretary for Research, Training and Extension, DA	Dr. Manuel M. Lantin
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. Akihiko Hashimoto
5.	Director, DA-Bureau of Agricultural Research	Dr. Manuel M Lantin Officer-in-Charge
6.	Chief, Project Packaging Division, DA-International Agricultural Development Cooperation Coordinating Office	Ms. Zenaida Villegas Officer-in-Charge
7.	Director, Public Investment Staff, National Economic and Development Authority (NEDA)	Dr. Ernesto D. Bautista
8.	Director, Project Monitoring Staff, NEDA	Mr. Rolando Tungpalan
9.	Deputy Director for Research, Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD)	Dr. Beatriz del Rosario
10.	Dean, College of Agriculture, University of the Philippines Los Baños	Dr. Cecilio Arboleda
11.	Personnel concerned to be dispatched by JICA, if necessary.	
12.	Official(s) of the Embassy of Japan may attend as observer(s).	

III. Progress Report of T. S. I.

TENTATIVE SCHEDULE OF IMPLEMENTATION (ITEMIZED)

Field/Item	Year 1992 Aug.	1993	1994	1995	1996	1997 July	Remarks
1. Research and Training Plan							
1) Research Planning							
a. Evaluation of present research work	XXXXXXXXXXXXXX						Present situation of rice production was investigated. Relationship between rice yield and meteorological condition was analyzed. Midterm evaluation of the project was conducted.
b. Emphasis of research subjects							
2) Effective Training Design							
a. Effective application of extension materials		X					
b. Efficient transfer of newly developed technology							
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	XXXXXXXXXXXXX						To determine genetic potential based on growth performance, 91 varieties (45 Japonicas and 46 Indicas) in dry season (DS) and 101 varieties (36 and 65, respectively) in wet season (WS) were planted four times, and their traits were examined.

_____: Master Plan XXX: Implementation (as of March 1995) _ _ _ _ _: As needed

Field/Item	Year: 1992 Aug.	1993	1994	1995	1996	1997 July	Remarks
b. Hybridization		XXXXXXXXXXXX					To introduce desirable genes into the popular Philippine varieties, 61 crosses in DS and 14 crosses in WS were made with specific emphasis on the Indica/Japonica cross.
c. F1 raising test			XXXXXXXX				40 F1's were verified as hybrid in DS and 60 F1's in WS.
d. Individual and pedigree selection			XXXXXXX				In the single-plant selection, 629 F2 plants out of 28 crosses were selected in DS and 420 F2 out of 25 in WS.
e. Performance test							In the pedigree line selection in WS, 153 F3 lines were selected out of 25 crosses.
f. Development of parental lines with tungro resistance		XXXXXXXXXXXX					To introduce the Tungro resistance genes from local varieties or the mutant lines of IRRI into the leading varieties, 38 crosses were made in DS and seven crosses in WS at PhilRice. For F1 nursery, 11 crosses in DS and 33 in WS. On site breeding: 12 F2 segregating populations and 14 F3 crosses with 80 pedigree lines were raised in a hot spot of Mindanao for selection, in which none of the populations resistant while two lines out of two crosses were rated intermediate, and selected.
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		XXXXXXXXXXXX					With cold-resistant varieties of Japonica, 32 crosses were made in DS and nine crosses in WS at PhilRice. For F1 nursery, 12 crosses in DS and 17 in WS.

_____: Master Plan XXX: Implementation (as of March 1995)

Field/Item	Year 1992 Aug.	1993	1994	1995	1996	199 July	Remarks
b. Individual and pedigree selection			XXXXXXX				On-site breeding: At cool elevated fields in Banaue, Ifugao and La Trinidad, Benguet, 147 plants out of 12 crosses were selected in DS but in the succeeding WS, all were sterile due to cold damage. Twelve segregating populations raised in WS were also sterile. From another set of breeding materials in Benguet, 17 cold-tolerant lines were selected out of 10 crosses. Among them, 2 family lines, designated as PJ 1 and PJ 2, were promising.
c. Performance test							
3. Soils and Fertilizers							
1) Development of fertilizer management technology for various agro-climatic conditions in rice growing areas							
a. Analysis of the past data in main rice production areas		XXXXXXXXXXXXX					Data on rice yields, fertilizer management, cropping practices etc., collected from Central Luzon, Bicol, and Central Visayas have been analyzed.
b. Classification of the nitrogen uptake patterns of rice plants at different fertilizer levels		XXXXXXXXXXXXX					Nitrogen content of rice plants is being determined and is being analyzed.
c. Determination of the nitrogen fertility of soils by biological method		XXXXXXXXXXXXX					Nitrogen mineralization of 25 soil samples was determined and nitrogen fertility of soils is being analyzed.
d. Development of simple method for determining the nitrogen fertility of soils			XXXXXXXXXXX				Chemically extractable nitrogen is being determined using several solutions. However, no method which has high correlation with biological method was found yet.

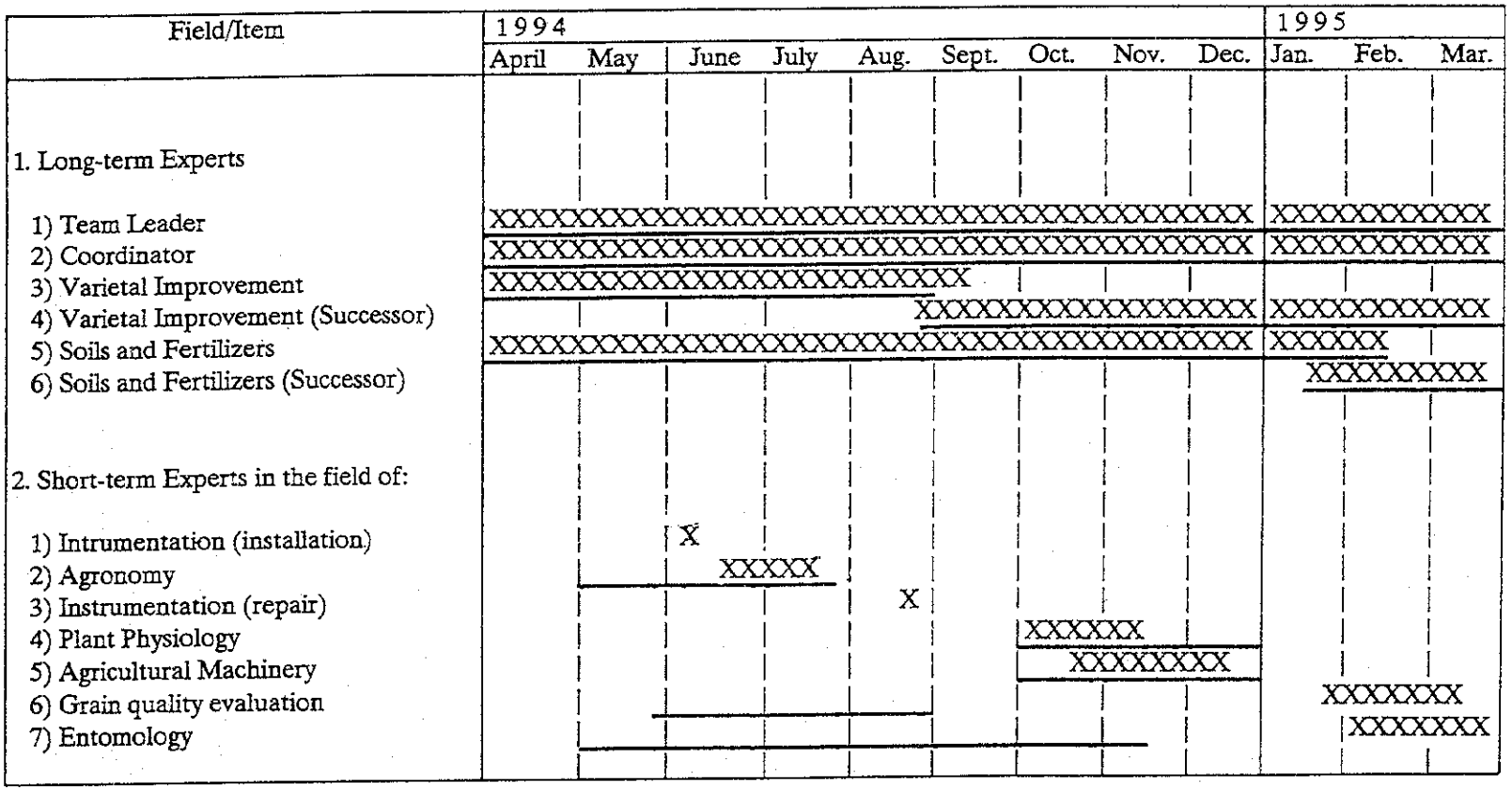
_____: Master Plan XXX: Implementation (as of March 1995)

Field/Item	Year 1992 Aug.	1993	1994	1995	1996	199 July	Remarks
e. Development of nitrogen fertilization technology			XXX				Field trials are being conducted.
2) Establishment of models that will predict responses of rice growth with different levels of fertilizer							
a. Analysis of the meteorological data of main rice production areas.		XXXXXXXXXXXX					Meteorological data of 21 locations have been analyzed.
b. Determination of the growth parameters of rice		XXXXXXXXXXXX					Data on plant height, tiller number, and dry matter weight have been analyzed.
c. Establishment of crop models		X	X				Preliminary crop models were developed.
4. Agonomy, Plant Protection, Agricultural Machinery, and Other fields (Short-term Experts will be dispatched)							
1) Improvement of cropping pattern			X				New methodology to integrate high yielding rice cultivation with combination of DS crop. A program for estimation of nitrogen mineralization in soils was introduced.
2) Integrated insect pest management		X		X			
3) Farm mechanization		X	X X				Development of "Maligaya reaper" and paddy seeder was conducted.
4) Other fields			XX	X			Physico-chemical and sensory methods were examined for grain quality evaluation. Anther culture method was examined for rice improvement.

_____: Master Plan XXX: Implementation (as of March 1995) _ _ _ _ _: As needed

IV. Annual Review of Technical Cooperation

1. Dispatch of Japanese Experts



_____: Master Plan, XXX: Implementation (as of March 1995)

2. Training of Philippine Personnel in Japan

Field	Name (Position)	Training Period	Affiliation (Destination)
1) Information Network	Ms. Virginia F. RECTA (Sr. Sci. Research Specialist)	1994.04.13 - 1994.08.27	Okinawa International 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 I)	1994.05.07 - 1994.10.29	National Agriculture Research Center (NARC)
4) Farm Management	Dr. Sergio R. FRANCISCO (Supv. Sci. Research 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)

* : Scheduled in FY 1994
Fiscal Year in Japan begins 01 April and ends 31 March of the following calendar year.

3. Provision of Machinery and Equipment

1) Purchased in the Philippines
FY 1994 P 6,440,000

2) Imported from Japan
FY 1994 6,703,000

3) Brought by experts
FY 1994 848,000

IV. Highlights of the Accomplishments on the TSI in 1994

4.1. Research Planning

4.1.1. Labor Productivity in Rice Production

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.

Method

As the background of the research planning, the labor productivity in rice production in the Philippines was analyzed and compared with those of other neighboring countries, using FAO Production Yearbook and the data collected by the Social Science Policy and Research Division (SSPRD), PhilRice.

Results

(1) Paddy Yield per hectare in the Philippines is relatively low compared to that of the neighboring countries, although it is higher than those of Thailand, Bangladesh, and India (Table 1).

(2) The percentage of the economically active population in agriculture to the total economically active population is relatively low compared with those of other Asian countries. A farmer supports a relatively high population and cultivates a relatively wide arable farmland (Table 2).

(3) On the other hand, the number of tractors and harvesting machine-threshers is small considering the arable farmland area per tractor and total area of cereals harvested per harvesting machine-thresher (Table 3). This implies that mechanization in rice production is still of low level, as shown in Table 4.

(4) In the whole process of rice production, the biggest portion of more than 60% of labor is shared by harvesting and threshing, while in Japan this is less than twenty percent. The biggest difference between the Philippines and Japan in terms of labor input is also in harvesting and threshing operations. The total labor input in the Philippines is larger than that in Japan. Consequently, the labor productivity represented by kg/man-day is low (Table 5)

Suggestions

(1) It can be said that the present JICA-PhilRice Project which aims to raise yield and to develop such machinery as rice reaper is appropriate.

(2) Farm machine dealers lead the farm mechanization by selling imported machines to farmers just to gain profits. This is regardless whether it is adequate or not for the Philippine Agriculture. However, it is still necessary to guide/support the mechanization with closer supervision and adequate provision of machinery developed for the small-scale farmers of the Philippines.

(3) It is essential to establish the research and development strategies targeting a high-yielding mechanized rice production for the future. In the strategies, it is needed to involve not only the development of farm machinery but also the improvement of high-yielding rice varieties suitable to mechanization, labor saving cultivation technologies, plant protection technologies, and farm management technologies for mechanized farming. Furthermore, farming system and rural or agro-industry should be considered and involved for the sake of utilization of labor saved in the mechanized rice production

Table 1. International comparison of rice production (average of 1991-1993).

	Area Harvested 1,000 ha	Paddy Yield (kg/ha)	Palay Production
World	147,919	3,544	524,245
Asia	131,919	3,635	479,538
Philippines	3,358	2,814	9,444
Bangladesh	10,441	2,648	27,629
China	32,297	5,799	187,184
India	41,632	2,646	110,149
Indonesia	10,772	4,357	46,938
Japan	2,098	5,571	11,671
Korea	1,167	6,053	7,064
Myanmar	5,142	2,943	15,156
Thailand	9,267	2,125	19,693
Vietnam	6,415	3,299	21,171

Source: FAO Production Yearbook for 1993.

Table. 2 International comparison of agricultural population and farmer's load in 1993.

	Economically Active Population in Agriculture (in thousand)	Economically Active Population Percentage in Agriculture (%)	Total population load per farmer	Arable Farmland Area per farmer (ha)	Total Population per ha of Arable Farmland
World	1,123,099	45.2	5.0	1.29	3.9
Asia	880,769	57.9	3.7	0.52	7.2
Philippines	11,074	45.4	6.0	0.8	7.2
Bangladesh	25,041	66.5	4.9	0.36	13.5
China	463,121	65.2	2.6	0.21	12.5
India	223,898	65.5	4.0	0.76	5.3
Indonesia	35,655	45.8	5.5	0.63	8.6
Japan	3,501	5.5	35.6	1.29	27.6
Korea	4,387	21.7	10.1	0.47	21.5
Myanmar	8,566	45.2	5.2	1.17	4.4
Thailand	19,057	62.3	3.0	1.06	2.8
Vietnam	20,392	58.5	3.5	0.33	10.6

Source: FAO Production Yearbook for 1993.

Table 3. International comparison of farm mechanization in 1992.

	Number of tractors	Arable Farmland Area per tractor (ha)	Number of Harvesting Machines-Threshers	Cereals Total Area Harvested per Harvesting Machine-Thresher (ha)
World	26,137,136	51	3,861,239	182
Asia	5,670,108	75	1,316,934	232
Philippines	11,500	480	700	9,316
Bangladesh	5,300	1,660	-	-
China	774,404	120	51,075	1,783
India	1,136,160	146	3,100	32,089
Indonesia	35,000	469	17,500	842
Japan	2,003,000	2	1,150,000	2
Korea	64,159	30	61,240	21
Myanmar	11,000	867	50	113,140
Thailand	163,600	104	-	-
Vietnam	37,627	146	-	-

Source: FAO Production Yearbook for 1993.

Table 4. Distribution of rice farmers by selected farm practices, PhilRice 1991.

Farm Practice	%
Source of Farm Power	
Two wheel Tractor	43
Four wheel Tractor	1
Draft Animal	56
Method of Threshing	
Mechanical	58
Manual	42

Source: Dr. Segfredo R. Serrano (PhilRice), 1994.

Table 5. Labor utilization in rice production.

hours/ha

	Irrigated Lowland in Dry Season Crop			
	High Yielders (>4MT/ha)		Low Yielders (<4MT/ha)	Japan
	Transplanting	Direct Seeding	Direct Seeding	Transplanting
Land Preparation	104	80	112	53
Seedbed Preparation	8	-	-	110
Pulling/Bundling Transplanting Broadcasting	112	24	16	
Crop Care and Maintenance				
Harvesting and Threshing	24	64	40	157
Drying/Storage	480	408	288	80
	56	48	24	30
Total	784	624	480	430
Labor Productivity Paddy kg/man-day	83	88	64	104

Note: (1) Data in the Philippines are from Dr. S.R. Serrano's paper (PhilRice 1994).
(2) Data in Japan are approximate estimate for the whole average.

4.1.2 Rice Yield and Meteorological Conditions

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.

Method

The meteorological data for 20 from 1971 to 1990 were collected from each observation station in all the 13 regions. The correlation coeffecient between the regional average of rice yields and the meterological elements was obtained.

Results

(1) Regarding the relationship of air temperature to rice yield, the yield is high in the region where maximum temperature is high and also where minimum temperature is low, that is, where diurnal range is large (Figures 1-3).

(2) High amount of rainfall generally results in high yield in the rainfed lowland in both dry and wet seasons.

(3) With regards to the duration of sunshine/solar radiation, there were insufficient data to generate a conclusion. However, it was found that the long duration of sunshine generally produced higher yields, except in the case where rice plant requires more amount of rainfall rather than sunshine.

Suggestion

If the meteorological data were available in each province, the analysis might have been done more accurately than the regional analysis. And if the accurate regression line is obtained, it may be said that those provinces plotted above the line have good soil fertility or that farmers are using high technology. On the other hand, provinces plotted below the regression line could be those with problem soil or farmers not adopting high-yielding technology.

Fig. 1 Yield vs Maximum Temperature

1985, Regions 1-12 (DS and WS)

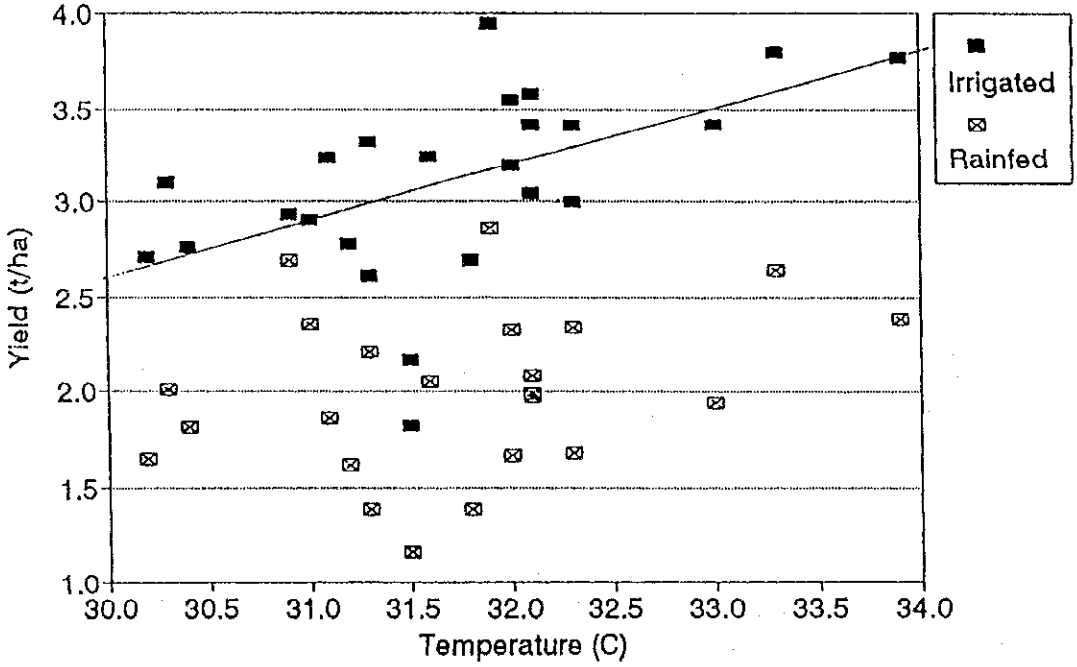


Fig. 2 Yield vs Minimum Temperature

1982, Regions 1-12 (DS & WS)

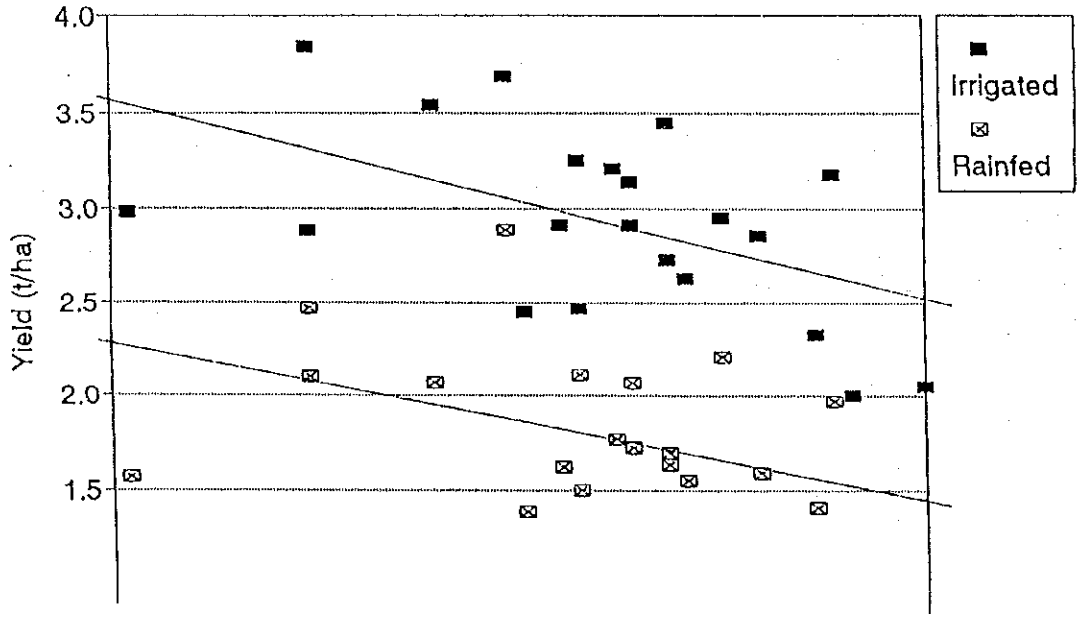


Fig. 3 Yield vs (Max-Min) Temperature

All Regions, 1989 (DS and WS)

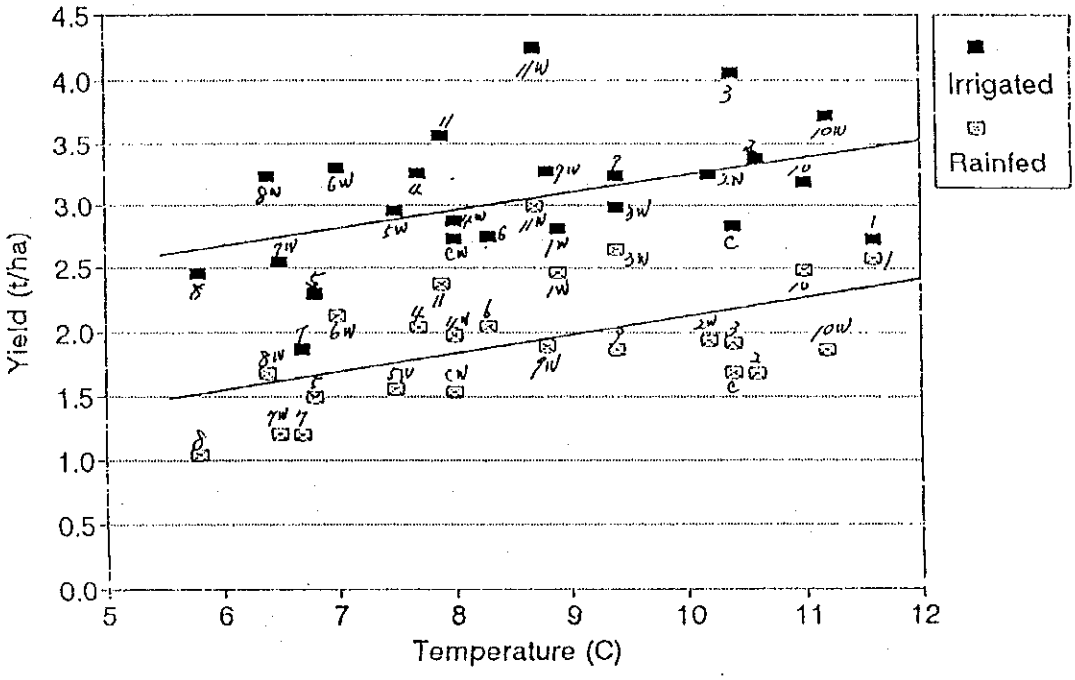
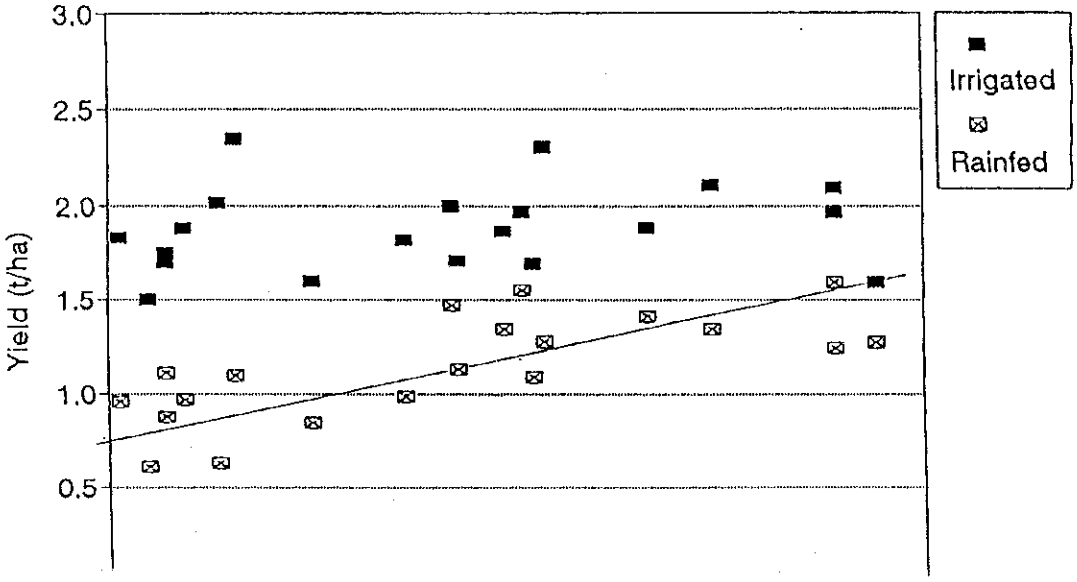


Fig. 4 Yield vs Rainfall

1973, By Region (DS & WS)



4.2 Varietal Improvement

4.2.1. Effect of backcrossing on improving hybrid sterility in *Japonica/Indica* cross

The spikelet sterility 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.

Materials and Method

The behavior of hybrid sterilities was studied in 1993 wet season (WS) on three single-cross F_1 progenies between Japonica varieties and Philippine Indica leading varieties, along with parental varieties. In the following 1994 dry season (DS), the sterility of subsequent back-cross B_1 F_1 progenies were compared with that of F_1 progenies.

Results

The sterility of the three single-cross F_1 progenies was as high as 77.0% However, the sterility was reduced to 23.1% in the progenies of subsequent backcrossing (Table 1). It was suggested that fertility restoring genes might exist in the Philippines leading varieties.

Table 1. Hybrid sterility of F_1 progenies of the J/I cross and subsequent backcross (B_1 F_1)

Materials	Year/Season	Sterility (%)	No./spikelet
(P_1) Koshihikari	1993/WS	7.1	65
(P_2) PSB Rc10	1993/WS	15.1	134
(F_1) P_1 /P_2	1993/WS	75.2	133
(B_1 F_1)P_1 /P_2 *2	1994/DS	27.3	135
(P_1) Koshhikari	1993/WS	7.1	65
(P_2) BPI Ri10	1993/WS	11.0	118
(F_1) P_1 /P_2	1993/WS	73.0	100
(B_1 F_1)P_1 /P_2 *2	1994/DS	24.1	117
(P_1) Koshhikari	1993/WS	7.2	89
(P_2) BPI Ri10	1993/WS	11.0	118
(F_1) P_1 /P_2	1993/WS	82.8	119
(B_1 F_1)P_1 /P_2 *2	1994/DS	18.0	114
Ave. sterility	P_1 /P_2	9.8	
	F_1	77.0	
	B_1 F_1	23.1	

4.2.2. Selection of elite breeding lines

Eleven elite lines were selected from the *Japonica/Indica* cross 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.

Materials and Method

Pedigree line selection was carried out in the 1994 WS on 28 F_3 crosses with 639 lines mainly derived from the *Japonica/Indica* cross.

Results

Compared with plants in the base populations, the lines were much improved but they still include plants with tall stature, late-maturity, high shattering habit, fast senescence and short panicle. However, other traits such as plant type, fertility, ripening color, and grain quality were acceptable in the selected plants.

In the field selection, 25 crosses with 199 lines were selected. The number of lines was trimmed down to 133 lines through strict kernel examination. Among them, 11 lines proved promising and were selected for performance testing in the 1995 DS (Table 2).

Table 2. Elite breeding lines

Breeding Line	Maturity	Grain quality
Akihikari/IR 68-9	VE	○~□
Akihikari/IR 68-13	ME	□~△
Akihikari/IR 72-11	L	○
PR 23428-66/IR 64-19	L	○
PR 23428-66/IR 64-28	ME	□
Habataki/PSB Rc 4-1	E	◎
Habataki/PSB Rc -8	E	□
Habataki/PSB Rc 10-29	E	○
Habataki/PSB Ri 10-8	ME	○
Habataki/PSB Ri -54	L	○
Sasanishiki/IR 64 - 6	M	□

Maturity: VE=very early, E=early, ME=medium early, M=medium, L=late
Grain quality: ◎=excellent, ○=very good, □=good, △=fair

4.2.3. Selection of promising cold-tolerant lines suited to the Cordillera areas

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.

Materials and Method

During the 1994 WS, the breeding materials were affected by low temperature stress which coincided with the reproductive growth of the plants. The cold temperature below 17°C triggered heavy spikelet sterility on majority of the plants. Among them, very few were fertile and were selected.

1) Site: La Trinidad, Benguet. EL 1500m above sea level
2) Materials:

① The JICA-PhilRice Collaborative Project's segregating F_3 populations which had been raised during the 1994 DS crop and grown as ratoon crops in the succeeding WS.

② Foundation lines from the National Cooperative Tests (NCT) for Cool Elevated Irrigated Areas, which were raised in the DS to evaluate cold tolerance at seeding were palnted during the WS to select plants with cold tolerance at meiosis.

Results

Through strict selection, highly cold-tolerant plants were harvested. The selected plants exhibited highly fertile spikelets in spite of the cold stress.

Two selected lines from two crosses proved most promising in terms of growth performance and grain quality. Twenty-nine plants from eight crosses were also cold-tolerant in terms of fertility but they possesed heavy shattering habit. These germplasms will be used further in the varietal improvement program.

Promising lines

Line	Foundation material	Origin	Plant selected
PJ 1	Tairei Unrei 5/IR 72	①	27
PJ 2	IR 61728-4B-2-1*	②	14

* Todorokiwase/Todorokiwase/OSOK

Cold-tolerant germplasms

Foundation material	Origin[1]	Plant selected
Toyonishiki/IR 66	①	3
Todorokiwase/IR 68	①	3
IR 40590-2B-20-2-2*	②	1
IR 62442-2B-7-2-2-2-1**	②	1
Tinawen/MRC 19366-22	②	4
Pinidua/IR 64	②	4
Guandong 5/YR 6488-ACP 39	②	6
PR 25169-413-1***	②	7

* Barkat/Ta Mao Tao/Ching Sri 15/Ta Mao TAo
** IR 42221-14-1-3-1-2/IR 1552
*** IR 59649-B-B-3-21/Salingkuyod
1) ①: JICA-PhilRice, ②: NCT

Spikelet fertility

Stunting and discoloration

Cold damage of breeding materials at a breeding site in Banaue

Inspection of the breeding materials with the counterparts

Kernel examination in the laboratory

4.3 Soils and Fertilizers

4.3.1. Rice yield and nitrogen fertilization in the Philippines

Characteristic 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 yields in dry season, while other provices such as Camarines Sur, Iloilo, Bukidnon, and Davao del norte have high yields in wet season but relatively low yields in dry season.

Methods

Data on rice production, area harvested, yield, damages in the rice production, amount of fertilizer, area fertilized, and other rice production data were obtained from the Handbook on Regional Rice Statistics, Calendar Year 1970-1990 (PhilRice-Bureau of Agricultural Statistics (BAS) Collaborative Project, 1991), Regional Rice Statistics Handbook, 1970-1992 (PhilRice-BAS Collaborative Project, 1994) and BAS Crop Forecast, 1993-1994.

Results

The 13 regions in the Philippines could be classified according to total rice production, rice area harvested, and yield per hectare (Table 1). 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 the main rice production areas in the future.

In Central Luzon, Nueva Ecija is the main rice area with high yields in dry season, but relatively low yields in wet season (Fig. 1). In Bicol, Camarines Sur is the main rice area with relatively high yields in wet season. In West Visayas, iloilo is the main rice area with high yields in wet season, but low yields in dry season (Fig. 2). Bohol is the main rice area in Central Visayas but rice production and yields are low. In Northern Mindanao, Bukidnon is the main rice area with high yields in wet season, but relatively low yields in dry season. Davao del Norte and South Cotabato are main rice areas in Souther Mindanao. Davao del Norte has higher yields then South Cotabato in dry and wet seasons (Fig. 3).

Table 1 Classification of 13 regions of the Philippines and estimated rice production, harvested areas and yield

Region	Rice Production $x10^3t$	Harvested Areas $x10^3ha$	Yield t/ha
Central Luzon, Cagayan Valley, Southern Tagalog, Western Visayas	≥ 1000	≥ 300	≥ 2.5
Ilocos, Bicol, Central Mindanao	500 ≡ 1000	150 ≡ 400	2.0 ≡ 3.0
Western, Northern and Southern Mindanao	400 ≡ 750	100 ≡ 200	≤ 2.5
CAR, Central and Eastern Visayas	< 400	< 250	< 2.5

Source: Regional Rice Statistics Handbook, 1970-1992 (PhilRice-BAS Collaborative Project, 1994)

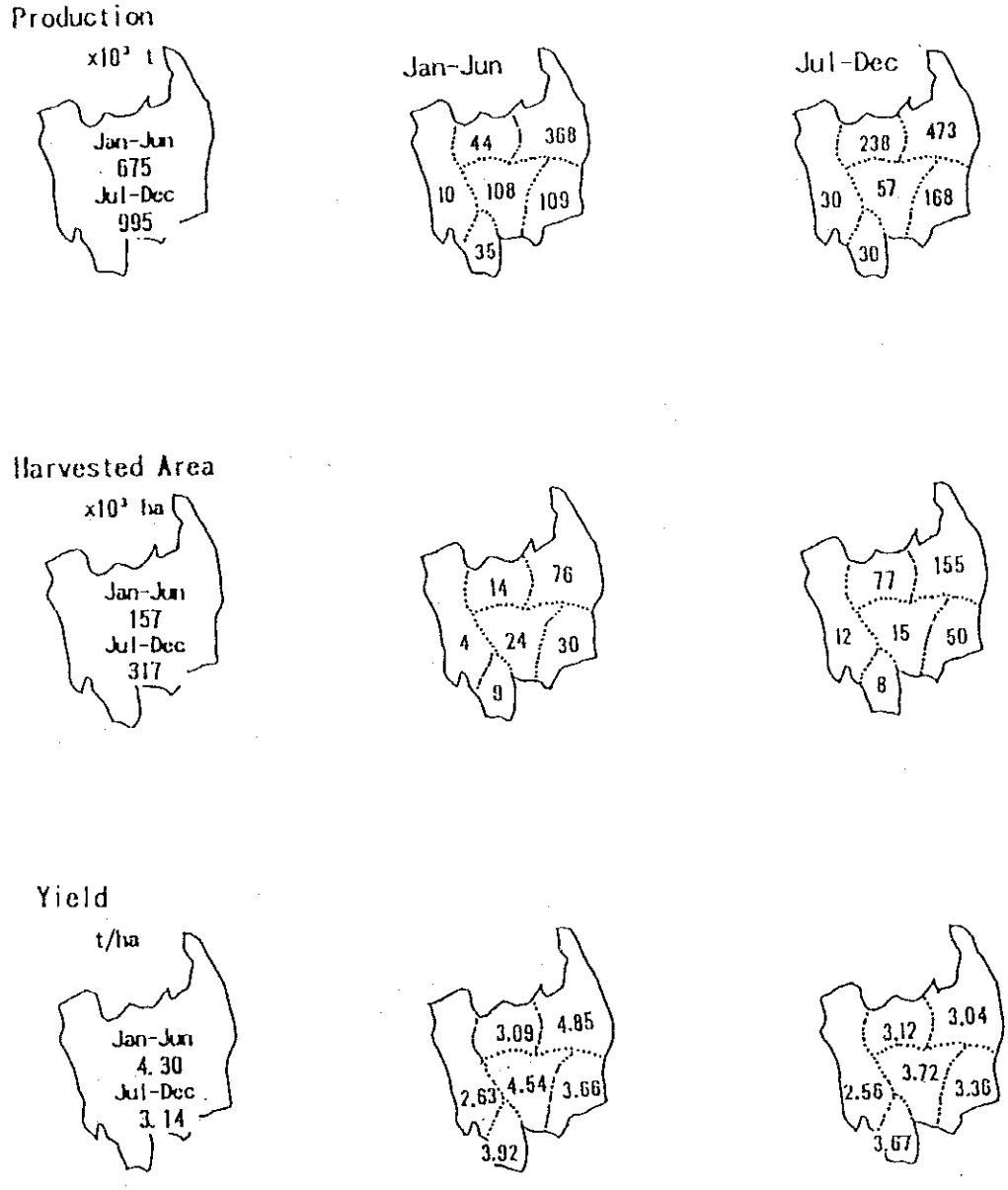


Fig. 1 Seasonal variation in rice production, harvested area and yield in Region III (Provinces of Bataan, Bulacan, Nueva Ecija, Pampanga, Tarlac, Zambales) - Average of 1992-1993

Source: Regional Rice Statistics Handbook, 1970-1992 (PhilRice-BAS Collaborative Project, 1994)

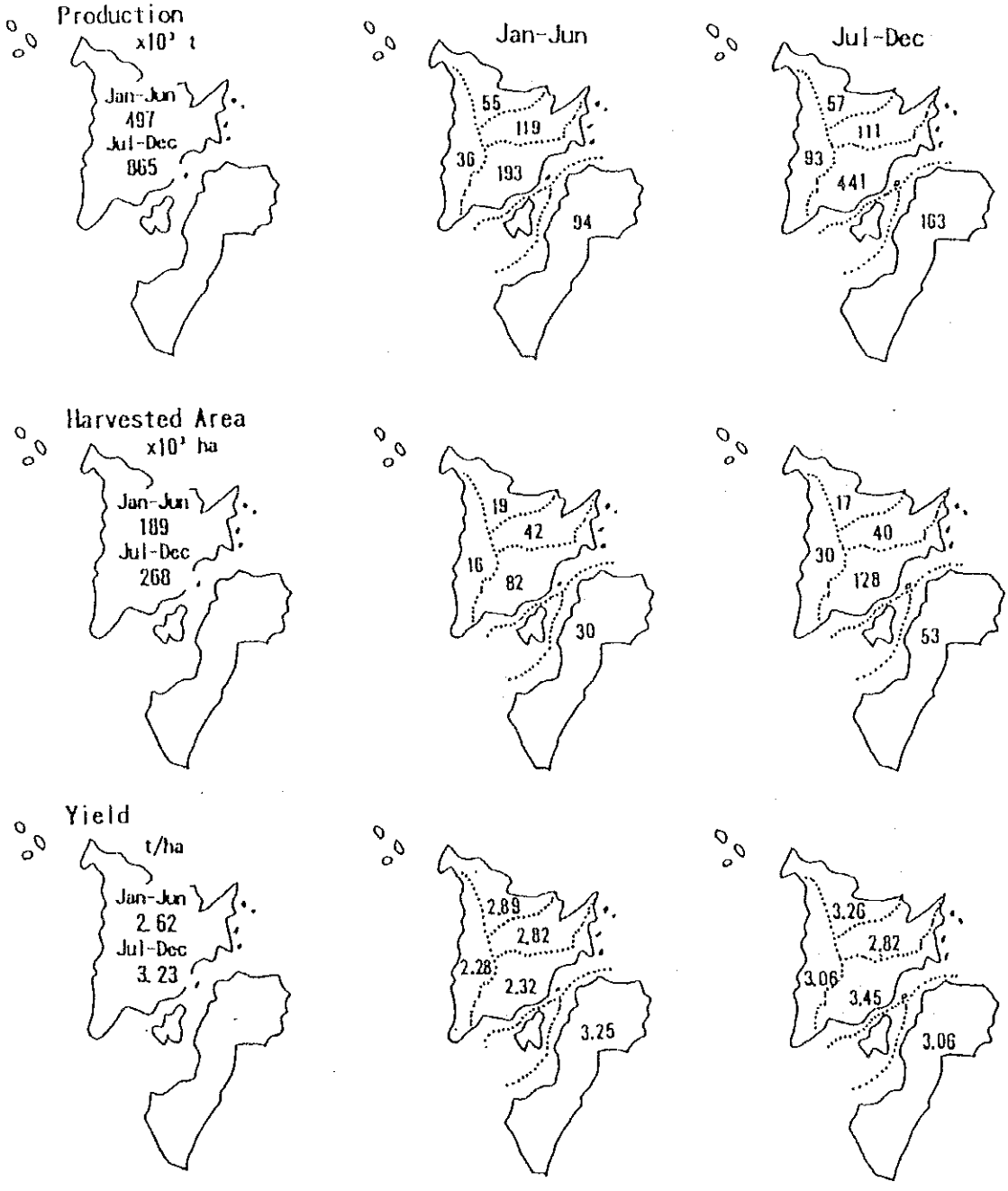


Fig. 2 Seasonal variation in rice production, harvested area and yield in Region VI (Provinces of Aklan, Antique, Capiz, Guimaras, Iloilo, Negros Occidental) - Average of 1992-1993

Source: Crop Forecast, 1993-1994 (BAS)

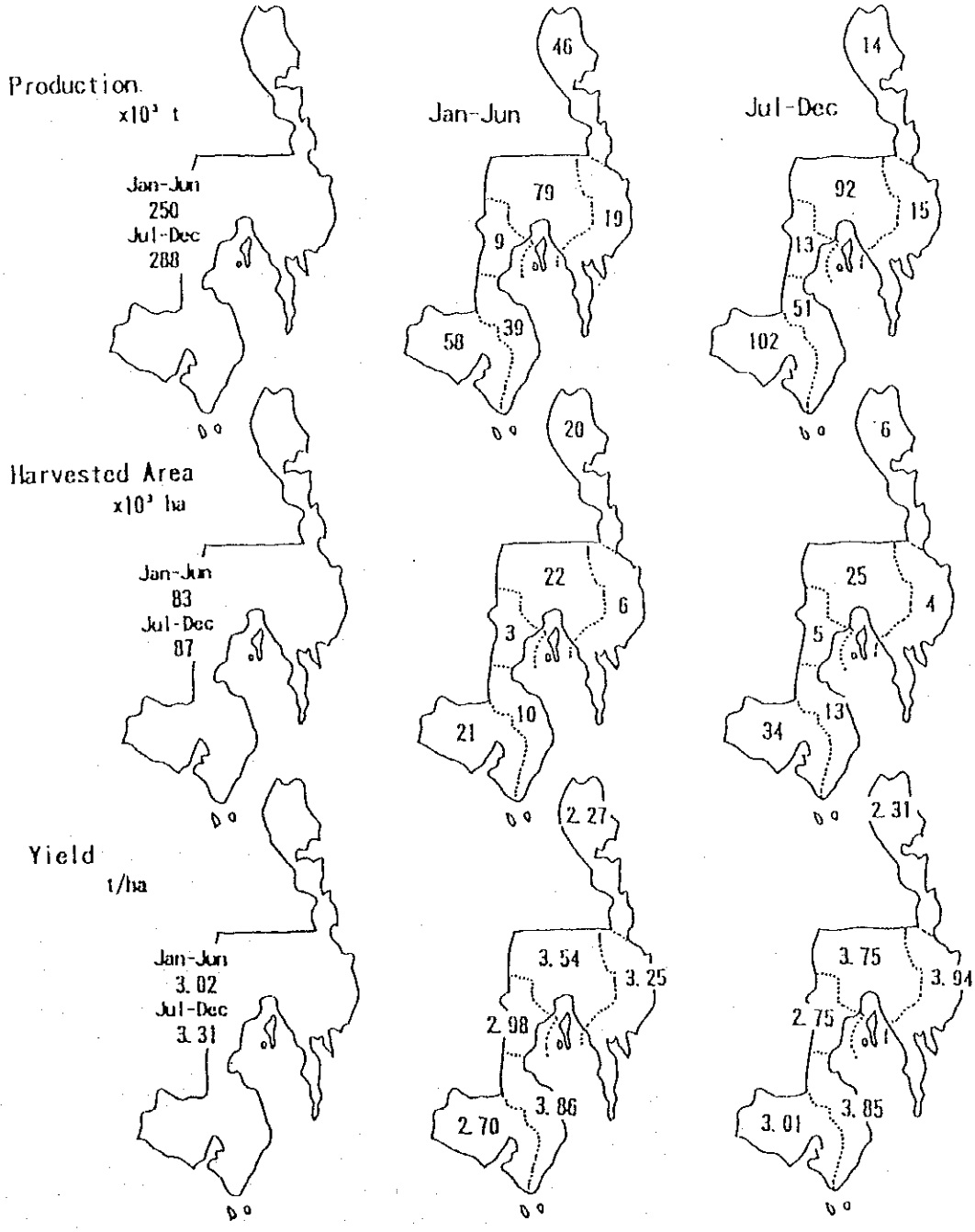


Fig. 3 Seasonal variation in rice production, harvested area and yield in Region XI (Provinces of Davao City, Davao del-Norte, Davao del Sur, Davao Oriental, South Cotabato, Surigao del Sur) - Average of 1992-1993.

Source: Crop Forecast, 1993-1994 (BAS)

2) Characterization of Central Luzon and Bicol 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.

Method

Data on individual farmer's rice yield, fertilizer management, and other related information were obtained from some municipalities of Central Luzon, Bicol and Central Visayas (PhilRice SSPR Div. 1988-1990, APC Bohol, 1992 and Survey by Mr. H. Yamamoto JOVC, 1994).

Results

In Central Luzon, direct seeded rice (DSR) generally receives higher amount of nitrogen (N) than transplanted rice (TPR) but without corresponding yield increase (Fig. 4).

Two split N application is common in Central Luzon. First application is done within 15 days after transplanting (DAT) in TPR or 30 days aftep sowing in DSR. Two split N application is also common in Bicol. However, first application is applied as basal or within 15 DAT.

Generally, increased frequency of N application results in increase in rice yield. The amount of N applied increases with the frequency of application (Fig. 5).

The application of P and K fertilizer are not effective at yield levels 4-6 t/ha in all cropping seasons. In Zambales, P and K application increased yield by 0.75 t/ha (Fig. 6).

N fertilizer efficiency (yield/N applied) did not differ among the different frequency [illegible] fertilizer combinations (Fig. 7).

yields (average is 4.5 t/ha), regardless of timing of second fertilizer N application do not vary (Fig. 9).

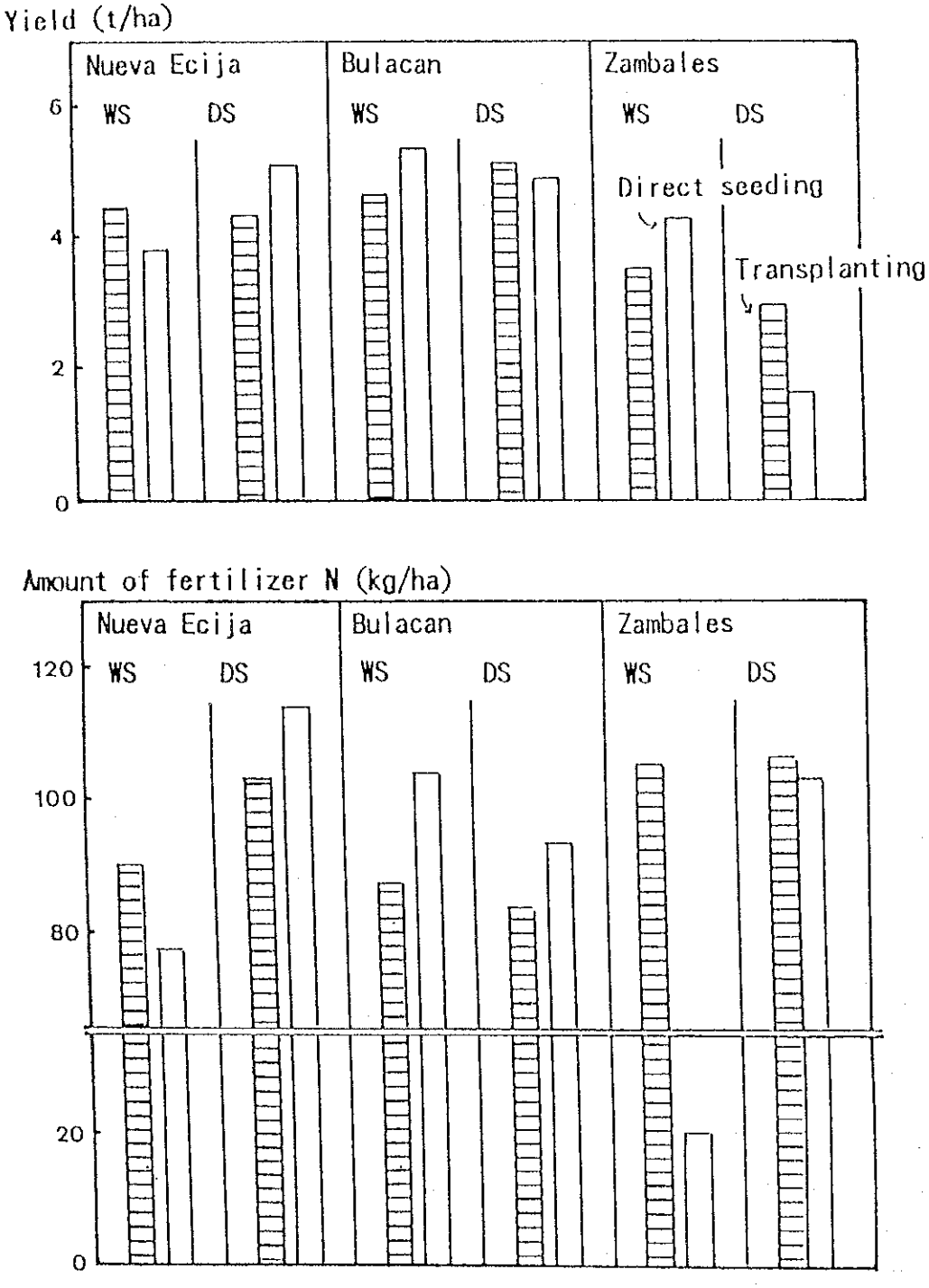


Fig. 4 Rice yield and amount of fertilizer nitrogen applied under transplanting and direct seeding establishments in the irrigated rice areas of Region III (Nueva Ecija, Bulacan, Zambales), Philippines

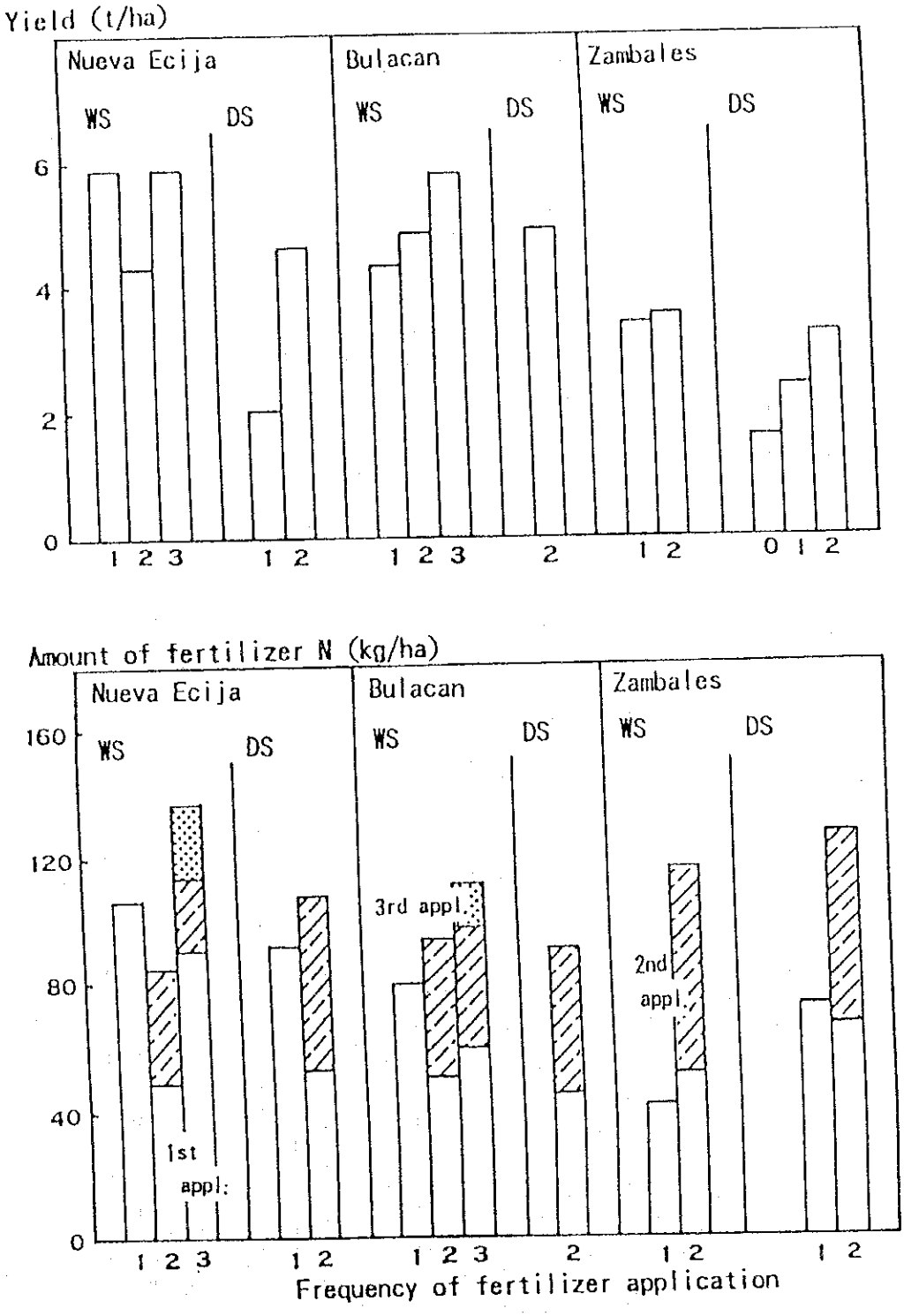


Fig. 5 Rice yield and amount of nitrogen fertilizer applied at different frequency of fertilizer application in irrigated areas of Region III (Nueva Ecija, Bulacan, Zambales), Philippines

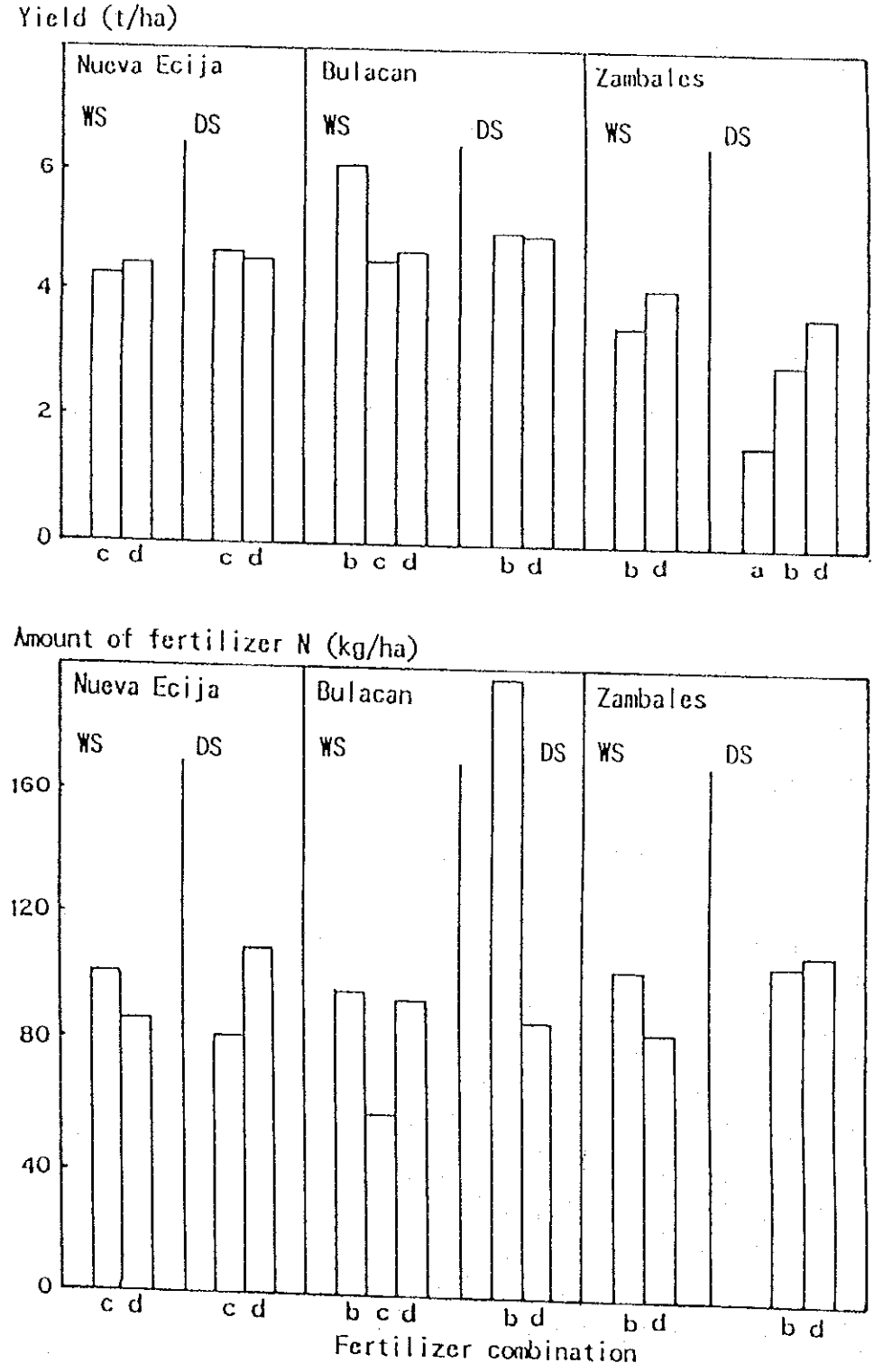


Fig. 6 Rice yield and amount of nitrogen in combination with phosphorus and potassium fertilizers during 1987 wet season and 1988 dry season in the irrigated rice areas of Region III (Nueva Ecija, Bulacan, Zambales), Philippines

a : No fertilizer b : N only c : N with P d : N with P, K

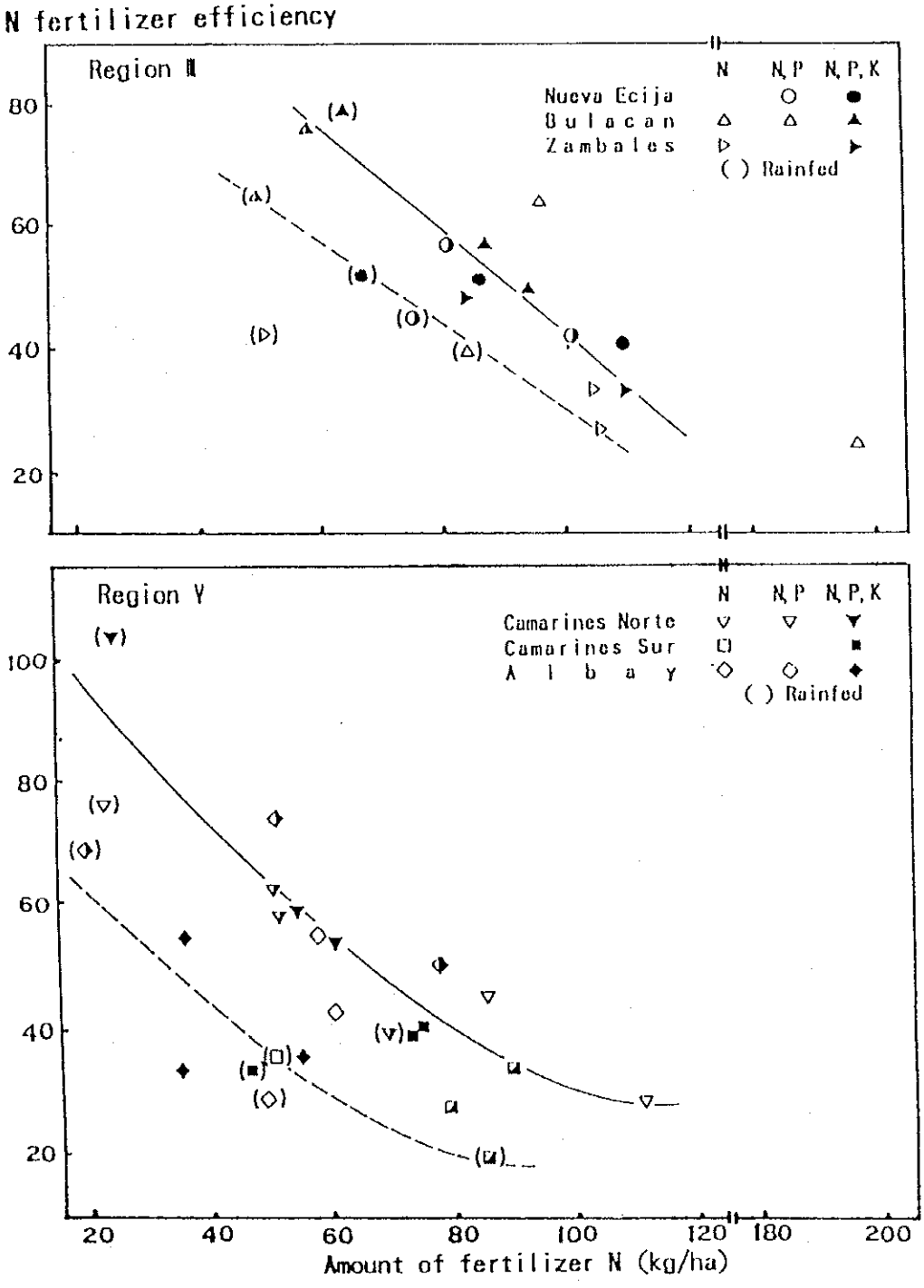


Fig. 7 Relationship between the amount of fertilizer nitrogen applied and nitrogen fertilizer efficiency (yield kg/N kg) in irrigated and rainfed rice areas of Region III (Nueva-Ecija, Bulacan, Zambales) and Region V (Camarines Norte, Camarines Sur, Albay), Philippines

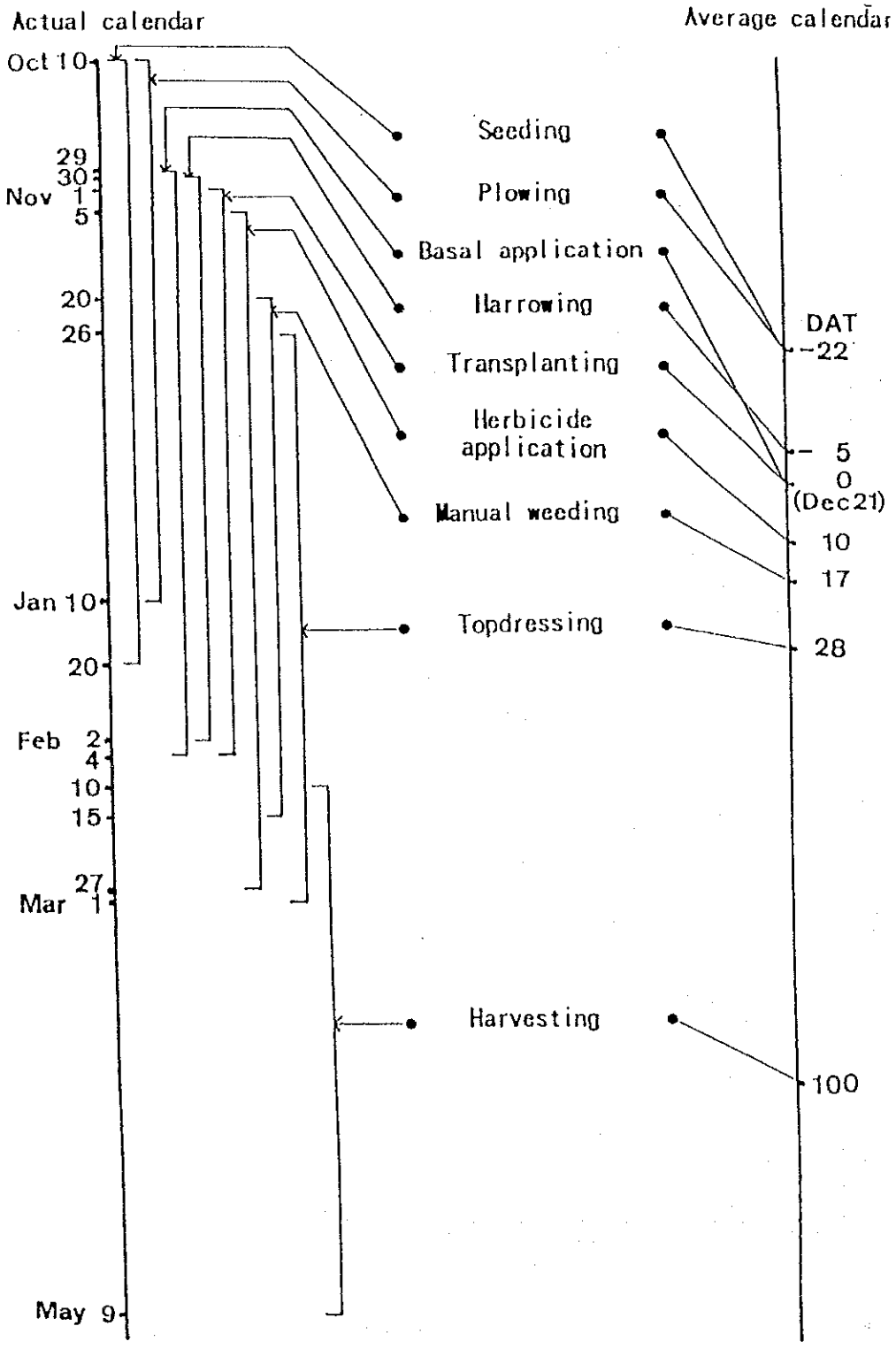
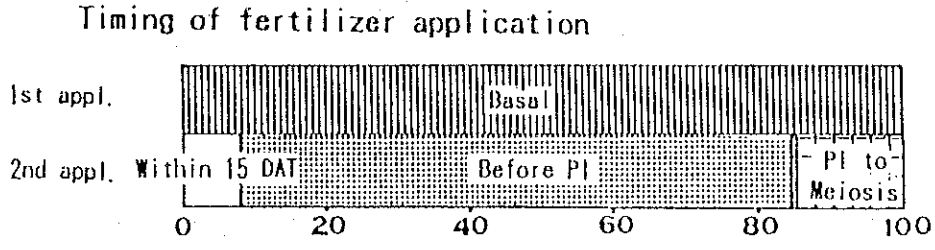


Fig. 8 Actual and average cultural calendar during 1993 to 1994 in irrigated rice areas of Calumpit, Bulacan Philippines

Source: Surveyed by Mr. H. Yamamoto (JOCV)



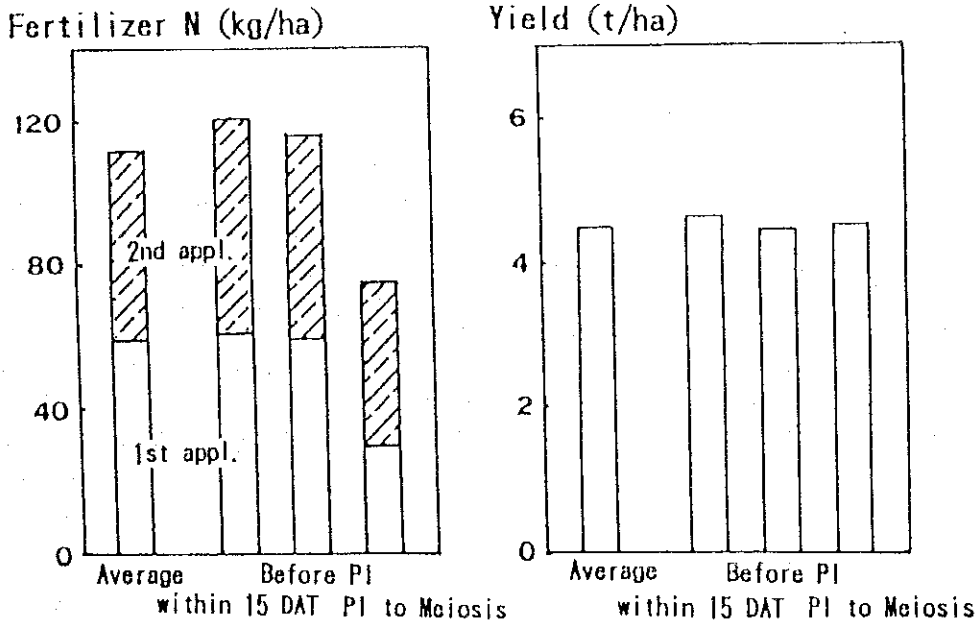


Fig. 9 Timing of fertilizer application (upper), and amount of fertilizer nitrogen and yield at different timing of fertilizer application (lower) in irrigated rice areas of Calumpit, Bulacan, Philippines.

Source: Surveyed by Mr. H. Yamamoto (JOCV)

4.3.2 Nitrogen fertility measurement

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 done of the reason why rice plants utilize more soil N in than dry season than wet season, hence, contributory to high yields.

Methods

Soil samples were collected from different locations in the province of Nueva Ecija. The soil taxonomy map of the province of Nueva Ecija (Soil Survey and Classification Project of Nueva Ecija Province, Bureau of Soils and Water Management, Department of Agriculture) was used. Similar activities were conducted in selected areas in Pangasinan and Banaue. Soil samples were obtained from the plow layer of the paddy fields just after harvesting or before plowing. Soil samplese were air dried and sieved through 2 mm mesh screen. Ten grams of soil samples (oven-dried) were laced into test tubes and test tubes were filled with pure water. Each test tube was plugged with rubber stopper after the removal of air from soils. The test tubes were then incubated at room temperature. Ammonium nitrogen in the soil was extracted with 10% potassium chloride solution and determined periodically.

Results

Main soil types in Nueva Ecija are Ustic Endoaquerts (44.60%), Ustic Endoaquerts (18.32%). and Aquic Ustropepts (13.64).

Nitrogen mineralization rate increases rapidly during the first four weeks and reached a plateu after 9 or 12 weeks of incubation. Nitrogen mineralization patterns and the amount of nitrogen mineralized vary even with the same soil types (Fig. 10). However, differences among soil types were not significant (Table 2).

The amount of mineralized N ranged from 3.6 to 16.6 mg /100 g oven-dried soil. These amounts correpond to 36 to 166 kg/ha of nitrogen supply from soils. Mineralization ratio ranged from 2.75 to 14.02%.

When soil is air-dried, nitrogen mineralization occurs faster than fresh soil and the amount of mineralized nitrogen is higher than that of fresh soil (Fig. 11).

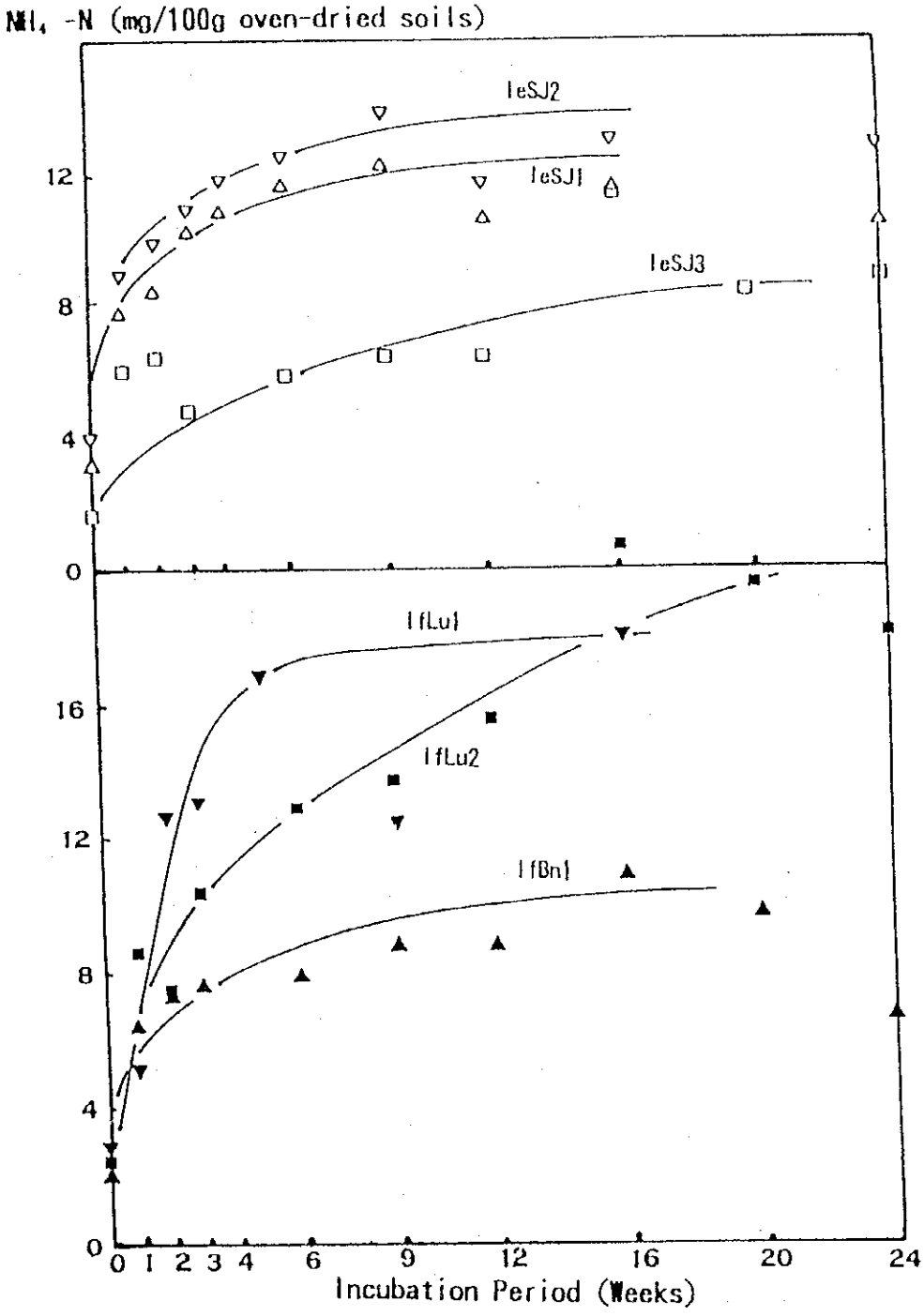


Fig. 10 Nitrogen mineralization patterns in Fine clayey, Aquic Ustropepts

Table 2 Average amount of mineralized nitrogen and mineralization ratio in each soil type

Soil type	Sample No.		Mineralized N mg/100 dry soils	Mineralization ratio %
Aquic Ustropepts	7	Average		6.7
		S.D.		1.8
Typic Tropaquepts	1	Average		9.2
Ustic Epiaquerts	3	Average	.0	6.7
		S.D.	2.3	1.2
Ustic Endoaquerts	11	Average	1	6.7
		S.D.	3.6	3.1
Typic Haflustalfs	1	Average	8.1	7.9
Mollisols	2	Average	8.6	5.3

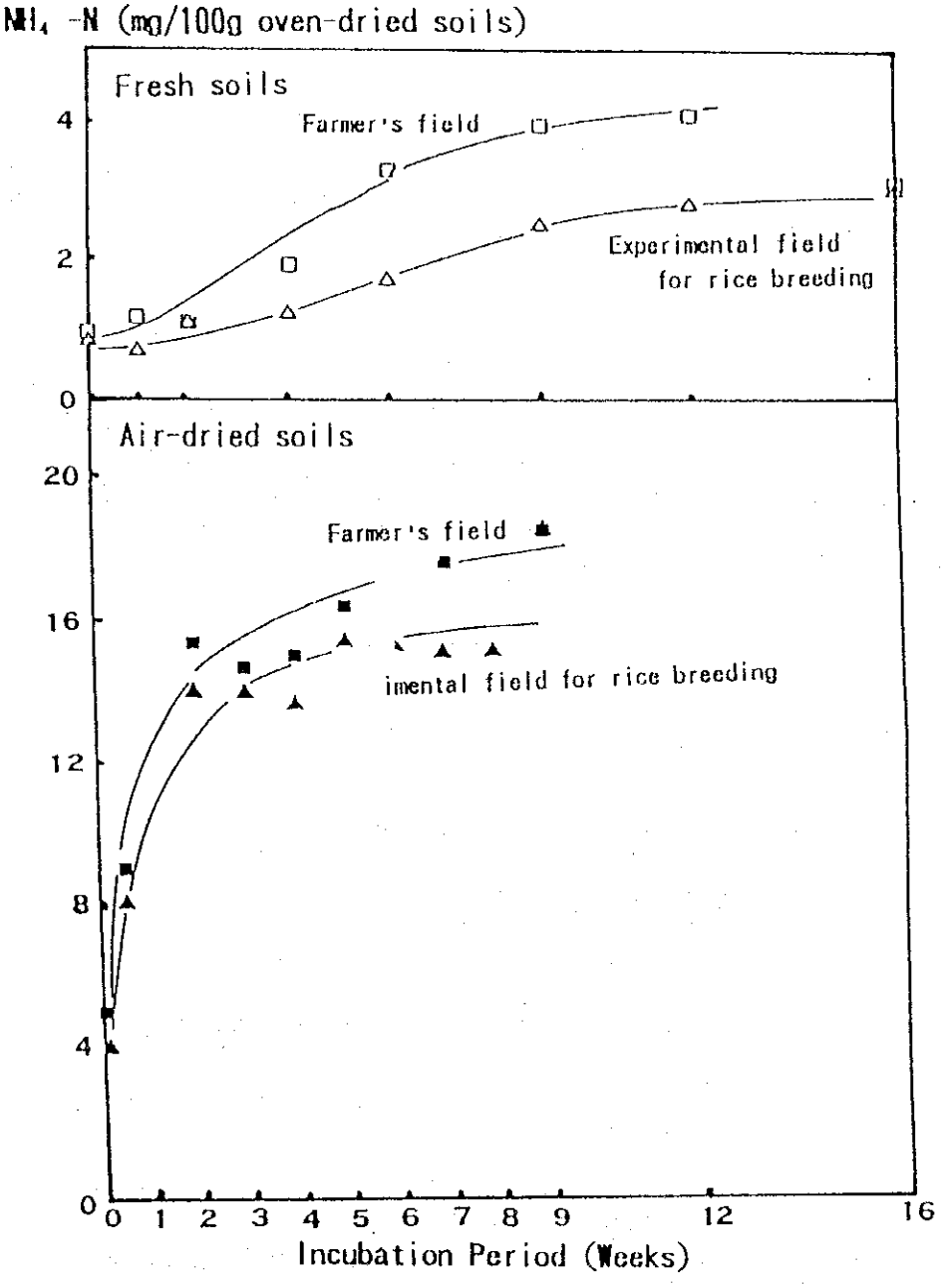


Fig. 11 Nitrogen mineralization patterns in fresh and air-dried soil samples of Banaue.

4.3.3 Local difference in climatic condition

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 difference between maximum and minimum temperatures and lower minimum temperature.

Method

Weather data were gathered from the Philippine Atmospheric Geophysical and Astronomical Services Administration (1979-1990) and Compilation af Real-Time weather for 1990 (Climatic unit, Agronomy, Plant Physiology and Agroecology Department, IRRI, 1991). Specifically, the data gathered were average monthly maximum amd minimum temperature, rainfall, and solar radiation in different locations in the Philippines.

Results

Critical climatic data at each location are shown in Table 3 and major observations are summarized as follows:

Banaue:	Low minimum temperature and radiation
Laoag:	Relatively high minimum temperature from May-June
Solana:	Relatively low radiation from October-February
Tuguegarao:	No data on radiation but maybe same trend as Solano
Muñoz:	CLSU has slightly higher maximum temperature and lower minimum temperature than PhilRice
Guimba:	Higher maximum temperature and lower minimum temperature, and slightly higher radiation than MuÑoz. Among the three places in Nueva Ecija, Guimba has the best weather conditions (Fig. 12)
Los Baños and Cavinti:	Lower radiation, comparatively smaller temperature difference during September-December
Calapan:	Smaller difference between maaximum amd minimum temperatures.

Legaspi, Lapu-Lapu, and Tacloban:	High minimum temperature, smaller difference between maximum and minimum temperatures
Betinan:	Lower radiation
Zamboanga City and Calveria:	Smaller difference between maximum and minimum temperature
Kabacan:	Relatively low minimum temperature but good enough for rice growth. Larger difference between maximum amd minimum temperatures

In terms of weather variables, high yields in Central Luzon could be partly explained by higher radiation in the region. On the other hand, high yields in Northern and Southern Mindanao could be duee to difference between maximum and minimum temperatures and lower minimum temperature.

Table 3 Critical climatic data at each location

SITE		Maximum Temperature (°C)		Minimum Temperature (°C)		Solar Radiation (MJ/m2)		Rainfall (mm)		TOTAL
		LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH	
Banaue	1979-1990	21.6(Jan)	27.9(May)	14.9(Jan)	18.9(Jun)	11.0(Dec)	18.6(Apr)	133.6(Feb)	486.5(Oct)	3,686.1
Laoag	1980-1990	30.4(Jan,Dec)	33.6(Apr,May)	19.2(Jan)	24.7(Jun)			1.3(Feb)	625.5(Aug)	2,061.9
Solana	1980-1990	26.8(Jan)	35.0(May)	19.7(Jan)	24.4(Jun)	13.3(Dec)	22.2(Apr)	17.4(Feb)	237.3(Aug)	1,416.3
Tuguegarao	1980-1990	27.8(Dec)	36.5(May)	19.3(Jan)	24.1(Jun)			15.2(Feb)	282.6(Oct)	1,746.8
Muñoz,CLSU	1985-1990	30.4(Jan)	34.8(May)	20.8(Jan)	24.0(May)			3.2(Jan)	405.9(Aug)	2,038.5
Muñoz, PhilRice	1985-1990	30.3(Dec)	33.7(May)	21.0(Dec)	24.4(Jul, Aug)	19.0(Nov)	24.1(Apr)	6.9(Feb)	328.3(Aug)	1,583.9
Guimba	1985-1990	31.5(Jan,Dec)	35.0(Apr, May)	19.5(Dec)	23.7(May)	19.8(Nov, Dec)	25.2(Apr)	1.0(Jan)	371.2(Jul)	1,722.2
Los Baños, IRRI (Dryland)	1979-1990	29.1(Dec)	34.1(May)	21.4(Feb)	24.1(May)	12.3(Dec)	20.5(Apr)	17.0(Feb)	376.9(Oct)	2,125.3
Los Baños, IRRI (Wetland)	1979-1990	28.1(Jan)	32.9(May)	21.4(Feb)	24.2(Apr, May)	12.0(Dec)	20.9(Apr)	19.5(Feb)	386.8(Oct)	2,047.5
Cavinti	1985-1990	25.3(Jan,Dec)	31.1(May)	19.3(Dec)	21.8(Jun)	12.4(Dec)	20.8(Apr)	112.4(Feb)	797.6(Oct)	4,406.7
Calapan	1979-1990	28.5(Jan)	32.8(May)	22.4(Feb)	24.2 (Apr, May)			53.8(Feb)	361.4(Oct)	2,072.0
Legaspi	1979-1990	28.8(Jan)	32.7(May)	23.0(Feb)	25.1(Aug)			130.2(Feb)	496.0(Nov)	3,254.5
Iloilo	1975-1990	29.8(Jan)	33.8(May)	22.5(Jan, Feb)	24.5(May)	16.5(Dec)	21.2(Apr)	37.6(Mar)	419.8(Oct)	2,242.7
Lapu-Lapu	1979-1990	29.8(Dec)	33.1(May)	23.8(Feb)	25.8(May)			37.7(Apr)	193.8(Jul)	1,498.5
Tacloban	1979-1990	28.5(Jan)	31.6(May)	22.6(Jan)	24.8(May)			135.3(Mar)	347.5(Nov)	2,574.1
Betinan	1980-1990	29.7(Jul)	37.5(Mar)	21.0(Feb)	23.1(May)	15.0(Jun)	18.2(Apr)	66.4(Feb)	427.9(Jun)	2,891.4
Zamboanga City	1980-1990	31.8(Jul)	33.1(Apr, May, Jun)	32.2(Jan, Feb, Dec)	24.4(May)			35.6(Mar)	195.5(Oct)	1,164.1
Claveria	1985-1990	27.2(Jan)	30.0(May)	20.2(Feb)	22.2(May)	15.7(Dec)	21.7(Apr)	37.7(Feb)	298.1(Oct)	2,014.4
Musuan	1979-1990	31.1(Jan)	34.1(Apr)	20.5(Dec)	22.1(Apr, May)			45.1(Feb)	361.1(Jun)	2,433.5
Davao City	1979-1990	31.1(Jan)	33.2(Apr)	22.8(Jan, Feb)	24.2(May)			84.8(Feb)	229.1(Jun)	1,779.3
Kabacan	1979-1988	32.9(Jan)	34.6(Apr)	21.3(Feb)	23.3(May)			63.7(Apr)	268.7(Jun)	1,714.8

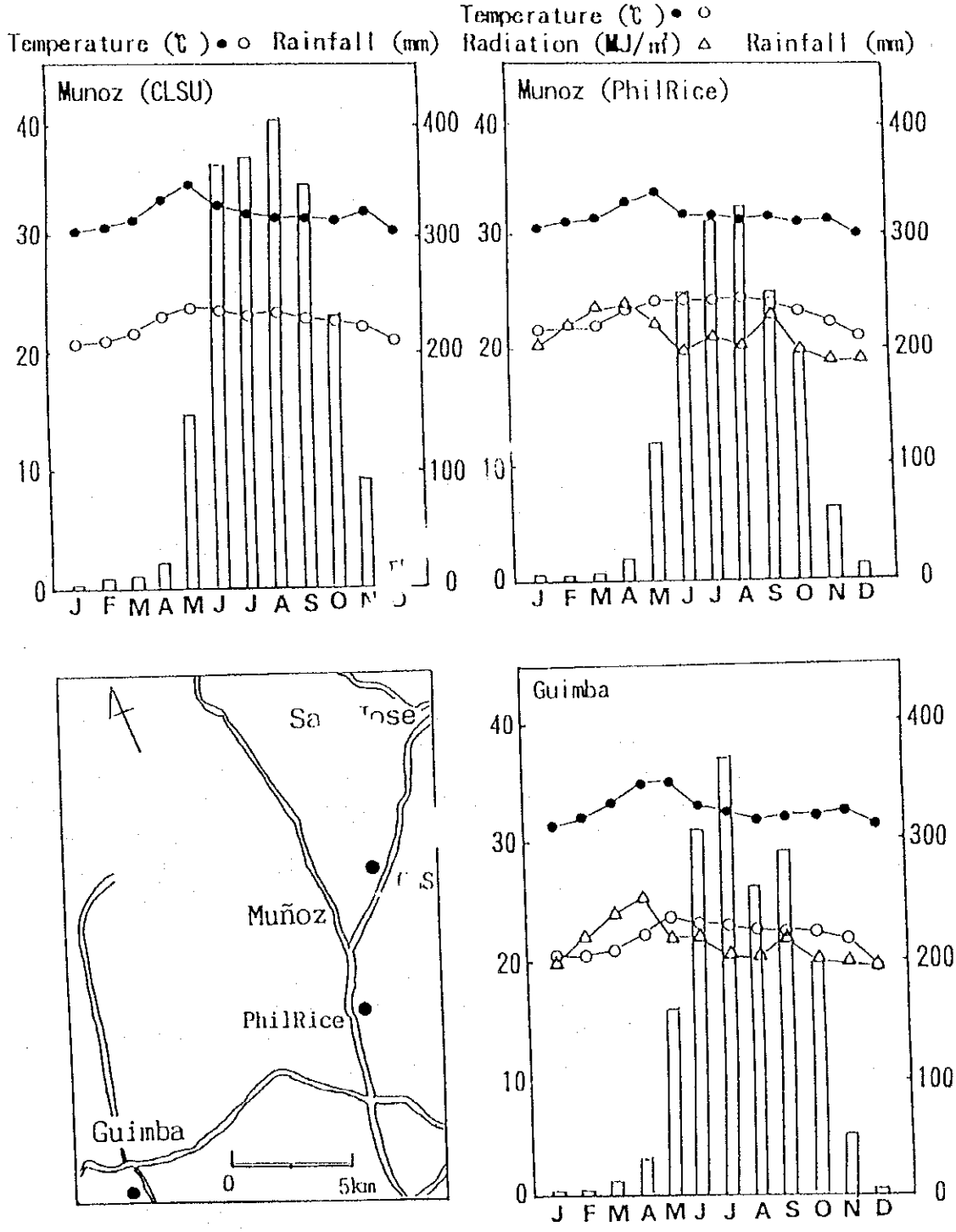


Fig. 12 Monthly average of maximum and minimum temperatures, solar radiation, and rainfall at Munoz and Guimba.

4.3.4 Growth Characteristics of rice

The duration of green leaf weight accumulation was longer in the dry season than 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 growing period could be estimated by using plant height and tiller number.

Methods

Rice varieties PSB Rc2 and PSB Rc6 werer transplanted every four weeks under two levels of nitrogen fertilizer (60 and 90 kg N/ha, with 30 kg/ha each of P_2O_5 and K_2O). Growth parameter such as plant height, tiller number, leaf area, dry matter weight, and light interception were measured at two weeks interval.

Results

PSB Rc2 grown under 60 kg N/ha condition is taller in 5th to 7th plantings as evidenced by greater plant height increment. Plant height decreased from 8th to 11th plantings and increased in the subsequent plantings (Fig. 13). Plant height of PSB Rc2 under 90 kg N/ha and PSB Rc6 under 60 and 90 kg N/ha showed similar reponse. Panicle number at maturity ranged 43-84% of maximum tiller number. Regardless of variety and nitrogen level, the duration of green leaf weight in dry season was longer than wet season, resulting in heavier accumulated dry matter. The accumulated dry matter in stem and sheath was also heavier in dry season than wet season (Fig. 14).

A linear relationship between plant height x tiller number and dry matter was observed (Fig. 15). The relationship at vegetative growth stage (up to 6 weeks after transplanting) had higher correlation coefficient than that at reproductive stage (8 weeks after transplanting to harvesting).

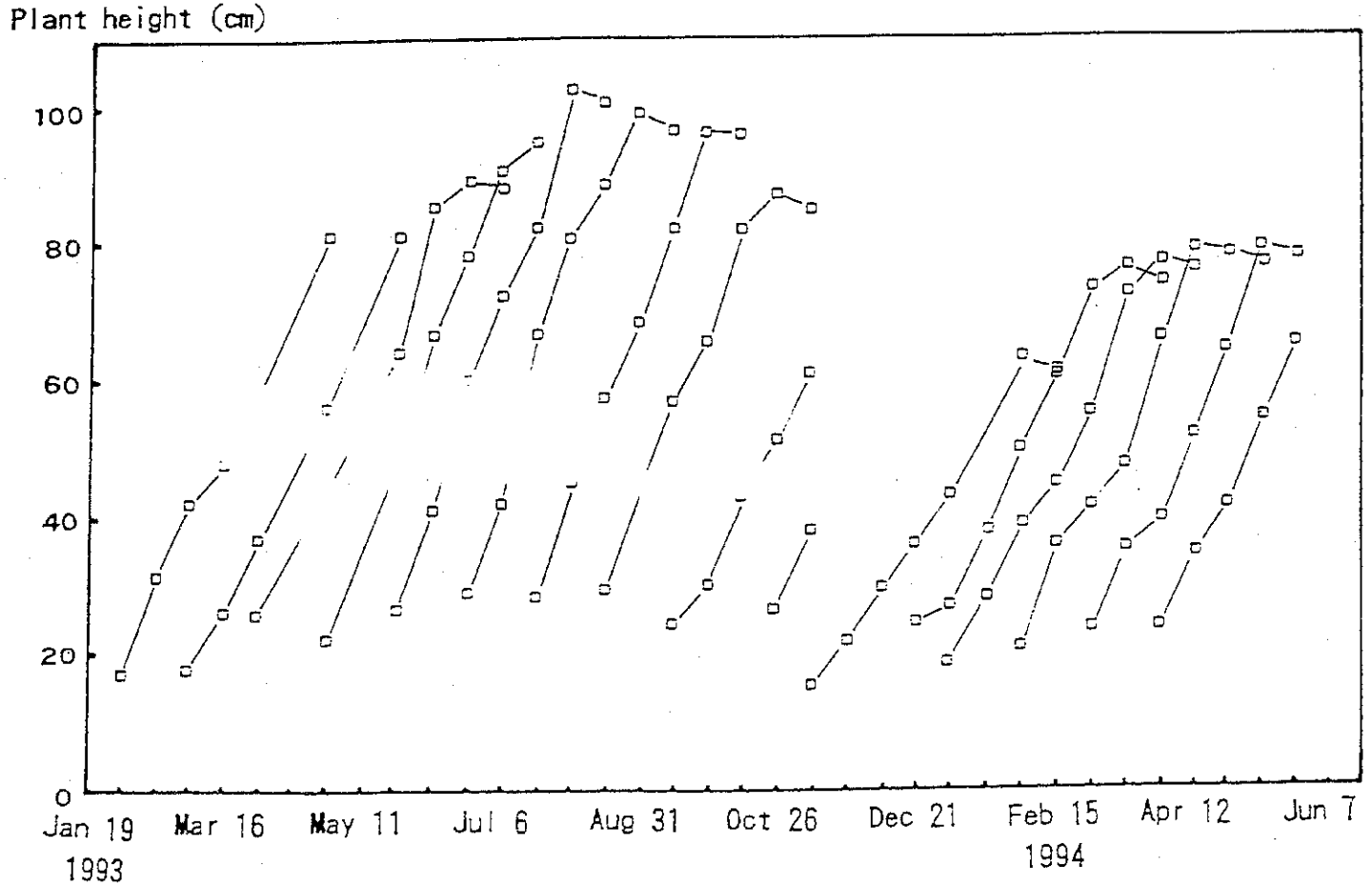


Fig. 13 Plant height trend of PSB Rc2 transplanted at every four weeks and applied with 60 kg N/ha of nitrogen fertilizer.

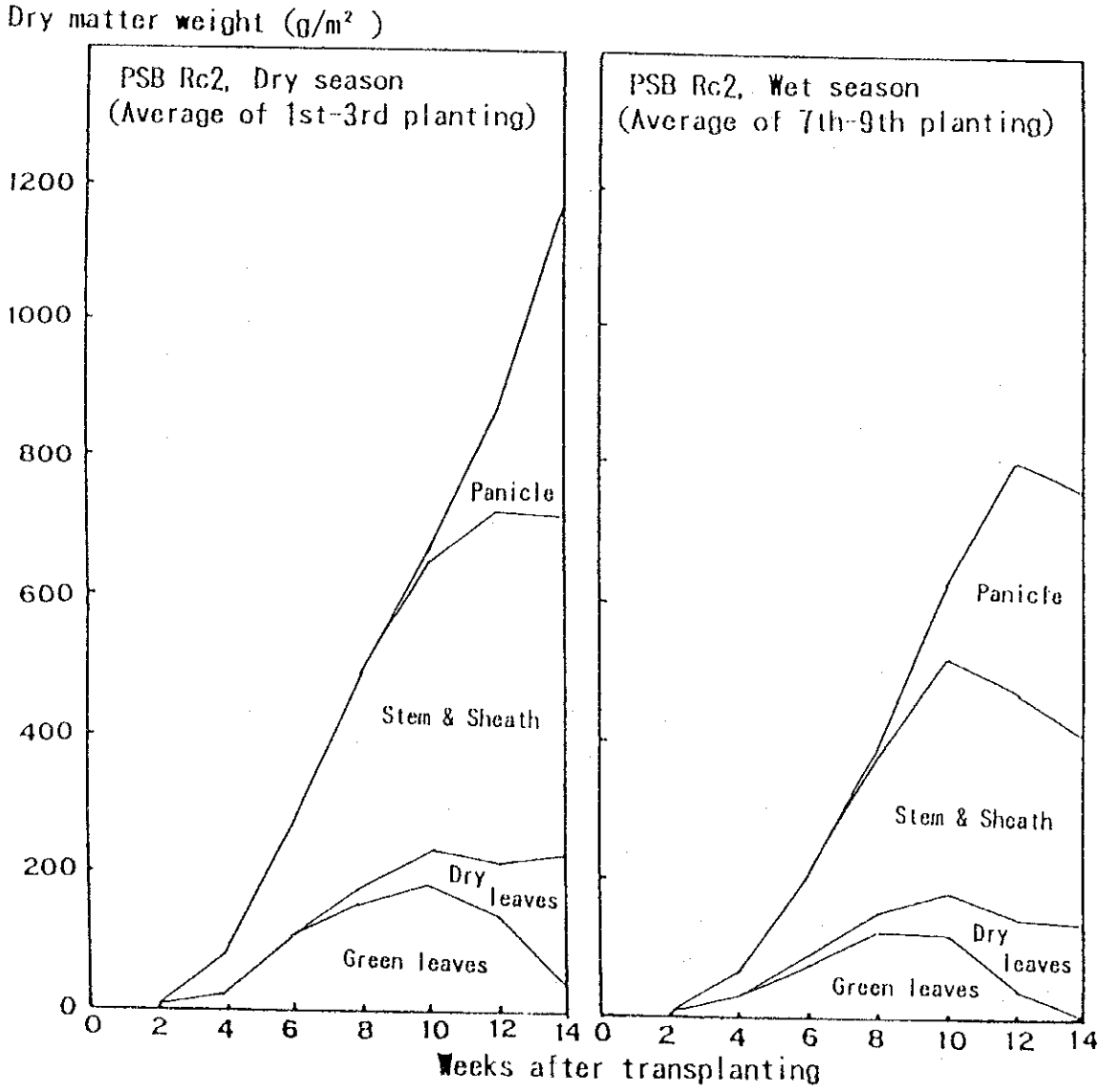


Fig. 14 The distribution of dry matter in each organ of PSB Rc2 applied with 60 kg N/ha of nitrogen fertilizer

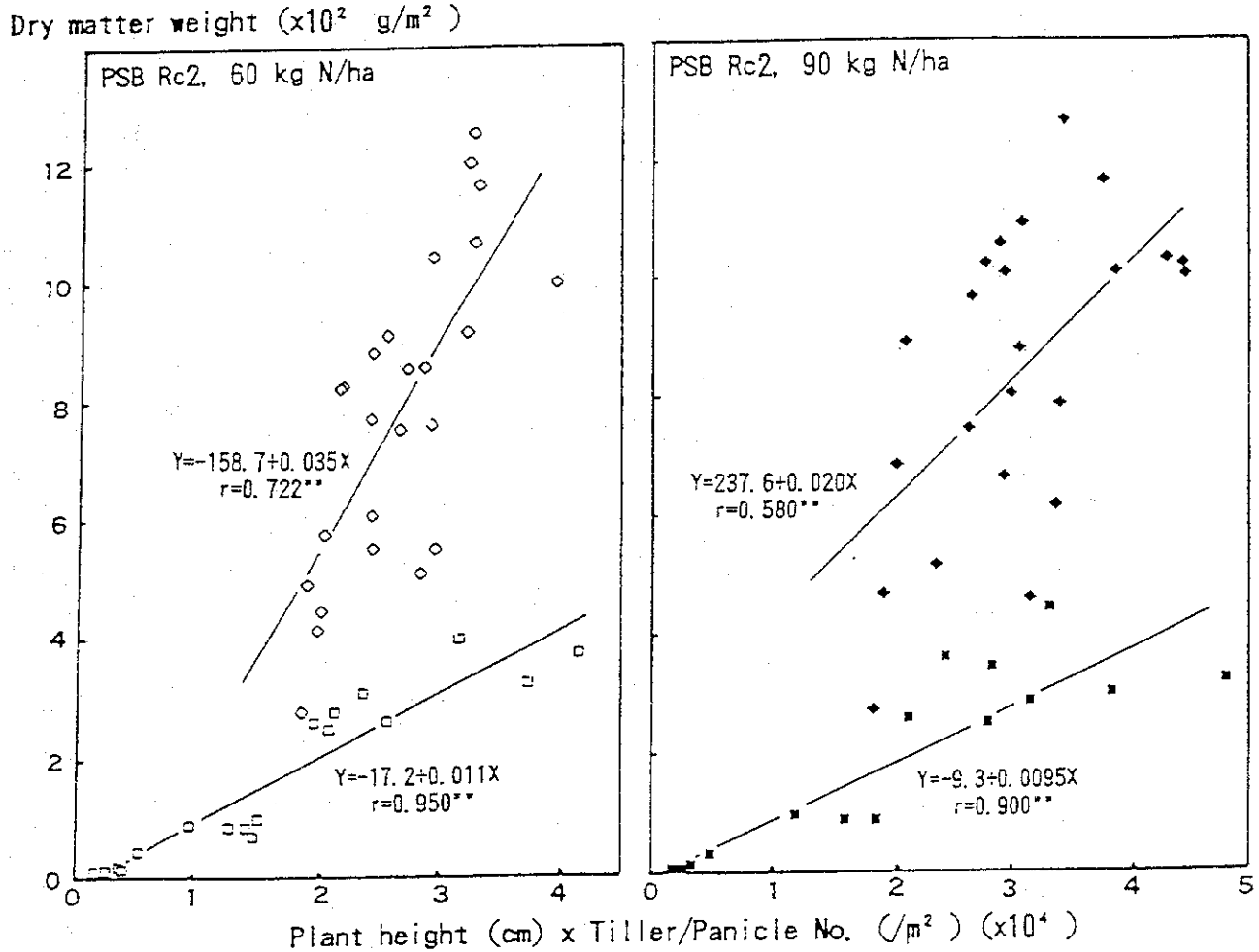


Fig. 15 Relationship between dry matter weight and plant height x tiller number of PSB Rc2 transplanted at every four weeks with 60 and 90 kg N/ha of nitrogen fertilizer

4.4 Crop Modelling

4.4.1 Modelling Development Process of the Rice Plant

Using the parameters generated from two separate experiments which were conducted in Japan and the Philippines, a growth model in combination with the Developmental Stage (DVS) model was developed. An added feature of the new model is its capability 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.

Method

An experiment was conducted at PhilRice, Muñoz, Nueva Ecija, Philippines in 1993-94 with following variables: 16 transplanting dates (4-weeks interval); 2 rice varieties; and 2N rates. A second experiment was carried-out at NIAES, Tsukuba, Ibaraki, Japan in 1993-94 with treatments consisted of 5 sowing dates, 12 rice varieties and 4N rates. The two separate experiments were conducted to generate information such as: leaf area index, top dry matter weight, light interception and days to heading of rice varieties; solar radiation, daylength and daily mean temperature were monitored at both sites within the duration of the experiments. The data generated were used in the validation of the existing DVS and the necessary improvement of the growth model for its appropriateness for tropical rice cultivation.

DVS Model. The meteorological data and days to heading of rice varieties at defferent planting time were parametarized by Simplex Method (non-linear least square method) to produce the following developmental rate (DVR) paramenters : minimum number of days required for heading, critical daylength; daylength daily mean temperature; and temperature at which DVR is half the maximum rate. After the simulation process, the estimated heading date; and thermosensitivity, photosensitivity and base DVR of the rice varieties were generated.

Growth Model. The leaf area measurement, top dry matter weight light interception and meteorological data were likewise parameterized by Simplex Method to generate the following growth parameters: leaf area increase ratio; maximum value of relative growth rate; daily mean temperature; maximum temperature for leaf area expansion; asymptotic value LAI when temperature is not limiting; and radiation-use effeciency. After the simulation process, estimated LAI and top dry weights were produced.

Results/ Major Findings

- Using the combined parameters from Tsukuba and Muñoz sites, the DVS model (adapted from Dr. Horie, 1987) was found to be suitable in estimating the heading dates of rice varieties from Tsukuba and Muñoz sites.

- A growth model in combination with DVS model was developed with the capability to predict LAI and DMA under varying N application.

- Estimated LAI and top dry matter values using the new model showed good fitness with the actual values.

- Problem encounterd overestimation of DMA in the middle and late growth stages of the rice varieties used which was attributed to the dysfunction between radiation-used effeciency value and N economy of the plant.

- Generally, indica rice varieties tested (PSBRc 6, 10, 12, 14, BPI Ri10, IR66, 64 and 72) except PSB Rc2, IR 60 and C4-63G are less photo and thermosensitive than the japonica varieties (Koshihikasi, Sasanishiki and Akihikari.

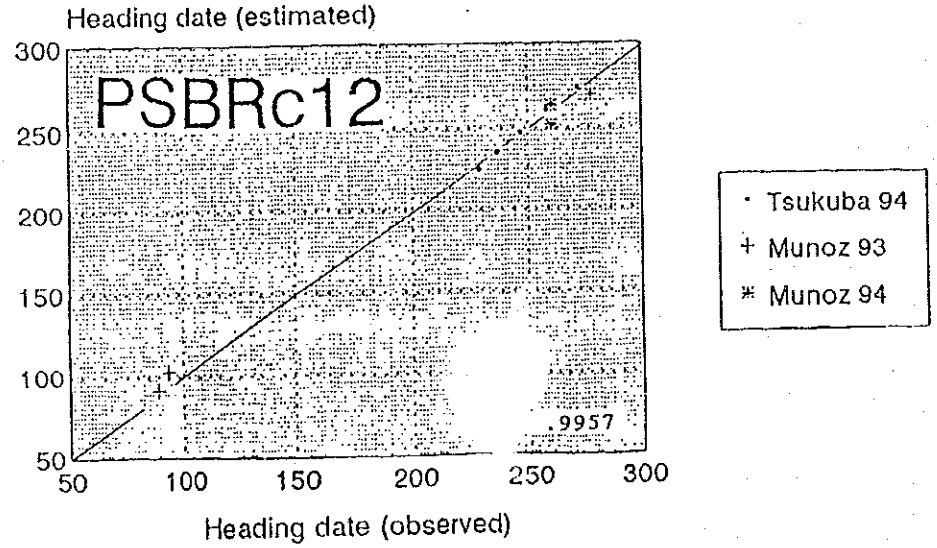


Fig. 1. Relationship between estimated and observed heading dates, 19[illegible]/1994. Parameters were determined from d[illegible] obtained in Tsukuba and Munoz.

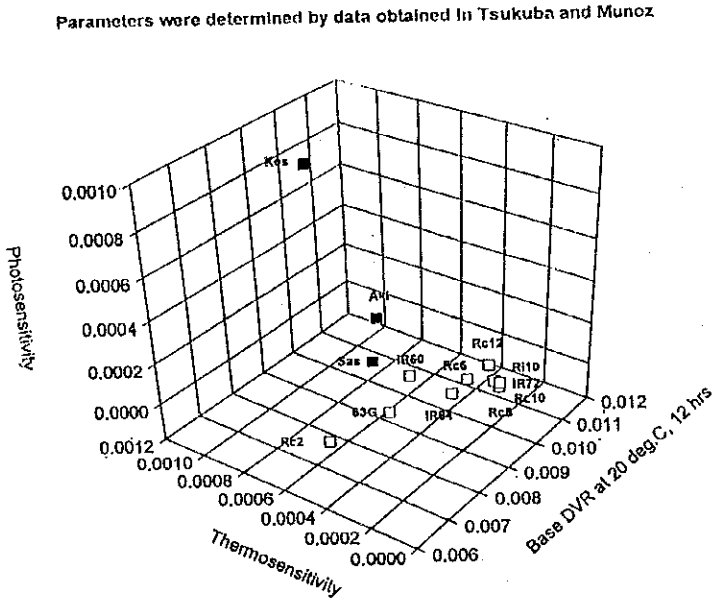


Fig. 2. Photosensitivity, thermosensitivity, and base DVR of rice genotypes planted in the Philippines and in Japan, 1994.

4.5 Farm mechanization

4.5.1 Development of the Maligaya Rice Reaper

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 occured 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.

Structure of the first reaper prototype, The reaper's design and structural features are as follows:

1. Rotary cutting mechanism;
2. Single, flat cloth belt with E-sh d lugs for conveying and windrowing of cut rice stalks;
3. Lower position of starwheel and cloth belt for holding shorter Indica varieties with minimal shattering losses; and
4. V-type belts and pulleys for most of the power transmission system.

The schematic diagram of the reaper is shown in Figure 1 while the main specifications are given in Table 1.

Field reaping trials, results an l discussion successful cutting of the rice stalks was achieved. However, the following pr blems were noted:

1. After cutting of the rice stalks by t rotary discs, some stalks were scattered at the cloth belt.

2. Conveyed cut rice stalks were not properly windrowed owing to the problem of the stalks being carried past the release point over to the end of the side pulley.

3. Although the machine was designed for three-row cutting width, only the left row cutter (farthest from the release side) could cut normally. It was presumed that the cut stalks were scattered by the contact of two adjacent starwheels thus causing less efficient cutting by the two other disc cutters.

Design and fabrication of the second prototype.

1. Working drawings of the second reaper prototype design with modifications were prepared.

2. Fabrication of the second prototype was subcontracted to another government agency which had better workshop facilities. However, the completed functional parts were brought back to the PhilRice workshop for assembly.

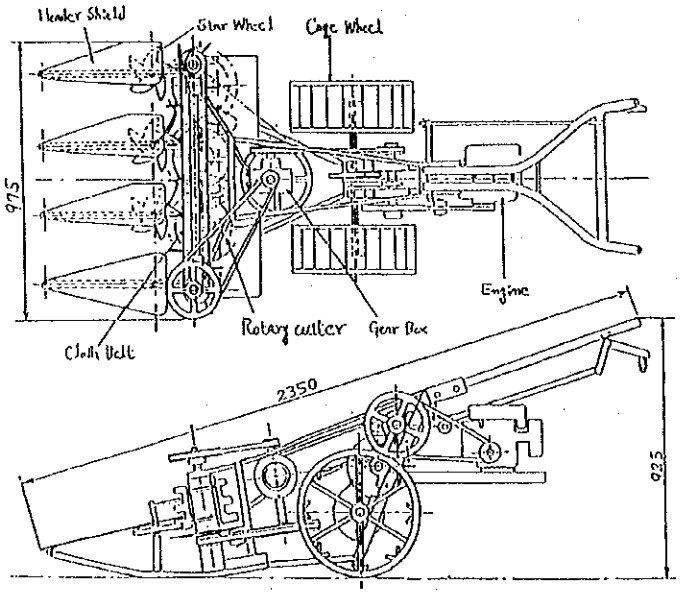


Fig. 1. Schematic diagram of the Maligaya Rice Reaper.

Table 1. Specifications of the first reaper prototype.

Overall length	2350 mm
Overall width	975 mm
Height (up to handle)	925 mm
Weight	115 kg
Engine power (max.)	2.2 kW (3.0 hp)
Travel Speed	0.93 m/s (3.3 km/h)
Travelling wheel	cage wheel (diameter 460 mm, width 180 mm)
Cutting device	rotary disc and blade
Cutting width	750 mm
Cutting height	140 mm
Side-delivery	cloth belt and lugs

4.5.2 Development of Power Tiller-Mounted Direct Seeder

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

Objectives

1. To increase capacity and reduce drudgery of existing method of mechanized direct seeding.
2. To do final leveling and seeding operations simultaneously.
3. To make in-field canal for drainage simultaneously with seeding and levelling operations.

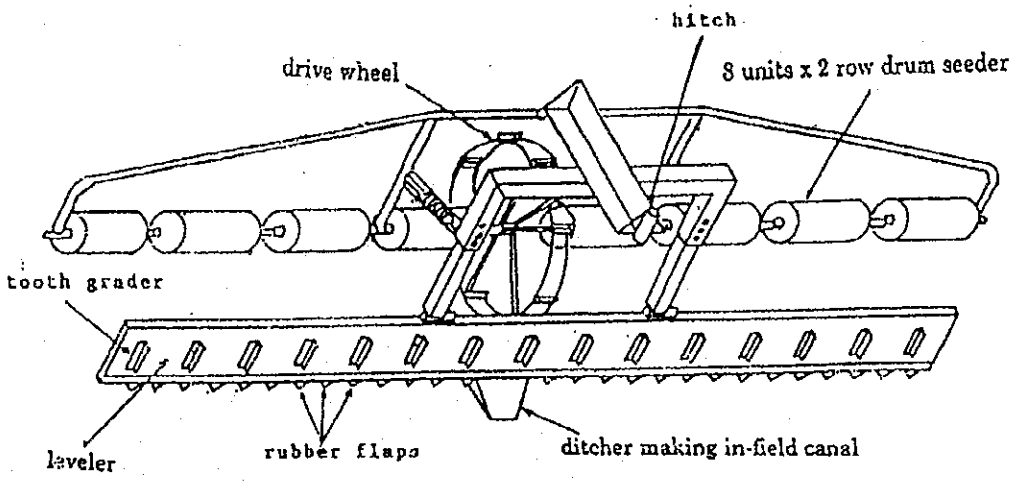
Concept

The seeder assembly consist of:

a. Wooden plank leveller with tooth grader made from angular bar. The leveller is connected to the frame by hinges and compression springs enclosed with two angular bars. The main function of the grader is to bury stubbles and rice straw into the soil. On the other hand, the rubber flap presses the soil surface.

b. Trapezoidal ditcher made from steel plate and placed underneath the center of the leveller and creates a canal. This will ensure the draining of excess water from the paddy field.

c. Eight drums with 16 rows for seeding attached at the rear most part of the assembly. It is directly behind the ditcher and the leveller. A drive wheel is provided at the center of the seeder shaft to ensure traction when operating in muddy field condition.



4.6 Improvement of cropping pattern

4.6.1 Recommendation on High Yielding Rice Cultivation on Rice-Based Cropping Systems

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Using the ENMS and NA-TDRS model, 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.

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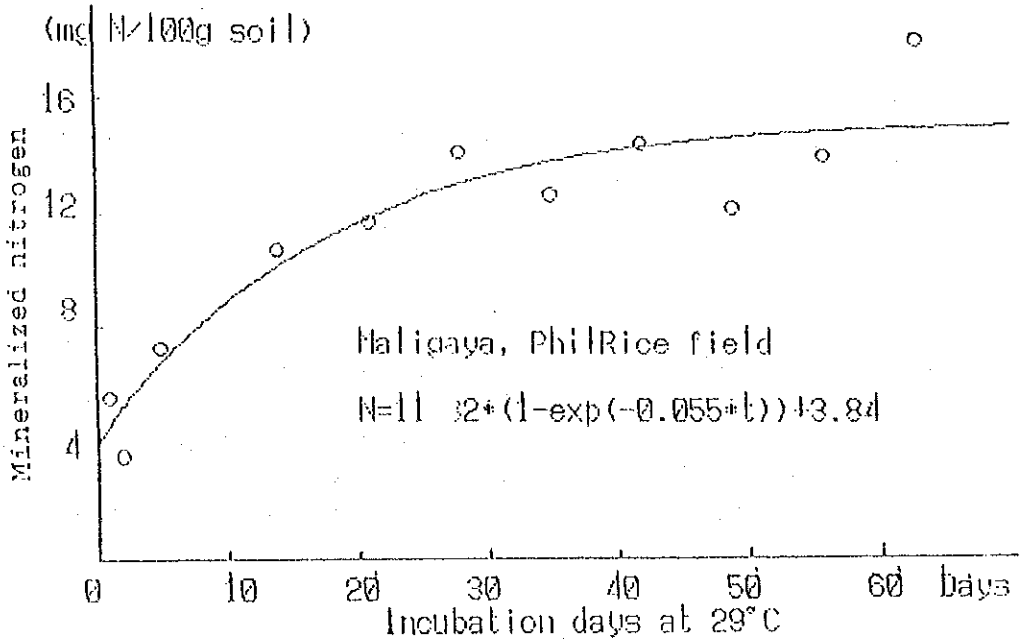
1. Introduced the Estimation of Nitrogen Mineralization in Soils (ENMS) and Nitrogen Fertilizer Application (NA) and Tillage Depth Recommendation System (TDRS) to determine nitrogen mineralization patterns of Philippine soils and fertilizer recommendation for rice at different tillage depths; converted the program to QBasic IBM compatible Mitac computer from the N88 Basic NEC compatible computer.

2. Using the available data from two soil types (Maligaya vertisol and Banaue soil), the nitrogen mineralization pattern of the two soils were determined. Results indicated similar patterns of nitrogen mineralization in the two soil types but slightly lower values were obtained in Maligaya vertisol (Fig. 1).

3. Using the NA and TDRS program, a fertilizer recommendation was formulated for the RBFS on-station experimental area (Maligaya vertisol) at different tillage depths.

4. Analyzed the existing rice-based cropping systems data at PhilRice and recommended experiments that can provide additional data on nutrient uptake, growth behavior, root distribution and available soil nitrogen.



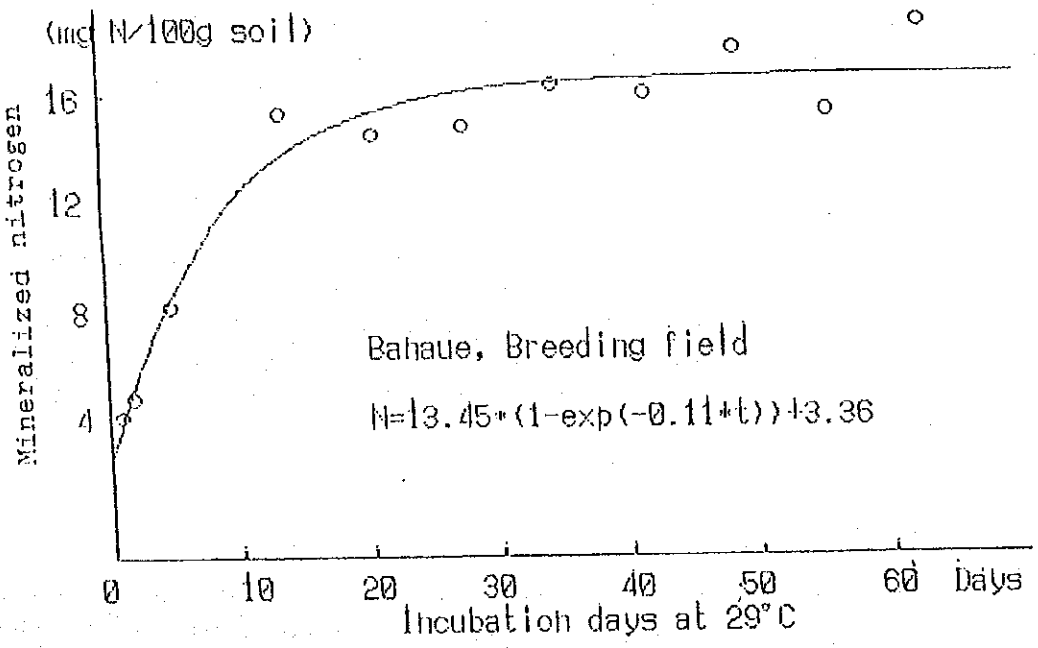


Fig. Nitrogen mineralization patterns of air-dried soils in Maligaya(above) and Banaüe(bel ow).

4.7 Grain Quality Evaluation

4.7.1 Sensory and Physico-Chemical Evaluation of Grain Quality

Rapid and more accurate methods of testing grain quality (sensory physical and chcemical) were introduced and found applicable

Sensory Evaluation

A new scoring system for the profiling of rice eating quality was designed. The ew system was devised based on the PhilRice conventional sensory evaluation scorecard and the Japanese Governmental Official Method. Modifications were made to suit Filipinos' demands for grain quality. The system showed good reproducibility and validity when tested through actual sensory evaluation of representative samples by trained assessors. The new system was also used in profiling the eating qualities of 12 newly-released Philippine rice varieties.

Determination of Rice Moisture (Paddy, Brown Rice and Polished Rice)

The expert brought with him two types of electric moisture meters (a direct-current resistance type and a high-frequency capacity type) and demonstrated to his counterparts the equipment's proper use, trouble-shooting and maintenance. With the new instruments, routine moisture analysis at the RCFS laboratory becomes faster, easier, more convenient, and also accurate.

Assesment of Milling Degree

Qualitative judgment of milling degree by staining with Mew-MG reagent was introduced. Brown rice stained blue green; completely milled rice, pink; and partially milled or undermilled rice, bluish to pink. Vis-a-vis the staining technique was the measurement of grain whiteness (using Kett whiteness meter) as an index of milling degree. Undermilled rices had whiteness values below 40.0 while regular-milled and overmilled ones had whiteness values above 40.0.

Freshness of Rice Grains

Three techniques for the judgment of milled rice freshness were introduced, namely: (a) pH indicator method, (b) fat acidity measurement by titration, and (c) fat acidity measurement by spectrophotometry. In method a, freshness is gauged by color reaction of

the sample and the pH indicator. Freshly-milled sample gave green color; one-year old rice, yellow; and two-year old rice, orange. Methods b and c quantify milled rice freshness based on fat acidity value. Fat acidity increases with storage time.

Tests for Cooking Quality

The Langhino method of testing cooking quality parameters was demonstrated. Contrary to the PhilRice conventional method which requires 80g of sample, the introduced method requires only 8 grams and is therefore very useful for grain quality screening at the early stage of breeding wherein the amount of sample is still limited. The method is also time-saving since 7 samples could be tested in one cooking vessel.

Estimation of Eating Quality by Chemometrics

Estimation formulas for rice eating quality were derived based on measured physicochemical properties and sensory evaluation scores. The estimates were proven to be adaptable as shown by the significantly high correlations between the predicted and measured values of several unknown samples.

4.8 Bio-technology

4.8.1 Anther Culture for Rice Improvement

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

Observations

1. Many cross combinations are being used in the project but the number of anthers plated per cross combination is less.

2. The ratios of callus induction and plant regeneration for indica rice being cultured in PhilRice are low compared with anther cultured-japonica rice in Japan.

3. A large number of materials are generated from anther culture due to too many tillers produced per regenerant.

Recommendations

1. A definite breeding target should be made. Characters controlled by few genes should be targeted.

2. Few cross combination should be used with increased number of anthers per cross combination. With the manpower limitation, mechanized planting of anthers is recommended.

3. F1's derived from three way or double crosses should be used instead of F1's from single crosses for increased recombination. F2's should also be done.

4. Basic studies to increase the percent callus induction and regeneration should be made. Studies to increase doubled haploid production should also be done.

5. Regenerants should be palnted closely (10x10cm) to minimize tillering. If sufficient seeds are produced (3g/plant), seed increase will not be made. Plants will be planted to panicle to a row where line selection could now be started.

6. Equipments are recommended for purchase like medium sized ultrasonic cleaner with stainless steel baskets and a cabinet type upright autoclave.

V. Annual Activity Plan of the Technical Cooperation for 1995

1. Technical Cooperation Activities

TENTATIVE SCHEDULE OF IMPLEMENTATION (ITEMIZED)

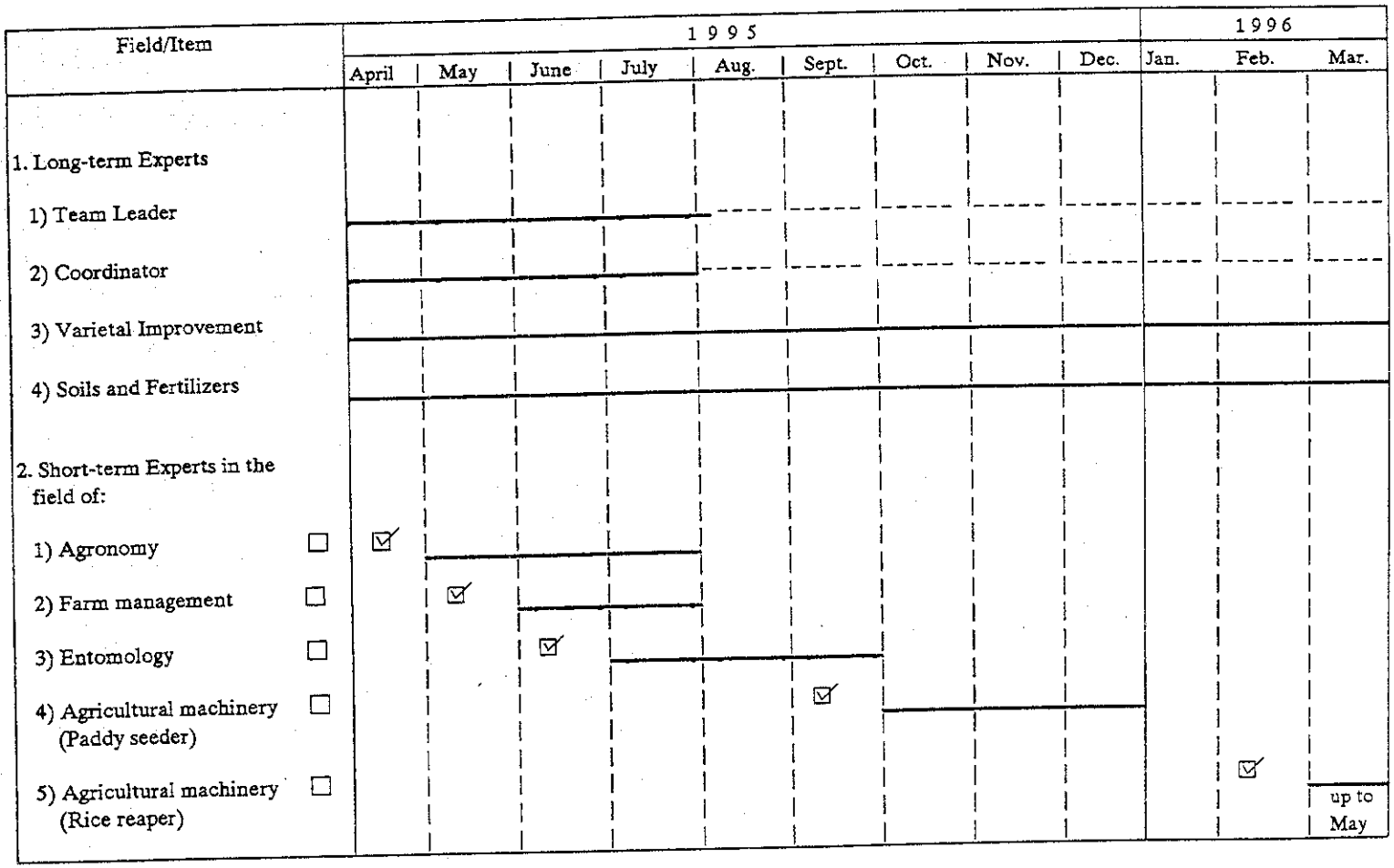
Field/Item	1995 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1996 Jan	Feb	Mar	Remarks
1. Research and Training Plan													
1) Research Planning													
a. Evaluation of present research work													Evaluation of technology development and JICA project position.
b. Emphasis of research subjects													Direction of research and development and subjects
2) Effective Training Design													
a. Effective application of extension materials													
b. Efficient transfer of newly developed technology													
2. Varietal Improvement													
1) Development of high yieldi varieties with excellent grain quality and resistant to pests and diseases for specific agr climatic conditions in the country													
a. Selection of mother plants and evaluation of crosses													Determination of the genetic potential, using 113 varieties, both in dry season (DS) and wet season (WS).
b. Hybridization													Hybridization of 50 crosses both in DS and WS, to introduce desirable genes into the leading varieties, with specific emphasis on the Indica\Japonica cross.
c. F1 raising test													Verification of 14 F1's in DS and planned 50 F1's in WS.

Field/Item	1995 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1996 Jan	Feb	Mar	Remarks
d. Individual and pedigree selection													Single-plant selection on 24 F2-F4 crosses, and bulk nurseries for generation advance on 141 F2-F4 in DS. Similar number will be tested in WS. In the pedigree line selection in DS, 420 F3 single lines with 25 crosses and 153 family lines with 25 crosses, 50% or more will be tested in WS.
e. Performance test													Eleven elite lines for preliminary performance test (AON) in DS. For WS, more than 25 lines are estimated for AON and five for performance test.
f. Development of parental lines with tungro resistance													Hybridization of 40 crosses both in DS and WS, to introduce the Tungro disease-resistance genes from local varieties, IRRI mutant lines, etc. into the leading varieties. F1 nursery of 7 crosses in DS and planned 40 in WS for verification. Some F1 crosses will be used for recurrent crossing. On-site breeding in hot spot: In Midsayap, Mindanao, 19 segregating populations and 85 pedigree lines with four crosses are raised for selection, while in San Mateo, Isabela, 13 populations are for selection work, in DS. In WS, nearly the same activities will be conducted.
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 40 crosses both in DS and WS, featuring highly cold-tolerant Japonica lines and other latest lines as parentals. F1 nursery of 9 crosses in DS and planned 40 in WS for verification. Some F1 crosses will be used for recurrent crossing.

Field/Item	1995 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1996 Jan	Feb	Mar	Remarks
b. Individual and pedigree selection													On-site breeding: At cool elevated fields in Banaue, Ifugao and La Trinidad, Benguet, 8 segregating populations and 208 lines with 20 crosses in total are raised for selection work in DS. In WS, nearly the same activities will be conducted.
c. Performance test													Two elite cold-tolerant lines, PJ1 and PJ2, will be tested on site in WS.
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													
b. Classification of the nitrogen uptake patterns of rice plants at different fertilizer levels													Determination of nitrogen uptake in rice plant under various nitrogen levels, especially focusing at panicle initiation and maturing stages of plant growth.
c. Determination of the nitrogen fertility of soils by biological method													Determination of the amount and pattern of nitrogen mineralization in soils of different soil types collected from different rice-crowing areas. Fresh (wet) soil incubation in addition to dry soil incubation.
d. Development of simple method for determining the nitrogen fertility of soils													Determination of the chemically extractable nitrogen in different soils, using pH 7.0 phosphate buffer.
e. Development of nitrogen fertilization technology													Field trials on different nitrogen fertilizer management. Determination of nitrogen uptake as stratified according to rice yield levels, and quantitative analysis of the ratio of derived nitrogen from soil and the nitrogen from applied fertilizers in the rice plant.

Field/Item	1995 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1996 Jan	Feb	Mar	Remarks
2) Establishment of models that will predict responses of rice growth with different levels of fertilizer application													
a. Analysis of the meteoro-logical data of main rice production areas													
b. Determination of the growth parameters of rice													Continuation of field trials to generate information for use in establishing crop models.
c. Establishment of crop models													Continuation of the development of preliminary crop models.
4. Agronomy, Plant Protection, Agricultural Machinery and Other fields (Short-term Experts will be dispatched)													
1) Improvement of cropping pattern													Integration of high yielding rice cultivation with combination of DS crop and soil fertility management.
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													Development of farming models.

2. Dispatch of Japanese Experts



3. Training of Philippine Personnel in Japan

Field	Name (Position)	Training Period	Affiliation (Destination)
1) Administration of Institute	Mr. Ronilo A. BERONIO (Deputy Director)	1994.05 - 1995.06	JICA, MAFF, NARC, etc.
2) Plant Breeding	Mr. John C. DE LEON (Sci. Research Specialist II)	1995.05 - 1995.11	National Agriculture Research Center (NARC)
3) Plant Physiology	Dr. Pompe C. STA. CRUZ (Chief Sci. Res. Specialist)	1995.06 - 1995.10	National Institute of Agro-Environmental Sciences (NIAES)
4) Audio-visual Education	Ms. Karen E.T. BARROGA (Sr. Sci. Research Specialist)	1994.08 - 1994.12	Okinawa International Center (OIC)
5) Agricultural Machinery	Engr. Ricardo F. ORGE (Sr. Sci. Research Specialist)	1996.02 - 1996.11	Tsukuba International Agricultural Training Center, JICA (TIATC)

4. Provision of Machinery and Equipment

Field/Item	1995									1996		
	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar
1) Purchased in Japan	■						□	●	X			
2) Purchased in Philippines		■							X			
3) Brought by Short-term Experts	■		■			■			X		■	X
		■							X			

■: Purchase order, □: Shipping, ●: Arrival in the Philippines, X: Arrival at PhilRice

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. Ronilo A. Beronio Deputy Director
Research and Training Coordination	Mr. Masaru Imamura	Ms. Eleanor L. Retales Chief, Administrative Division Ms. Virginia F. Recta Head, Planning & Collaborative Programs Office
Plant Breeding	Dr. 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. Teodula M. Corton Supervising Science Research Specialist, ASD Ms. Jacqueline A. Prudente Science Research Analyst, ASD
B. Short-term		
Biotechnology	Mr. Munetoshi AIKAWA	Dr. Nenita V. Desamero Research Fellow, PBBD Ms. Cynthia Bato Senior Science Research Specialist, PBBD
Agricultural Machinery (Reaper)	Engr. Tatsushi TOGASHI	Engr. Eulito U. Bautista Head, Rice engineering and Mechanization Division (REMD) Engr. Manuel Jose Regalado Senior Science Research Specialist, REMD

FIELD OF EXPERTISE	JAPANESE EXPERT	FILIPINO COUNTERPARTS
Grain Quality Evaluation	Dr. Toshio OGAWA	Mr. James A. Patindol Head, Rice Chemistry and Food Science Division (RCFS) Ms. Nanette Zulueta Science Research Specialist, RCFS
Crop Modelling/Physiology	Dr. Masaharu YAJIMA	Dr. Pompe C. Sta. Cruz Chief Science Research Specialist, ASD
Instrumentation	Mr. Mikio TAKAGI	Dr. Teodula M. Corton Supervising Science Research Specialist, ASD
Agronomy/Croppping Systems	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, REMD
Agricultural Machinery	Engr. Noboyuki SAWAMURA	Engr. Bernardo 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 Zulueta Science Research Specialist, RCFS
Entomology	Dr. Takashi WADA	Dr. Hilario D. Justo Supervising Science Research Specialist, Crop Protection Division(CPD) Mr. Vic V. Casimero Senior Science Research Specialist, CPD

Appendix 2a.

TRAINING REPORT

Name : ZYLA CIRILO-MACASIEB

Position : Supervising Science Research Specialist, and Head, Training Division

Agency : Philippine Rice Research Institute
Maligaya, Munoz, Nueva Ecija

Travel Duration : 10 May to 31 July 1994

Place : JAPAN

Purpose : To participate in the group training course on Agricultural Extension Service for Leader II under the PhilRice-JICA Technical Cooperation Project

Sponsor Agency : JAPAN INTERNATIONAL COOPERATION AGENCY

Training Course : Group Training Course on Agricultural Extension Service for Leader II

Training Period : 11 May to 31 July 1994

Main Training Center : Ministry of Agriculture, Forestry and Fisheries (MAFF)
1-2-1 Kasumegaseki, Chiyuda-ku
Tokyo, Japan Tel 81-3-3502-8111

Affiliate Training Center : Tokyo International Center (TIC)
2-49-5 Nishihara, Shibuya-ku
Tokyo 151, Japan Tel 81-3-3485-7051

Number of Participants : 22 Participants from Asia, Africa, and Oceana

Course Objectives :

The main purpose of the course was to provide participants with opportunities to understand agricultural extension services in Japan through lectures, practice, and abservation tours.

The course is also designed to give participants practical suggestions on the application of agricultural guidance, and to impart to them competence for leadership in agricultural guidance through discussions on the background, history, theory and practical methods of extension work.

The specific objectives of the training course were to enable the participants to:

1. understand the outline and background of agricultural extension service in Japan, and the process by which the contemporary agricultural extension service has been formed;

2. understand the methods of extension service and related administrative measures in Japan in order to develop action plans applicable to their respective countries; and to

3. understand the methods of training for extension workers in Japan and thus utilize such training methods in their respective countries.

Training Methods Used :

A combination of lecture-discussions, small group workshops, film shows, dialogues, and study tours were conducted for the participants to attain the objectives of the group training course.

Highlights of the Training Course :

General Orientation. A three-day general orientation program on "Japan Past and Present" was conducted by TIC to provide the participants with general information about Japanese values, behavior and customs, as well as economic and social institutions. The participants were briefed about the following:

1. Japanese Society and People
2. Japanese History and Culture
3. Education in Japan
4. Japanese Economy
5. Japanese Politics and Government
6. Japanese Conversation
7. A bus tour in Tokyo was also organized as a part of the general orientation.

Training Curriculum. The training curriculum covered the following modules:

1. Background of Extension Service

   1.1 Outline of Japanese Agriculture (Farming, Family and Society)
   1.2 History of Farming in Japan
   1.3 Agricultural Policy, Land Reform, Agri-Cooperative in Japan
   1.4 Educational System in Japan

2. Outline of Extension Service

   2.1 Agricultural Imporvement Promotion Law, Organization, Agricultural Extension Workers
   2.2 Relationship Between Research and Extension Service
   2.3 Fostering of Rural Youth and Home Life Improvement
   2.4 Management of Agricultural Extension Information

3. Practice of Extension Activities

   3.1 Method of Extension Activities
   3.2 Establishment of Extension Program

4. Capability Building and Training of Extension Workers

   4.1 Qualification of Extension Workers and Qualification Test
   4.2 Training System for Extension Workers
   4.3 Organization of Training Curriculum for Extension Workers
   4.4 Management and Evaluation of Training for Extension Workers

5. Agribusiness

6. Country Reports

Study Tours. Study tours were organized to enrich the lecture-discussions, and to provide first-hand experience and information to the participants regarding Japan's R&D system. The participants' study tours were as follows:

1. Within Tokyo

   1.1 Agriculture Information Center
   1.2 Nippon Telegraph and Telephone Corp (NTT)

2. Tsukuba Science City

2.1 Japan International Research Center for the Agricultural Sciences (JIRCAS)
2.2 Kubota Tractor Manufacturing Company
2.3 Tsukuba International Agricultural Training Center (TIATC)

3. Akita Prefecture

3.1 Akita Prefectural Hall (Farming Technique Dev't. Division and Agricultural Information Center)
3.2 Showa Extension Office
3.3 Ogata Reclaimed Land Village
3.4 Agricultural Technology Exchange Hall
3.5 Farmers' Academy
3.6 Akita Agricultural Experiment Station
3.7 Ohuchi Town Hall
3.8 Ohuchi Town Agricultural Cooperative
3.9 Akita New Bio-Farm
3.10 Atrion

4. Hiroshima

4.1 Hiroshima Prefectural Hall (Agricultural Administration Department)
4.2 Satake Corporation
4.3 Life Planning Class and Dairy Farm Guidance
4.4 Field Meeting of Rice Farmers
4.5 Hydroponics Guidance on Welsh Onions
4.6 Rural Youth Guidance
4.7 Farm Product Processing by the Homelife Improvement Group
4.8 Livestock/Cattle Farm
4.9 PEACE Memorial Museum*

5. KYOTO

5.1 Takii and Company
5.2 Kyoto Festival*

6. FUKUI

6.1 Fukui Prefectural Hall
6.2 Grain Elevator and Rice Seedling Production
6.3 Fukui Agricultural Experiment Station
6.4 Vegetable Production and Distribution Center
6.5 Eihei-ji Temple*
6.5 Fukui Prefectural Museum*

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* Exposure of participants to the Japanese Culture were also included in the itenerary.

Country Reports. Participants from 19 countries in Asia, Africa and Oceana delivered their country reports towards the end of the group training course. Each participant discussed the R&D/Extension System of his own country and shared his country's experiences in extension work. Country reports were presented by the participants as follows:

1. Asia

    1.1 Bangladesh
    1.2 Cambodia
    1.3 Indonesia
    1.4 Laos
    1.5 Malaysia
    1.6 Philippines
    1.7 Thailand
    1.8 Vietnam

2. Oceana

    2.1 Papua New Guinea
    2.2 Tonga

3. Africa

    3.1 Cameroon
    3.2 Egypt
    3.3 Ethiopia
    3.4 Kenya
    3.5 Malawi
    3.6 Mozambique
    3.7 Tanzania
    3.8 Zambia
    3.9 Zanzibar

Extra-Curricular Activities. A twelve-hour Basic Course on the Japanese Language, a four-hour class on Ikebana Flower Arrangement, and a one-hour Kimono Show were also attended by the participant at TIC.

Post-training Evaluation. The training participants, training management staff members, and a faculty member of the Tokyo University of Agriculture evaluated the course towards the end of the course. The participants, in general found the course well-managed and very rewarding although some points were raised to further improve the training.

Impressions from the Training Course:

The training course provided an opportunity for the participant to understand the agricultural extension system in Japan, and have gained insights that are useful in designing training programs that will help upgrade the present capabilities of extension workers in the Philippines. These insights are discussed in the foregoing:

The Agriculture Promotion Law. The government of Japan has been very keen in protecting the agricultural sector ever since the enactment of the Agriculture Promotion Law right after World War II. This law enabled the equitable distribution of agricultural lands from the big landowners to their farmer-tillers. This has given rise to small landholdings as these were handed over from farming parents to their offsprings since 1945.

The Japanese Farmers. The Japanese farmers are very hardworking, innovative, and very enterprising. However, out of the 1.9 million Japanese farmers, only 15 percent are full time farmers, and 85 percent of them are part-time farmers employed in industrial companies. They have an average farm of only 1.3 hectares which is highly mechanized. They are members of a farmers' organization, farmers' group, or a cooperative. They are graying very fast with an average age of 65, and need younger successors to tend their farms.

Problems of Farming in Japan. Japan's number of aging farmers is fastly decreasing. Majority (53.7%) of them produce rice, while the others are engaged in the production of vegetables, fruits, flowers, livestock, or a combination of these commodities. The Japanese government is bent on encouraging more rice farmers to diversify from rice farming to other cash crops due to the decline in rice consumption by the Japanese consumers, and to reduce government subsidies on rice.

The Japanese government buys the rice produced by the farmers to ensure that they get an equitable market price, and to ensure that the country attains food security. However, overproduction has been taxing the government, and so rice farmers have been encouraged to shift to high value crops.

The government has been intervening by providing long-term loans to farmers shifting from rice to vegetables, fruits, flowers, and livestock production. These loans are intended to upgrade the capability of farmers to put up glass houses, farm equipment, and processing facilities. Loans are given to individual farmers and/or to farmers' cooperatives and organizations for the optimum efficiency in the use of such facilities and farm equipment.

Fostering the Rural Youth. Japan's younger generation are attracted to the cities to work as company employees. Hence, the government is fostering the rural youth and training them as farm managers through the provision of formal training in the

farmers' academy, and non-formal training through exchange programs with other developed countries, and related farm activities through the extension system. Young Japanese men who are still interested in farming face yet another problem of finding their lifetime partners and getting comfortably married.

Goal of Japan's MAFF. The liberalization of farm-product imports, and the high quality orientation of consumers have greatly influenced Japanese agriculture. The goal of MAFF is, therefore, to enable Japanese farmers to produce high quality products at lower costs, and with environment-friendly farming practices. This is posing a great challenge to MAFF if Japan has to maintain the productivity of its agricultural sector despite of its advanced and highly industrialized state.

Japan's Agricultural Extension System. Agricultural guidance in Japan dates back during the Meiji period when farm information were passed on to the farmers by word of mouth. This type of farm communication is still very effective today and is even made faster and more efficient with the advancement of communication technology. The guidance which are being personally extended by farm advisers are complemented by the country's telecast radio communication system, and most recently, by the computer system. Farmers can have ready access to the farm information they need through their personal computers which are attached to the Agricultural Information Service Network.

Farm advisers support the farmers by providing them their needed technical knowledge and skills , and by helping them use the information which are relevant in their farms. Each prefecture employs farm advisers who have been trained in the farmers' academy to provide guidance to farmers.

The Subject Matter Specialists. The farm advisers, on the other hand, are backstopped by the subject matter specialists (SMS) who have been tempered in extension and/or research work. The SMS are the essential fulcrum of the Japanese Agricultural Extension Service. They constantly train the farm advisers, supervise them, and update them on the latest technologies. The SMS link with researchers of the experiment stations to find out the latest research breakthroughs and to feedback farmers' problems to the researchers. A special examination is given to farm advisers who (with at least 10 years experience in extension/research) wish to enter the SMS category. Only about 20 percent out of the total examinees every year pass this test.

Home Life Improvement. The other element of Japan's extension service is Home Life Improvement which caters for farmers' wives and other women farmers. Home Life Improvement deals with food processing, knitting, cooking, sewing, other aspects of home management, and also farm book keeping and accounting.

Japan's R&D System. The efficiency of the agricultural extension service maybe largely attributed to Japan's aggressive R&D System. There are 29 national experiment research institutes

affilited to MAFF, 19 of which work with agriculture, 19 are engaged in fisheries, and one conducts research on forestry. This excludes international research organizations based in the country, and researches being undertaken by private companies. Regional agricultural experiment stations are strategically located in Japan, and each prefecture has its own agricultural experiment station. Hence, Japan has attained the advanced state of its agricultural science and technology at present.

Conclusion:

The success of Japan's Agricultural Extension Service nowadays maybe attributed to many factors, some of which maybe traced back to the effective implementation of the Agricultural Promotion Law. Their efficient delivery of extension service is a complementation of the farmers' cooperative endeavors, responsiveness of the R&D system, government intervention, farmers' industry, and the concern of Japanese consumers on the plight of farmers. The advancement of the communication and information system cannot also be underscored.

The ratification of the General Agreement of Tarrifs and Trade (GATT) may pause another big challenge for Japan's labor and input-intensive agriculture. However, the alternatives it will take to resolve the impending effects of GATT on Japanese agriculture remains to be seen.

Insights from the Training Course:

The agricultural extension service in the Philippines which has been devolved to the local government units must be supported by providing intensive training for the extension workers, and by constantly updating them with the latest technological information. PhilRice needs to retrain rice specialists in the regions, and in the different rice producing provinces who will be able to effectively respond to local needs.

Our extension workers need logistics, i.e, transport facilities, basic office equipment such as computers and photocopying machines, and efficient linkages with research organizations. Farmers need to cooperativize for easier and faster extension work, and provision for loans and other support facilities.

Government intervention in the form of subsidies, irrigation, infrastructure, and equitable pricing support for the farmers is likewise very vital in alleviating their productivity and efficiency.

Appendix 2b.

TRAINING REPORT

Name:	VIRGINIA FARPALE RECTA
Position:	Senior Science Research Specialist
Agency:	PHILIPPINE RICE RESEARCH INSTITUTE Maligaya, Munoz, Nueva Ecija
Authorized Travel Duration:	13 April to 27 August 1994
Place:	JAPAN
Purpose:	To participate in a group and individual training course as counterpart in connection with the JICA - PhilRice Technical Cooperation Project.
Sponsor Agency:	JAPAN INTERNATIONAL COOPERATION AGENCY
Training Course:	INFORMATION NETWORK
Training Period:	14 April to 26 August 1994
Main Training Centers:	OKINAWA INTERNATIONAL CENTRE (OIC) 1143-1 Maeda, Urasoe-shi Okinawa-ken, 901-21 JAPAN NATIONAL AGRICULTURE RESEARCH CENTER Ministry of Agriculture, Forestry and Fisheries 3-1-1 Kannondai, Tsukuba-shi Ibaraki-ken, 305 Japan
No. of Participants:	12 (Group Training Course)

Course Objectives:

1. To participate in a group training course on Personal Computer Network System Design for :

   1.1 planning and implementation of personal computer network systems;
   1.2 design and development of application programs aimed at establishing personal

computer network systems under given conditions; and

1.3 evaluating the function and quality of a personal computer network system.

2. To participate in an individual training course for studying the research information network systems of the different agencies under the Ministry of Agriculture, Forestry and Fisheries in Tsukuba Science City.

Course Content:

1. Personal Computer Network System Design Course

1.1 Lectures and discussions

Basic subjects:	Personal computer (PC) introduction, word processing, spreadsheet, C programming, database programming, PC system design, test planning
Advanced subjects:	Network design outline, PC network system design, PC networking usage, UNIX fundamentals
Special subjects:	Special lectures (invited speakers), computer aided software engineering, advanced computer technology

1.2 Computer exercises and hands-on exercises

Individual and group work on programming (C language, dBaseIV, UNIX), problem solving, network hardware configuration, and system design.

1.3 System development workshop

To consolidate and strengthen the technical knowledge and skills gained by participants, a small-scale PC network system under given conditions was developed in groups.

1.4 Homeroom and independent study

Discussion among participants on computer related topics, and time for participants to study selected topics.

1.5 Observation tours

To observe computer manufacturing facilities, application of computer systems, and other computer facilities in Japan.

1.6 Achievement Tests

A periodic evaluation of participants' comprehension of the different topics is done to assess the effectiveness of teaching methodology, participants' understanding of the subject, and usefulness of subject to the participants.

2. (Individual) Observation Tour

A 2-week visit to the different research facilities in Tsukuba Science City under the Ministry of Agriculture, Forestry and Fisheries (MAFF) was undertaken to study the system for storage, retrieval and exchange of information on research, technologies, and others. The MAFF clients include researchers, extensionists, administrators, farmers, and policy makers. Briefings and demonstration on the systems (softwares) installed and hardware configuration and installation were delivered. In addition, highlights of ongoing research were also discussed.

Highlights:

1. General Orientation

1.1 Briefings on JICA, OIC, training policies, guidelines and procedures, and the PC Network System Design Course.

1.2 Lectures about JAPAN : society and people; government, history and culture; economy, international cooperation, educational system, and language.

1.3 Diagnostic tests and individual interview of participants to establish participants' profile, level of knowledge and skills, and expectations of the course. This interview was conducted by staff from FUJITSU and Nippon Telegraph and Telephone (NTT), the course instructors.

2. Lectures and Discussion

2.1 Basic subjects
- 2.1.1 Personal computer (PC) introduction
- 2.1.2 Spreadsheet: Lotus 1-2-3
- 2.1.3 Word processing: WordPerfect
- 2.1.4 PC system design
- 2.1.5 Test planning

2.1.6 Database programming: dBase IV
2.1.7 C language programming,

2.2 Advanced subjects
2.2.1 UNIX Fundamentals
2.2.2 Data communication system itroduction
2.2.3 OSI/LAN
2.2.4 PC network system design
2.2.5 PC networking usage

2.3 Special topics
2.3.1 Advanced computer technology
2.3.2 Computer aided software engineering (CASE) introduction

3. Individual Exercises/Group Work/Workshop

3.1 Individual Exercises
3.1.1 Lotus 1-2-3 and Wordperfect
3.1.2 dBase IV programming
3.1.3 C language programming
3.1.4 Test planning: selection of test cases
3.1.5 UNIX programming

3.2 Group Work
3.2.1 PC network system design (network configuration, hardware requirements)
3.2.2 PC network system usage (dBaseIV program under NOVELL Netware)

3.3 Workshop

A small-scale PC network system under given conditions was developed by participants in groups. The purpose of this workshop is to consolidate and strengthen the ability to work systematically (following the required steps of the system development cycle) in the design and development of an information system under a network environment. Other skills such as system documentation and group coordination are also developed.

4. Study and Observation Tours

4.1 Group Training Course
- Okinawa Prefectural Government Office, Naha City
- Okinawa Times Press Office,Naha City
- Matsushita Hall of Science and Technology, Kyoto
- Osaka University, Osaka
- FUJITSU Manufacturing Plant,Numazu City

- NTT Central Training Institute, Tokyo
- Statistical Bureau, Tokyo
- Toshiba Science Hall, Tokyo

4.3 Individual Study Tour (Tsukuba Science City and Ibaraki Prefecture)

- National Agriculture Research Center
  Department of Planning and Coordination
  Department of Research Information
- National Institute of Agro-environmental Sciences
- Information Research Institute, MAFF
- Computer Center, MAFF
- National Institute of Agriculture and Bio-resources
- Japan International Research Center for Agricultureal Sciences
- Ibaraki Agricultural Experiment Station

5. Co-curricular Studies

Completed the following Japanese Language Course sessions organized OIC:

5.1 Introductory Japanese Language Course (April 18 - May 26, 1994 , 24 hours)
5.2 Basic Japanese Language Course (May 30 - June 30, 1994 , 20 hours)

6. Terminal Activities

1. Final Examination
2. Presentation and defense of system development workshop output
3. Final Report Writing - filling up of standard JICA training evaluation questionnaire.
4. Closing Ceremonies and Awarding of Certificates.

Impressions

1. On the Content and Organization of the Group Training Course

The training was well organized and comprehensive. The lectures, hands-on exercises, and workshops were used as complementary methods to transfer knowledge and skills to the participants.

The training was divided into three stages. Basic/ introductory subjects were given at the start of the course, which established (more or less) a common level of knowledge and skill among the participants, who were found to have very varied backgrounds. During the second stage, more advanced subjects were tackled, which were found very informative and applicable to the participants' countries. The third stage consisted of a workshop, in which the participants, working in groups, actually developed an information system, based on a given set of conditions and following the standard methodology for system development (planning, database design, test planning, program development, and testing and evaluation). The workshop gave the participants an actual walk-through experience in system development, thus effectively rounding off the knowledge and skills gained during the earlier stages. It also called for other skills such as teamwork, coordination, and documentation.

Observations tours in Okinawa, Kyoto, Osaka and Tokyo were also organized to enrich the lectures and workshop, and provide actual examples of how networking is applied in the academe and industry.

Finally, the observation tour organized after the group training course provided the important link between the training on PC network system design and its actual application in research and development. The systems installed in the different institutes demonstrated how the technology can be used to share information and other resources among scientists, policy makers, extensionists and farmers. While these systems cannot be directly applied Philippine conditions (mainly due to budgetary constraints), they do provide us with ideas on how selected features can be adopted to enhance our system.

2. On Training Management and Facilities

The training was managed by JICA/OIC but the actual instruction was implemented by two groups, Nippon Telephone and Telegraph (NTT) and FUJITSU, Limited. Both companies are the leaders in their own fields (NTT for communication systems and FUJITSU for computer hardware and software). This means that the instructors were experienced practitioners as well as trainers. They brought with them a wealth of experience in actual installations and systems development, and this experience showed in the quality of instruction and during discussions and evaluation of participants' outputs.

The effective instruction is well complemented by the administrative and organizational support of the JICA and OIC management. The participants' needs were well provided for, and all steps were taken to ensure their comfort, health and safety.

The learning experience was also facilitated by the best facilities available. The entire computer system in OIC is changed every four or five years to keep abreast of the latest hardware and software, and ensure that the participants are exposed to state-of-the-art technology.

3. On Japan and its People

It is easy to see why science and technology is so advanced in this country. The Japanese virtues of discipline, hard work, teamwork, thoroughness, and attention to detail enable them to conduct and finish complex and difficult tasks without compromising the quality of their work -- characteristics important to research.

As trainers, they are very diligent and honest, while maintaining courtesy and patience at all times. This is very important, especially when dealing with trainees with different backgrounds.

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Appendix 2c.

TRAINING REPORT

Name:	MA. RUFELIE R. SOTES
Position:	Science Research Specialist I
Agency:	PHILIPPINE RICE RESEARCH INSTITUTE Midsayap Experiment Station Bual, Midsayap, Cotabato
Authorized Travel Duration:	07 June to 29 October 1994
Place:	Japan
Purpose:	To participate in an individual training course as counterpart in connection with the JICA-PhilRice Technical Cooperation Project
Sponsor Agency:	JAPAN INTERNATIONAL COOPERATION AGENCY
Training Course:	On-the-job Training on Plant Pathology
Training Period:	13 June to 27 October 1994

Main Training Center:

NATIONAL AGRICULTURE RESEARCH CENTER (NARC)
3-1-1 Kannondai, Tsukuba-shi
Ibaraki-ken, 305 JAPAN

Affiliate Training Center and Dormitory:

TSUKUBA INTERNATIONAL CENTER (TBIC)
3-6 Koyadai, Tsukuba-shi,
Ibaraki-ken, 305 JAPAN

Course Content:

Ecological and histological studies on the disease development of sheath blight and rice blast in rice.

Highlights:

I. **General Orientation**

1. Lectures and orientation on Japan's history and culture, education, government, society and people, means of transportation, Japanese ways of living and a bus tour around Tokyo (held at Tokyo International Center, Hatagaya, Japan on 07 to 12 June 1994)

2. Briefing on JICA and TBIC: structural organization, system and policies, rules and regulations and facilities.

3. Orientation on NARC, structural organizations, buildings and facilities, training guidelines, policies and procedures and the activities of the Paddy Crop Disease Laboratory of the Crop Protection Department.

II. **Practice/Training Activities:**

1. Introduction to the Director of the Crop Protection, Heads of the different laboratories, researchers, laboratory aides and laborers.

2. Tour and orientation on the different facilities and equipments and their functions, laboratories, greenhouses and experimental fields.

3. Meeting with the adviser and discussion of the studies to be conducted.

The Plant Pathology Course emphasized on the ecological and histological studies of Sheat Blight and Rice Blast disease development and involves the conduct of the following studies:

1. Race Differentiation of Rice Blast Fungus in Philippine and Vietnam Isolates

   a. Identification of blast races
   b. Media preparation and adjustment
   c. Single spore culture (monoconidial isolation)
   d. Inoculation to differential and test varieties
   e. Evaluation of blast lesion types
   f. Culture preservation (long-term storage)

2. Evaluation of the field resistance of "Super Rice" Lines to Rice Leaf Blast

   a. Trial establishment
   b. Isolation and purification of fungal cultures
   c. Inoculation to test varieties
   d. Evaluation of blast lesion types for true and field resistance.

3. The Effect of Varieties, Time of Fertilizer Application and Method of Inoculation for Sheath Blight Disease Development

a. Trial establishment and field lay-out
b. Transplanting
c. Fertilizer and pesticides application
d. Mechanisms of sheath blight disease development
e. Sheath blight media preparation
f. Isolation and cultivation of pathogen
g. Inoculum preparation
h. Field inoculation
i. Disease reading and evaluation of disease severity

- relation between disease development and fertilizer application
- relation between disease development and varieties

4. Research assistant in the conduct of the following studies:

a. Evaluation of New Fungicides for Timely and Effective Control of Rice Blast

- trial establishment and field lay-out
- transplanting
- inoculation
- fertilizer and fungicide application
- disease reading

b. Identification of Nitrogen Top Dressing Periods to Influence Rice Blast Development

- transplanting
- application of fertilizer
- inoculation
- disease reading

c. Inoculation Methods for Sheath Blight Development in Rice at Early Stage

- familiarization and practice of different inoculation techniques
- microscopic observations and taking of photomicrographs
- conducted Paraffin Sealing Test
- conducted Glass Slide Staining Technique for paraffin sealed samples

III. Study Tours

1. Ibaraki Agricultural Center
   - Plant Biotechnology Institute
   - Agricultural Research Institute
2. Fukushima Prefecture Agricultural Experiment Station
3. Tohoku National Agricultural Experiment Station
4. Aichi-ken Agricultural Research Center
   - Mountainous Region Institute
   - Genetic Engineering Laboratory
   - Department of Biotechnology
5. Hiroshima Agricultural Research Center
6. Tohoku University
7. Utsunomiya University
8. Kyoto University
9. Nagoya University
10. Du Pont K.K. Agricultural Science Laboratory (Fungicide Research Division)
11. Ibaraki Asahi Brewery Company

IV. Seminars and Meetings

1. Attended the national symposium on "Rice Blast Control" held in Fukushima High Land Hotel, Fukushima Prefecture, Japan on August 30-31, 1994.

2. Attended the national meeting on "Rice Blast Management in Cold Areas" held in Tohoku National Agricultural Experiment Station, Omagari, Akita, Japan on September 20-22, 1994.

3. Conducted a seminar on "Philippine Agriculture and PhilRice" to the freshmen researchers of the National Agricultural Research Center (NARC) and to the new members of the Ministry of Agriculture, Forestry and Fisheries, Tsukuba Office on July 25 and August 23, 1994, respectively.

4. Conducted a seminar on "The Ecological and Histological Studies on the Disease Development of Sheath Blight and Rice Blast: A Training Report" to the members of the Paddy Crop Disease Laboratory, Crop Protection Department on October 27, 1994.

V. Co-curricular Studies

1. Completed the Japanese Language Course organized by MAFF, Tsukuba Office (40 hours)

2. Attended computer lessons on MicroSoft Works Software organized by JICA-TBIC.

3. Participated in the Yukata Ceremony and Ikebana Flower Arrangement lessons organized by TBIC-Soroptimist Group of Japan.

4. Conducted an English Seminar (by invitation) to selected junior students of Utsunomiya University held at Utsunomiya University Forestry Building at Nikko on September 15, 1994.

VI. Terminal Activities

1. Terminal report writing

2. Completed the standard JICA Training Evaluation Questionare

3. Awarded certificates by NARC and JICA.

VII. Impressions

The training provided me a broader knowledge on the mechanisms of the development of diseases in rice particularly fungal diseases such as sheath blight and rice blast.

The hands-on training on different plant pathology techniques and using of advanced laboratory equipments was very rewarding and enhances my skills in assessing rice diseases. The principles and practical techniques used, although Japanese way, was very significant in my work in PhilRice Midsayap. However, it could have been more effective if lectures and reading materials about the topic or techniques were given for better understanding.

The observation tours to the different agricultural research and experiment stations were likewise more rewarding. It gives me the opportunity to observe the different researches of rice and have an idea on their rice pest management. Moreso, it also provided the chance to met famous plant pathologists and see the beautiful places of Japan.

Meeting and working with world known pathologists who were hardworker, honest and output-oriented researchers inspired me in the whole duration of the training. Their warm accomodation and kindness helps me feel at home and made my stay fruitful and worth memorable.

Appendix 2d.

TRAINING REPORT

Name: FERNANDO DUQUE GARCIA

Position: Science Research Specialist II

Agency: PHILIPPINE RICE RESEARCH INSTITUTE
Maligaya, Munoz, Nueva Ecija

Authorized Travel
Duration: 31 January - 18 November 1994

Place: Japan

Purpose: To participate in the group training course on Rice Cultivation Technology in connection with the JICA-PhilRice Technical cooperation Project.

Sponsor Agency: JAPAN INTERNATIONAL COOPERATION AGENCY

Training Course: Rice Cultivation Technology

Training Period: 1 February - 16 November 1994

Main Training Center:

TSUKUBA INTERNATIONAL AGRICULTURAL TRAINING CENTRE
3-7 Koyadai, Tsukuba-shi
Ibaraki-ken, 305 Japan

Affiliate Training Center and Dormitory

TSUKUBA INTERNATIONAL CENTER
3-6 Koyadai, Tsukuba-shi
Ibaraki-ken, 305 Japan

No. of Participants: 9

Course Objectives:

1. Obtain up-to-date knowledge and techniques of high yielding rice cultivation in Japan.

2. Attain a higher level of knowledge in the fields concernede such as agronomy, breeding, plant physiology, plant protection and soil & fertilizer.

3. Develop abilities to plan and carry out the experiments connected to participants' specialized fields and to analyze the results.

4. Improve the skills of making and presenting experimental results.

5. Deepen understanding of the methods of applying research results to actual farming.

6. Learn the skills of effective utilization of research equipment and tools.

Course Content

1. Lectures - Agriculture in general, Agronomy, Soil and Fertilizer, Rice Breeding, Rice Physiology, Plant Protection and Statistics

2. Practice and Experiment - Soil sampling and analysis, Breeding techniques, Physiological characters measurement, growth observation, yield diagnosis, rice cultivation techniques, conduct of individual experiments.

3. Study Tours - Research and experimental institutes, Progressive farmers, cooperatives, Industries related to agriculture and extension offices.

Highlights

I. General Orientation

1. Briefing on JICA, TIATC and TBIC, training policies, guidelines and procedures, and the Rice Cultivation Technology course.

2. Lectures about Japan: society and people; history and culture, and educational system and government.

3. Test to check benchmark knowledge of participants regarding the course.

4. Individual interview by Rice Section staff.

II. Lectures

1. Physiology in rice - life cycle of rice, seeds and seedlings, photosynthesis and assimilation, photosensitivity.

2. Soils - general, fertilizer and fertilizer application, characteristics of paddy soil, characteristics of tropical soils.

3. Breeding - general, upland rice breeding, anther culture, breeding in the tropics, artificial crossing, gene resources.

4. Statistics/ statistical analysis.

5. Cultural management - direct seeding methods, land preparation, new science on rice cultivation, growth diagnosis, water management.

6. Crop Protection - general entomology, general plant pathology, insect occurrence forcasting, virus diseases, fungal diseases.

7. Others - extension activities in Japan, safety operation of machines, organizing and planning agricultural project, agricultural problems in highly developed countries, Theory of getting high yield, grain quality.

III. Practice and Experiments

A. Practice

1. Rice cultivation and Physiology - seed preparation seed sowing, seedling growing, land preparation, photosynthesis and assimilation measurement.

2. Soils - sample collection, preparation, analysis.

3. Statistics - sample and data collection, analysis/ computation.

4. Breeding - anther culture, artificial crossing.

5. Crop Protection - weed diagnosis, insect disection, making specimens.

B. Experiments

1. Root characteristics of upland and lowland rice.

2. Methods of data collection for statistical analysis.

3. Characteristics of seedlings as influenced by N application at late nursery stage (greenhouse).

4. Growth habit of young and old seedlings in response to N application (pot experiment).

5. Growth and yield of transplanted young and old seedlings in response to fertilizer application in nursery bed (field trial).

IV. Study Tours and Observations

A. Universities and Agricultural Research Centers

1. Utsunomiya University
2. Tottori University
3. Kagoshima University
4. Ichigai Agri. Extension Office
5. Tochigi Pref'l. Agri. Experiment Station
6. Okayama Pref'l. Agri. Experiment Station
7. Kagoshima Pref'l. Agri. Experiment Station
8. Miyazaki Pref'l. Agri. Experiment Station
9. Fukushima Pref'l. Agri. Experiment Station
10. Niigata Agri. extension Office

B. Farms and Cooperatives

1. Aya chemical-free Agri. Dev't. Center
2. Yuza Agricultural Cooperative
3. Mr. Usui's farm - best farmer of the year

C. Corporations related to agriculture

1. Shimadzu Corporation, Kyoto
2. Sukigara Agricultural Machineries Corp, Kyoto
3. Kett Electric Laboratories, Tokyo
4. Nippon Bayer Company, Tochigi
5. Zeneca KK Japan (Jardine-Davies), Ibaraki

V. Paper presented

The Influence of Seedling Age and Topdressing at Late Nursery Stage on Seedling Characteristics, Growth and Yield of Rice Plant. - Included in the JICA-TIATC publication, The Compilation of Experiments in Rice Plant. November 1994.

VI. Co-Curricular Activities

1. Completed Intensive Sessions on Japanese Language course, February 14 - March 2, 1994. organized by JICA-TBIC.

2. Attended computer Classes (Wordstar, Lotus and Microsoft Works software) organized by JICA-TBIC.

VII. Terminal Activities

1. Technical Report writing and completed the standard JICA training evaluation questionaire.

2. Discussions with Rice Section Staff for the improvement of the Rice Cultivation Technology Course program of activities.

3. Final evaluation tests.

4. Individual interview of participants by JICA-TIATC Rice Section staff.

5. Attended closing ceremonies and Awarding of Certificates.

VIII. Impressions

The training is very comprehensive and detailed, scheduled topics are relevant and timely, however, it can be improved further by including topics on stress physiology, integrated nutrient management and research results interpretation. The topics discussed were good and relevant to high technology, but sometimes, the lecturers can not deliver clearly due to language problem. It is better if they can invite former JICA experts as lecturers who understand and worked in tropical countries, they can tap these experts as resource persons, since most of the participants came from tropical countries.

The training provided me with deeper technical understanding in rice science. The topics and activities were very useful in carrying out my work as a researcher. The individual experiments I conducted provided me with invaluable experiences and hands-on training on Japanese rice cultivation. Eventhough its very tough work, I learned how to decide and manage a research work independently.

The study tours in research institutions provided the participants a full view of how Japanese technologies are generated. The thing that impressed me much was their equipment and facilities, with these, they can proceed in generating advanced technologies. Likewise, the farmers' fields were very impressive. Farming activities and farm mangement practices were done in accordance with the government recommendation. Farmers and farm extensionists worked hand in hand to ensure that recommended practices were implemented properly and with the provision of full government support, higher production is attained.

The training center is very conducive to learning. With the excellent facilities, we can apply what we've

learned in the classroom. The staff are very considerate, cooperative, kind and patiently guided the participants in any undertaking. Moreover, with warm accomodation given to the participants by the training staff, the situation of being away from home and family made easier.

Appendix 2e.

Training Report

Name: Sergio Reyes Francisco

Position: Supervising Science Research Specialist

Agency: Philippine Rice Research Institute
Maligaya, Muñoz, Nueva Ecija

Travel Authority:

Duration: 05 July to 15 December, 1994

Place: Japan

Purpose: To attend individual training course as counterpart in connection with the JICA-PhilRice Technical Cooperation Project

Sponsor Agency: Japan International Cooperation Agency

Training Course: Farm Management and Farm Model Analysis

Training Period: 11 July to 14 December

Main Training Center:

Comparative Farming Laboratory
Department of Farm Management
National Agriculture Research center
3-1-1 Kannondai, Tsukuba-shi
Ibaraki-ken, 305 Japan

Highlights of the training

I. **General Orientation**

1. Orientation in form of lecture on Japan's history, culture, goverment, society and trasportation system was held in Tokyo International Center, Hatagaya, Japan on July 6 to 9, 1994.

2. Courtesy call on JICA personnels in Mitsui Building in Tokyo

3. Orientation on NARC structural organization. buildings and facilities and activities of the Center.

II. Training Activities

1. Introduction to the director and Staff of the Department of Farm Management and Heads of the different laboratoties of the department.

2. Courtesy call to the Director General and different staffs of the center.

3. Tour of research facilities of the Department of Farm Management.

4. Meeting with training supervisor and discussion re: activities to be undertaken.

5. Conduct of Research Entitled:
   Risk Preference and Optimum Cropping Pattern in the Rainfed Areas of Ilocos, Philiipines

III. Study Tours

1. Hokkaido Universiry
2. Kokkaido Experiment Station
3. Kyushu University
4. Kyushu Experiment Station
5. Komamoto JA Cooperatives and Farmer leaders
6. Iwate Prefectural Experiment Station
7. Morioka Town hall and farmer leaders
8. Akita Experiment Station
9. Ibaraki farmer cooperators of Dept of Farm Management

IV. Seminars and Symposia

1. Attended a National Symposium on Vegetable Mechanization and Contracting in Memuro City, Hokkaido.

2. Conducted a seminar on **Philippine Rice Industry, Situation and Direction** at the Departmant of Farm Management, NARC.

3. Conducted a seminar on **Decomposition Analysis of Derived Demad for Pesticides in Rice Farming in the Philippines** at the Departmant of Farm Management, NARC

4. Conducted a Special Seminar/Lecture on the **Impact of Pecticide Externality on Total Factor Productivity in Rice Production in the Philiipines** at Kyushu University

V. Other Activities

1. Prepared a research proposal on **Evaluation of the Different Rice-based Farming Systems in the Rainfed Areas of the Philippines,** submitted to JIRCAS for funding.

VI. Impressions

As a whole, the training was a success. It provided me with a broader knowledge on how to analyze farming models. Furthermore, it enhanced my basic skills in evaluating farming systems options using mathematica programming. The mathematical programming package which I used, although in Japanese, had been very useful since it helped me arrived at my objectives. This training also aroused my interest and pursue researches that try to evaluate the different rice-base farming systems in the Philippines.

The study tours provided me with oppurtunity to interact with farm management researchers in different reasearch stations and farmers. It also gave me some ideas on their research activities and research thrusts. The observation also gave me chance to meet known economist and sociologist and exchange ideas with them.

The most impressive experience that I heard from the farmer was the Murakaoshi approach to development. This has been the showcase of how the Japanese in the Rrural areas had turned their locality into a developed one with minimal help from the national gavernment. Their self-helped approach to rural revitalization is an appraoch that can be done in the Philippines considering that the government had little budget for rural development.

Working with the Japanese researchers, e.g. the farm management researchers who are hardworking and accomodating helped me feel at home and made my training in Japan fruitful and memorable.

Appendix 3a. Equipment purchased under the JICA technical cooperation (FY 1993).

	ITEM/DESCRIPTION	QTY	UNIT COS (Pesos)	TOTAL COS (Pesos)	LOCATION
A.	LOCALLY PURCHASED				
1.	Camera lens, Nikon	1 lot			IPM
	AF-28, f28	1 unit	4,450	4,450	
	Micro 105 mm, f2.8	1 unit	13,985	13,985	
	Macro-Zoom, 35-105 mm	1 unit	9,396	9,396	
2.	Uninterruptible power supply American Power Conversion, SMART UPS 900	10 unit	25,800	258,000	All Divisions
3.	Station Wagon, Mitsubishi Lancer 1500GXL	1 unit	405,000	405,000	Office of the Director
4.	Plain paper copier, SHARP 8870	1 unit	151,380	151,380	Office of the
	15-bin sorter, SF-S11	1 unit	37,021	37,021	Director
	Auto Document Feeder, SF-AF12	1 unit	44,631	44,631	
	Auto Duplex, SF-D11	1 unit	38,714	38,714	
5.	Analytical balance, A&D ER-180A Capacity 0-180 g; Sensitivity 0.1 mg	1 unit	110,800	110,800	RVI
6.	Carbon dioxide incubator Cole Parmer G-39200-15	1 unit	246,780	246,780	IPM
7.	Hectonic test weight kit, ELE EL-560-115/118	1 unit	85,500	85,500	RVI
8.	Leaf area meter, portable LI-COR LI-3000A, w/ belt conveyor, LI-3050A	1 unit	438,800	438,800	PFM
9.	Fraction collector, BIO-RAD 2110	1 unit	64,000	64,000	IPM
10.	Platform truck, Seedburo No. 361-9 floor lock, Seedburo No. 361-A foot operated brake Seedburo No. 361-B	2 unit	77,880	155,760	RVI
11.	Transparency maker machine, 3M 4550	1 unit	36,000	36,000	TTP
12.	Microphone discussion system, Philips CCS 400	1 lot	525,000	525,000	
13.	Software programs	1 lot			PCPO
	- Statistical Package for the Social Sciences (SPSS)	1 set	9,699	9,699	
	- SPSS PC+/Base Package	1 set	25,673	25,673	
	- SPSS Trends	1 set	24,550	24,550	
	- SPSS Statistics	1 set	22,550	22,550	
	- SPSS Advance Statistics	1 set	22,550	22,550	
	- SPSS PC Graphics	1 set	29,407	29,407	
	- SPSS Data Entry IV	1 set	22,550	22,550	
	- SPSS Tables	1 set	22,550	22,550	
	- Harvard Graphics for Windows v3.0	1 set	18,493	18,493	
	- Quattro Pro V4.0 Server Edition for Network	1 set	14,500	14,500	

ITEM/DESCRIPTION	QTY	UNIT COS (Pesos)	TOTAL COS (Pesos)	LOCATION
- Quattro Pro for Workstations	10 set	4,200	42,000	
- Windows v3.1	1 set	5,200	5,200	
- Autocad R12 for Windows w/o AME	1 set	111,000	111,000	
- WordPerfect for SU/Server v6.0 Edition	1 set	12,765	12,765	
- WordPerfect for Workstations Node Edition	10 set	5,900	59,000	
- Correl Draw v4.0	1 set	27,500	27,500	
- Lotus 1-2-3 for 10 Workstations	1 set	110,700	110,700	
		Subtotal	3,205,904	
B. SHIPPED FROM JAPAN				
1. Books and Journals	1 lot	494,225	494,225	Library
2. Slip Ring for Strain Gauge and Thermocouple	1 lot			REM
Model : 6118-4	1 unit	52,500	52,500	
Model : 6118-12	1 unit	168,250	168,250	
Model : 6105-4	1 unit	124,750	124,750	
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 Gauge	1 lot			REM
Model : KFG-30-120C1-11	2 unit	900	1,800	
Model : KFG-20-120-C1-11	2 unit	725	1,450	
Model : KFG-10-120-C1-11	2 unit	725	1,450	
Model : KFG-5-120-C1-11	2 unit	525	1,050	
Model : KFG-10-120-D16-11	2 unit	1,675	3,350	
Model : KFG-5-120D16-11	2 unit	1,375	2,750	
Model : KFG-2-120D16-11	2 unit	1,375	2,750	
Model : KFG-1-120D16-11	2 unit	2,150	4,300	
6. Elisa Microplate Reader Model 3550, #170-6602	1 lot	507,500	507,500	IPM
Replacement Lamp, 170-6610	2 unit	3,250	6,500	
Printer Interface Cable, 170-6611	1 unit	4,125	4,125	
DOT Matrix Printer, 170-V550	1 unit	56,500	56,500	
7. Water Bath for Crossing, Ozawa Model : 702	1 unit	221,250	221,250	RVI
8. Digitizer, Model : 33180SER, w/ Transformer	1 unit	47,500	47,500	PFM
9. Hot Air Rapid Drying Oven , Model : SF-216AS	1 unit	547,500	547,500	PFM
10 Manometer & Air Velocity Gauge, Model 4019K71	1 set	157,500	157,500	REM
11. Gauge Cement Kit, Model : BCK-77	1 unit	13,750	13,750	REM
12. Gauge Cementing Tool Kit, Model : GTK-77	1 unit	25,500	25,500	REM
13. Manual Sprayer, Lodle-shaped, Model : 256	2 unit	875	1,750	RVI
14. Grain Crack Inspection Apparatus, Model : 133-C	2 unit	575	1,150	RVI
15. Haemocytometer, Model : A-103	1 unit	8,250	8,250	RVI
16. Digimatic Caliper, Model : SCD-20	2 unit	5,750	11,500	RVI
17. Vitascope	1 unit	235,000	235,000	RVI
18. Low Temperature Programmable Incubator, Model : ILD-110HM	3 unit	187,500	562,500	PFM
19. Specimen Set, Model : L-55-1300	2 unit	4,500	9,000	IPM

ITEM/DESCRIPTION	QTY	UNIT COS (Pesos)	TOTAL COS (Pesos)	LOCATION
20. Electronic Balance, Model : FB-2000	1 unit	24,250	24,250	Midsayap
Electronic Balance, Model : FB-2000	1 unit	24,250	24,250	San Mateo
Electronic Balance, Model : FB-2000	1 unit	24,250	24,250	IPM
Electronic Balance, Model : FB-2000	1 unit	24,250	24,250	IPM
21. Optical Character Reader, Model : GT-6500	1 lot	39,500	39,500	PCPO
Interface Board, GT65RSPRB	1 unit	5,000	5,000	
Interface Board, GTATSPIFS, for PC/AT	1 unit	3,750	3,750	
22. Cast Alloy Square Tool Bits	1 lot			REM
1/4" x 2.1/8", 3203A11	5 set	375	1,875	
5/16" x 3", 3203A24	5 set	650	3,250	
3/8" x 4", 3203A27	5 set	1,125	5,625	
1/2" x 4", 3203A15	5 set	1,900	9,500	
5/8" x 4.1/2", 3203A16	5 set	2,425	12,125	
23. Keyway Broach Set, 3152A29	5 set	12,875	64,375	REM
24. Square/Hexagon Broach	1 lot			REM
3156A15, 1/4"	5 unit	4,225	21,125	
3156A17, 5/16"	5 unit	4,300	21,500	
3156A19, 3/8"	5 unit	5,500	27,500	
3156A24, 1/2"	5 unit	8,050	40,250	
2875A24, 1/2"	5 unit	8,000	40,000	
2875A26, 5/8"	5 unit	11,050	55,250	
2875A28, 3/4"	5 unit	12,850	64,250	
25. Tap and Die Sets	1 lot			REM
2640A4, 1/4-1/2"	5 set	14,400	72,000	
2646A12, 3-12mm	5 set	10,875	54,375	
26. Magna Byte 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	
Over Head Projector, HP-A305S	1 unit	5,975	5,975	
Monitor Interface, 5328	1 unit	26,500	26,500	
Remote Controller, 5302	1 unit	8,625	8,625	
27. Image Recorder, Digital Pallete, Model CI-5000S	1 unit	325,000	325,000	SSPR
Complete with accessories				
28. Gas Chromatograph, Model : GC-14BPTF	1 lot	447,050	447,050	RCFS
Air Compressor with Transformer	1 unit	57,500	57,500	
Carrier Gas Pipe, 5m	2 unit	2,250	4,500	
Hydrogen Gas Pipe, 5m	1 unit	2,250	2,250	
Air Pipe	1 unit	1,250	1,250	
Air Dryer	1 unit	4,000	4,000	
Soapfilm Flowmeter with Stand	1 unit	5,000	5,000	
Gas Filter	2 unit	7,500	15,000	
High-Purity Gas Pressure Regulator for He	1 unit	17,000	17,000	
High-Purity Gas Pressure Regulator for N2	1 unit	17,000	17,000	
High-Purity Gas Pressure Regulator for H2	1 unit	17,000	17,000	
Gas Cylinder for He	1 unit	23,750	23,750	
Gas Cylinder for N2	1 unit	17,500	17,500	
Gas Cylinder for H2	1 unit	17,500	17,500	
Glass Colum 1.1m	4 unit	1,125	4,500	
Glass Colum 2.1m	4 unit	1,625	6,500	
Glass Colum 3.1m	4 unit	2,375	9,500	
Packing Material Set	1 set	37,500	37,500	
Data Processing Unit, C-R7Ae	1 unit	272,500	272,500	
Split/Splitless Sample Injector, SPL-14	1 unit	62,500	62,500	
Column Packing Accessories	1 unit	13,750	13,750	
Capillary Column 25m, OV-1	1 unit	21,750	21,750	
Capillary Column 25m, SE-52	1 unit	21,750	21,750	
Capillary Column 25m, OV-1701	1 unit	21,750	21,750	
Capillary Column 25m, PEG-20M	1 unit	21,750	21,750	
Small-Sized Soapfilm Flowmeter	1 unit	2,500	2,500	
Micro Syringe, 1 micro liter	2 unit	3,750	7,500	

	ITEM/DESCRIPTION	QTY	UNIT COS (Pesos)	TOTAL COS (Pesos)	LOCATION
	Micro syringe, 5 micro liter	2 unit	4,500	9,000	
	Micro syringe, 25 micro liter	2 unit	3,000	6,000	
	Electro Capture Cell, ECD-9	1 unit	85,250	85,250	
	Electro Capture Detector	1 unit	82,500	82,500	
	Spare & Consumable Parts	1 set			
	injection rubber septum	5 unit	150	750	
	O-ring for glass column 20 pc/set	5 set	125	625	
	glass column joint	10 unit	500	5,000	
	silica wool	5 unit	500	2,500	
	chart paper 10 pc/set	3 set	8,750	26,250	
	graphite ferrule 4 pc/set	10 set	500	5,000	
	glass insert for split	5 unit	875	4,375	
	glass insert for splitless	5 unit	750	3,750	
	glass insert for glass column	5 unit	625	3,125	
	nut for capillary column 10 pc/set	3 set	1,125	3,375	
	graphite ferrule for capillary column 10 pc/set	3 set	1,500	4,500	
	graphite ferrule for capillary column 0.8 10 pc/set	3 set	1,500	4,500	
	nozzle for FID	4 unit	1,250	5,000	
	floppy disk, 10 pc/set	2 set	3,000	6,000	
	TCD detector	1 unit	14,750	14,750	
	standard sample for FID	1 unit	2,000	2,000	
	standard sample for TCD	1 unit	2,000	2,000	
	standard sample for ECD	1 unit	2,000	2,000	
	oxygen trap	1 unit	11,750	11,750	
29.	Oven Dryer, Model : DN-910	1 unit	266,000	266,000	San Mateo
	Oven Dryer, Model : DN-910	1 unit	266,000	266,000	Midsayap
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	PFM
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.	Seedburo Seed Blower, Model : HF-1	1 unit	136,750	136,750	San Mateo
	Seedburo Seed Blower, Model : HF-1	1 unit	136,750	136,750	Midsayap
	Seedburo Seed Blower, Model : HF-1	1 unit	136,750	136,750	PFM
33.	Sampling Thresher, Model :190-C	1 unit	161,250	161,250	RVI
34.	Herbarium Presser, Model : SG-618	6 unit	10,000	60,000	IPM
35.	Insect Collection Cabinet, Model : SG-481	2 unit	123,000	246,000	IPM
36.	Digital Vibration Meter, 8534T21	1 unit	72,500	72,500	REM
37.	Drafter, Model : RES2-12G	1 unit	37,500	37,500	REM
38.	Drafting Table, Model: TH-20, with Drafting with Drafting Board, Model : BM-12	1 set	30,500	30,500	REM
39.	Video Projection System, Consisting of:	1 set			TTP
	Video Projector, Model: VPH-1042QM	1 unit	408,000	408,000	
	Remote Control Unit, Model : VPR-722S	1 unit	22,325	22,325	
	Projector stand	1 unit	25,500	25,500	
	Carrying Case, Model: VLC-1040	1 unit	26,250	26,250	
	100" Flat Screen, Model : VPS-100FH	1 unit	28,000	28,000	
	Ceiling Fittings, Model : PSS-722	1 set	11,425	11,425	
	Ceiling fittings, Model : PSS-10	1 set	17,850	17,850	
	Projector Cable, 25m, Model : CCQ-25BRS	1 unit	17,325	17,325	
	Operation Manual (English), For VPH-1042QM	3 unit	1,500	4,500	
	Operation Manual (English), For VPR-722S	3 unit	1,500	4,500	
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
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

ITEM/DESCRIPTION	QTY	UNIT COS (Pesos)	TOTAL COS (Pesos)	LOCATION
44. Insect display Case, Model : SG-422	10 unit	2,750	27,500	IPM
45. Lighting Moth Collector, Model : 217-B	1 unit	95,250	95,250	IPM
46. Rubber Boots	1 lot			RVI
23.0cm	1 pr	2,525	2,525	
24.0cm	2 pr	2,625	5,250	
25.0cm	6 pr	2,625	15,750	
25.5cm	2 pr	2,625	5,250	
26.0cm	3 pr	2,625	7,875	
27.0cm	3 pr	2,625	7,875	
28.0cm	2 pr	2,750	5,500	
29.0cm	4 pr	2,800	11,200	
		Subtotal	9,539,225	
		Add: 3% ta	286,177	
			9,825,402	
		TOTAL	13,031,306	

Appendix 3b. Equipment programmed for purchase under the JICA technical cooperation (FY 1994).

	ITEM/DESCRIPTION	QUANTITY	LOCATION
A.	LOCALLY PURCHASED		
1.	Micro-centrifuge	1 unit	Rice Varietal Improvement (RVI)
2.	Heating block for YAMATO HF-41	2 units	RVI
3.	Vacuum pump	1 unit	RVI
4.	P.C. Board Control Assembly for leaf area meter	1 unit	Planting and Fertilizer Management (PFM)
5.	Soil Cation Exchange Capacity Determination Apparatus, Harada-Yoshida type	4 unit	PFM
6.	Soil Samplers for 100 mL cylinder	3 unit	PFM
7.	Mill, laboratory "Labo-Mill"	2 unit	PFM
8.	Air blast Seed cleaner	2 unit	PFM
9.	Digital Lux Meter	1 unit	PFM
10.	Optional Gradient Maker w/ Gradient Gel Adapter	1 unit	Integrated Pest Management (IPM)
11.	Multiple Dialyzer	1 unit	IPM
12.	Micropipettors with replacement tips	1 lot	IPM
13.	Water Purification System	1 unit	IPM
14.	Cryogenic shippers	1 unit	IPM
15.	Eppendorf Microcentrifuge with rotors	1 unit	IPM
16.	Diesel engines	2 unit	Rice Engineering and Mechanization (REM)
17.	Blue printing machine	1 unit	REM
18.	Digital seed moisture meter	1 unit	REM
19.	Camera, single lens reflex	1 unit	Social Science and Policy Research
20.	Desktop publishing system	1 lot	Technology Transfer Program (TTP)
21.	Process camera	1 unit	TTP
22.	Platemaker	1 unit	TTP
23.	Slide projector	4 unit	TTP
24.	Internal Disk Drive	1 unit	Planning and Collaborative Programs Office (PCPO)

ITEM/DESCRIPTION	QUANTITY	LOCATION
25. Statistical Analysis System (SAS) Software	1 unit	PCPO
26. Tape Back-Up System	1 unit	PCPO
27. Camera, auto-focus	1 unit	PCPO
28. Seed counter, manual	4 unit	Midsayap, San Mateo
29. Brush cutter	10 unit	Midsayap, San Mateo
30. Seed blower	2 unit	Midsayap, San Mateo
31. Hand tally counter	20 unit	Midsayap, San Mateo
32. Reaper	2 unit	Midsayap, San Mateo
33. Journals	1 lot	Library
34. Vehicle, Double cab pickup with spare parts and consumables	1 lot	Research Department
B. For Purchase in Japan		
1. T-shape manifold	1 unit	RVI
2. Adapter	24 unit	RVI
3. Freezer	1 unit	RVI
4. Winnower	1 unit	PFM
5. Ion Chromatograph	1 unit	PFM
6. Hollow cathode lamps, for Mo, Al, B, Ni, Co and Hg for HITACHI HLA-4S	1 unit	PFM
7. Crucibles	3 unit	PFM
8. Huller	1 unit	PFM
9. Lighting moth collector	5 unit	IPM
10. Noxious insect rearing box	5 unit	IPM
11. Rice insect collecting case	5 unit	IPM
12. Winnower	1 unit	IPM

	ITEM/DESCRIPTION	QUANTITY	LOCATION
13.	Vertical band saw	1 unit	REM
14.	Combination press-brake, slip roll and shear	1 unit	REM
15.	Arbor press	1 unit	REM
16.	Rotary sheet metal forming machine	1 unit	REM
17.	Hand bending brake	1 unit	REM
18.	Single blade cutter w/ spare blades	1 unit	REM
19.	Electronic digital vernier caliper	1 unit	REM
20.	Digital micrometer	1 unit	REM
21.	Digital stopwatch	5 unit	REM
22.	Universal tachometer	1 unit	REM
23.	Accessories for Auto Analyzer	1 unit	Rice Chemistry and Food Science (RCFS)
24.	Near Infrared Reflectance Spectrophotometer	1 unit	RCFS
25.	Rotary shaker	1 unit	RCFS
26.	Hand tractor	4 unit	Midsayap, San Mateo
27.	Seed cleaner	4 unit	Midsayap, San Mateo
28.	Centrifugal pump	4 unit	Midsayap, San Mateo

Appendix 3c. Equipment brought by JICA Experts (FY 1993).

ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	LOCATION
FY 1993				
1. Video camera sets	1 unit	104,625	104,625	TTP
2. Printed base for leaf meter	1 unit	42,500	42,500	P F M
3. Lighting moth collector	1 unit	94,750	94,750	C P D
4. Chemical for Biotechnology	1 set	65,481	65,481	R V I
5. Accessories for Data Fielder	1 set	76,350	76,350	R E M
6. Personal Computer	1 set	71,250	71,250	P F M
		TOTAL	241,875	
FY 1994				
1. Logger	1 unit	45,900	45,900	P F M
2. Sunshine Recorder	1 unit	56,700	56,700	P F M
3. Personal Computer	1 set	101,385	101,385	J I C A
4. Thermometer solar radiation	1 unit	83,400	83,400	W S
5. Dyna vane converter	1 unit	23,575	23,575	W S
6. Stereo microscope	1 set	7,775	7,775	C P D
7. Bag for rice insect	1 unit	11,250	11,250	C P D
8. Seed tray	300units	74	22,125	R V I
9. Grain moisture tester	1 unit	33,000	33,000	R C F C

ITEM/DESCRIPTION	QTY	UNIT COST (in Pesos)	TOTAL COST (in Pesos)	LOCATION
10. Grain moisture tester	1 unit	46,200	46,200	R C F C
11. Testing rice polisher	1 unit	12,100	12,100	R C F C
12. Testing rice polisher	2 units	1,300	2,600	R C F C
13. Nitrogen distilation apparatus	2 sets	24,325	48,650	P F M
14. Electronic balance	1 unit	51,213	51,213	P F M
15. Conductivity meter	1 unit	6,170	6,170	P F M
16. Twin pH meter	1 unit	5,050	5,050	P F M
17. Personal mill with transformer	2 sets	5,250	10,500	P F M
18. Soil water extractor	20 units	324	6,475	P F M
19. Meteograph	1 unit	203,500	203,500	R V I
		TOTAL	848,000	

Appendix 4. PhilRice Corporate Operating Budget, 1994-1995

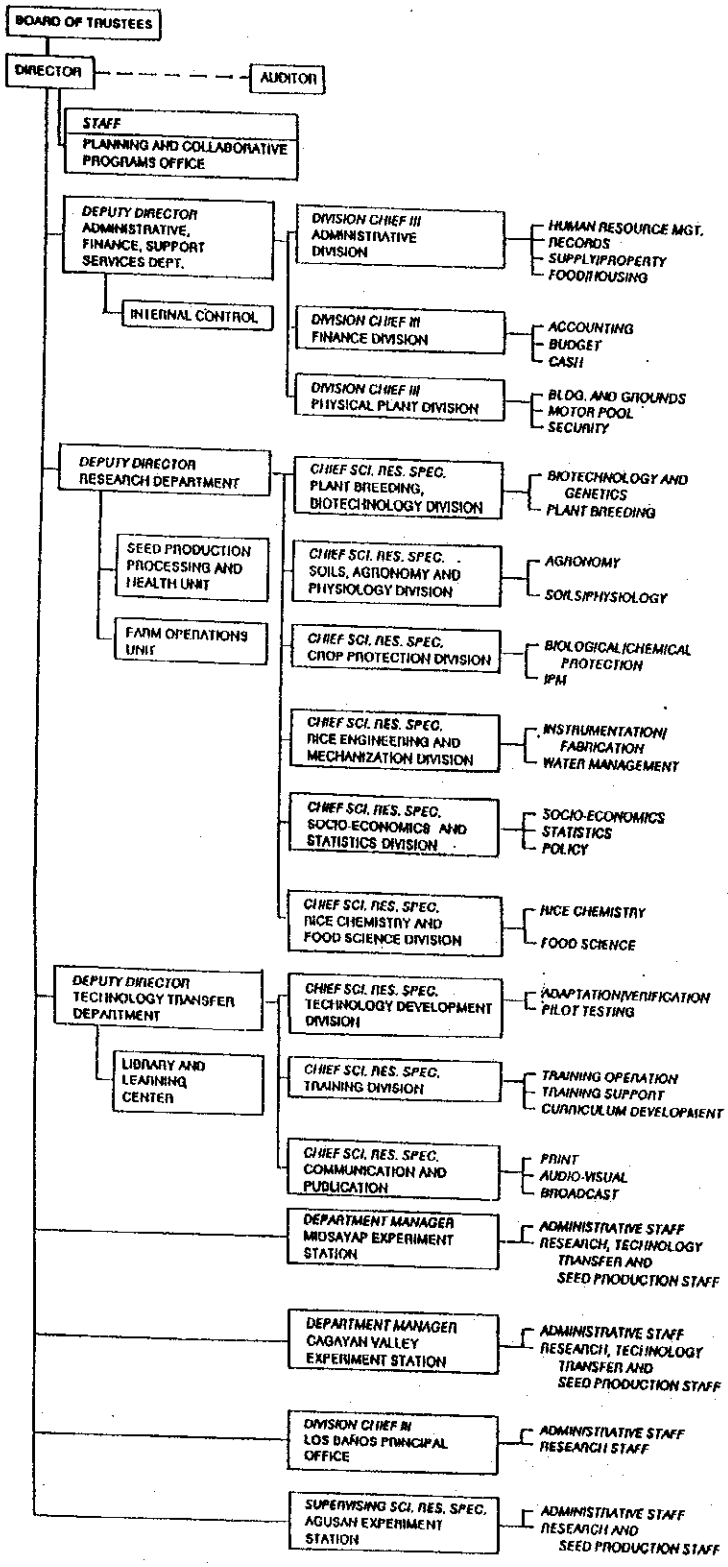
ACTIVITY	AMOUNT (P '000) 1994	1995
1. General Administration	24,069	27,174
2. Support to Operations	7,337	12,048
3. Research		
Rice Varietal Improvement	14,917	20,176
Planting & Fertilizer Management	6,811	6,644
Rice-based Farming Systems	2,919	2,214
Integrated Pest Management	11,982	9,350
Rice Engineering & Mechanization	5,568	4,921
Rice Chemistry and Food Science	3,687	2,460
Social Science and Policy Research	4,387	3,445
4. Technology Transfer		
On-farm Technology Demonstration	3,516	1,140
Training	15,235	9,546
Communication and Publication	4,687	3,562
5. Service related programs (Support to the network)	34,299[1]	8,689[2]
TOTAL	139,414	111,368

1 Congrssional initiative

2 Includes congrssional initiative of P 1 million

Appendix 5. PhilRice Organizational Chart

PHILIPPINE RICE RESEARCH INSTITUTE
ORGANIZATIONAL CHART
(PURSUANT TO DBM-APPROVED ORGANIZATION STRUCTURE AND STAFFING PATTERN DATED 30 APRIL 1992)



付属資料③　本調査にかかる協議結果概要及び調査団活動内容(フィリピン側より提供)

THE JICA TECHNICAL COOPERATION FOR THE PHILIPPINE RICE RESEARCH INSTITUTE

VISIT OF JICA SURVEY MISSION

A. HIGHLIGHTS OF DISCUSSION

1. Visit to the Department of Agriculture

The JICA Survey Mission was cordially welcomed by Hon. Roberto S. Sebastian, Secretary of the Department of Agriculture (DA), in Diliman, Quezon City. The courtesy call to the DA Secretary was also attended by key officials of PhilRice, and the JICA-PhilRice Technical Cooperation Project. Sec. Sebastian explained the Grains Production Enhancement Program (GPEP), a flagship program of the DA. He stressed that the priority concern of DA is to raise the productivity of Filipino rice farms from an average of 3.0 tons/ha to as much as 5 to 7 tons/ha.

GPEP aims to increase rice production through the provision of improved irrigation facilities, seed support, and farm machinery and equipment. The Secretary further explained that the Philippines is geared towards farm mechanization to further increase farm productivity and efficiency. The other concern of GPEP is to reduce the total land area planted to rice from 3.0 million hectares to only 1.9 million hectares by encouraging rainfed lowland and upland farmers to shift from rice farming to the cultivation of high valued crops.

Sec. Sebastian also invited the team members to visit Mindanao in Southern Philippines for them to be able to see banana and pineapple plantations. Mindanao will soon be the future food basket of the country due to its productivity potential, and favorable weather conditions.

The JICA Survey Mission team expressed their interest in visiting Mindanao at some other time, and also expressed their appreciation to the DA Secretary for his warm welcome and briefing.

The Team, accompanied by Dr. Takahashi and Mr. Imamura, moved to PhilRice Muñoz at 9:30 and arrived at 12:45 noon.

2. Discussion with JICA Experts, PhilRice Officials and Counterparts

2.1 *Arrival, Briefings, and Reception*

The Team arrived in PhilRice Muñoz at 12:40 pm, 29 March and were welcomed by Dr. Rolando Cruz, Chief of the Agronomy, Soils and Plant Physiology Division, and Dr. Hilario D. Justo, Supervising Science Research Specialist of the Crop Protection Division.

At 2:00 p.m., briefing videos on PhilRice, the JICA Grant Aid to PhilRice, and the JICA-PhilRice Technical Cooperation were shown at the Training Room followed by a tour and visit to the different laboratories. The group then proceeded to the field service building and observed the prototypes of the Maligaya reaper and the paddy seeder, which are being developed under the technical cooperation. After this, the research farm was visited, particularly the experimental setups of the JICA-PhilRice collaboration in varietal improvement and soils and fertilizers.

The Survey Team was formally welcomed by JICA Experts, PhilRice officials and counterparts led by PhilRice Director Dr. Santiago R. Obien and JICA Team Leader Dr. Hitoshi Takahashi at 6:00 p.m. with cocktails and dinner.

2.2 *Discussion on the progress of the project*

In the morning of 30 March, the JICA Experts discussed the progress of the technical cooperation with the Team.

In the afternoon, all the PhilRice and JICA participants met in a general session to discuss the self-assessment at the midterm of the project, by JICA experts and PhilRice counterparts. The discussion followed the order of items in the Tentative Schedule of Implementation (TSI).

1. Research and Training Plan

Good progress has been achieved in the evaluation of present research work due to availability of good counterparts and equipment, and good guidance of experts. In training, the effective application of extension materials has been enhanced with the training on audio-visual (AV) production planning conducted by Mr. Masao Yoshida, JICA AV expert. Since the training, the communication group has produced 12 instructional and briefing videos.

2. Varietal Improvement

The activities programmed in varietal improvement have been implemented on schedule, due mainly to adequate planning, good guidance of experts, as well as highly capable and commited counterparts. Emphasis is placed on breeding for good grain quality, and this is realizable with the successful Indica x Japonica crosses. The lines will be subjected to preliminary performance tests starting this year.

In the development of varieties for cool elevated areas, materials are being tested in two sites of the Cordilleras, in cooperation with network researchers. In breeding for tungro resistance, the materials are also being tested in hot spot areas..

With the provision of adequate equipment, it is estimated that the targets set at the end of the project will be achieved.

3. Soils and Fertilizers

In the development of fertilizer management technology for various agro-climatic conditions in rice growing areas, all activities are progressing well, with adequate planning, good guidance of experts, capable counterparts, and provision of needed equipment. Some delay in the activities have been observed, due mainly to sporadic/unannounced brownouts, which interrupt laboratory procedures, and even damage highly sensitive equipment. Some difficulty has also been experienced in the search for a rapid method (comparable to the biological or incubation method) for determining the nitrogen fertility of soils. The biological method is very time-consuming, which is why the search for simpler (but correlated) method, while admittedly difficult, is being continued.

Preliminary crop growth models have also been established and are being validated using data from experiments established simultaneously in Japan and the Philippines by expert and counterparts.

4. Other fields

Improvement of cropping pattern. Good progress has been attained with adequate planning, good guidance of expert, and capable counterparts. Some delay in the analysis of soil samples was experienced due to the heavy load of the analytical laboratory, but it is expected that this will be remedied soon with the training of other staff to help in the analysis.

Integrated pest management. In this area, some delay has been experienced due mainly to the difference in the IPM situation in the two countries. In Japan, the economic threshold level (ETL)-based approach has been effective in controlling rice insect pests. In

the Philippines, however, the emphasis has shifted to enhancing the effectiveness/activity of natural enemies of rice pests. However, it was agreed that, while the two approaches may differ, there are common areas of interest, such as the improvement of research methodology and techniques. Mass rearing techniques (especially for yellow stemborer), research on mechanisms of resistance, and yield damage assessment under pest complexes are some examples of proposed areas of collaboration.

Farm mechanization. In this area, very good progress has been achieved in two projects: the development of the rice reaper, and development of the paddy seeder. The second prototype of the rice reaper is ready for further testing and improvement, while the first prototype of the paddy seeder has been completed. These achievements are attributed to adequate planning, good guidance of experts, and highly capable counterparts.

Grain quality evaluation. Two experts in this field have contributed to the improvement of grain quality testing methodology. Adequate planning, good guidance of experts, and highly capable counterparts contributed to these achievements.

Biotechnology. There was an exchange of ideas and techniques for anther culture, with highly capable researchers from both sides of the collaboration (expert and counterpart).

2.3 *Discussion on future activities*

During the morning session of 31 March, the participants had small group discussions to discuss more specifically the future activities of the project. The groups were: (1) Rice Varietal Improvement; (2) Soils and Fertilizers, and Crop Modeling; and (3) Management Matters and other fields.

Each group identified activities to be continued for the duration of the project. New activities to be initiated in the proposed Phase II of the project were also evaluated by the participants. The order of discussion followed the items in the TSI:

1. Research and Training Plan

Research Planning. Under research planning, there are two major activities. The first item is the evaluation of present work, which consists of the study of the status of rice technology development at PhilRice, and how the JICA can best complement and enhance these activities through collaborative work. This item directly affects the second item, which is the emphasis of research subjects. This item involves the identification and prioritization of the major thrusts of the cooperation in 1995 and beyond.

It was generally agreed that a major concern of rice production in the Philippines is low labor productivity. One solution identified is the enhancement of farm mechanization, of which the Philippines is one of the lowest relative to other Asian countries. It was therefore suggested that a major thrust of future work will be farm mechanization. Mechanization is an important factor in increasing efficiency and improving competitiveness of rice, especially under the GATT. This belief was also expressed by Agriculture Secretary Roberto Sebastian when he received the group on 29 March.

Effective Training Design. Dr. Takahashi has already requested the dispatch of an Extension/Training Design Expert, and the request is now being evaluated by JICA officials. At the earliest, the expert will be here in January 1996 for two months. Ms. Macasieb requested that the assigment period be increased to four months, since the expert will evaluate the Season-long Rice Specialists' Training, and design a training plan to improve the present activities. In case the expert can only come for two months, the training group will communicate with him earlier so that he will be familiar with the project when he arrives, and can immediately be actively involved.

In the case of development communication, there are no collaborative activities planned for this fiscal year. However, a communication staff (Ms. Karen Barroga) will be sent to Japan (Okinawa International Center) for training on AV Production. Mr. Roger Barroga requested for an expert in Computer Aided Instruction, since computer-aided learning materials will be developed by the communication group as an additional training tool for transferring technology to farmers. This tool has been shown to be effective in Japan. The request is being considered.

2. Varietal Improvement

Briefing on PhilRice Breeding Program. Mr. dela Cruz gave a short briefing on the Institute's breeding program. Previously, breeding was done using indica materials, but with the implementation of the JICA-PhilRice collaborative Project, japonica materials were introduced. Varietal improvement encompasses major agro-ecosystems like irrigated lowland, rainfed lowland, upland, adverse environments like cool elevated, saline-prone and problem areas.

The main breeding objectives are to develop high yielding varieties with resistance to major insect pests and diseases and good grain quality. With the GATT, grain quality will be given more emphasis to compete in the world market.

Conventional and non-conventional breeding strategies like anther culture are being used to achieve these objectives. The respective project leaders informed Mr. Hoshino of their accomplishments. Ms. Padolina stated that approximately 200 breeding lines, 50 advanced lines for preliminary yield testing and 35 advanced lines for national performance test are generated each season for irrigated lowland. Dr. Sebastian informed him that they

are doing molecular mapping for tungro resistance while Dr. Desamero has already produced regenerants from cold tolerant materials and are now under field observation. Dr. Truong, on the other hand, reported on the mapping activity of the bacterial leaf blight (BLB) population in Luzon.

The group also visited the greenhouses/experimental field of Rice Varietal Improvement Program.

The Annual Activity Plan of the T/C for 1995-1996. Mr. dela Cruz discussed the itemized technical cooperation activities for FY 1995. After deliberation on the planned activites, the group agreed on the planned implementation of the T/C project.

Future Collaboration. The group discussed plans for future collaboration, specifically research and training activities:

Research

a. On-site selection of the breeders for tungro resistance in North Cotabato and Isabela
b. Use of ELISA to screen the breeding materials for tungro resistance in support to shuttle breeding
c. Rice tungro virus mapping in collaboration with IRRI and Japan
d. Avail of the advances made by Japan on cold tolerance gene mapping

Training

a. On-the-job training on conventional breeding and biotechnology (transformation and genome mapping)
b. Dispatch of a medium-term (6-12 months) expert on transformation

3. Soils and Fertilizers

Accomplishments. The group briefly reviewed the research accomplishments under the technical cooperation. Methods for determining nitrogen uptake, total root of rice plants, and soil sampling in Japan and the Philippines were also discussed at length.

In research, baseline information on rice production and fertilization have been gathered, and substantial soil and plant samples have been obtained. A methodology for rapid determination of available nitrogen in soil (comparable to the biological method) is still being established. Analysis of meteorological data have also established that major weather variables affecting grain yield are solar radiation, maximum temperature, and temperature range. Preliminary crop growth models for rice are also being validated using data from experiments in the Philippines and in Japan..

In training, two staff in Agronomy have undergone counterpart training in Japan -- one in the field of nitrogen fixation, and another on rice cultivation.

Future activities. The proposed activities for 1995-96 take off from the accomplishments during the first half of the T/C. The activities outlined in the TSI were discussed and approved. In addition, additional research on the availability of nitrogen as affected by green manure under irrigated and rainfed condition was suggested and will be considered. Proposed trainings include not only those for counterparts in Japan (on-the-job training and study tours), but also for on-the-job training within the division, on the following fields: 1) laboratory equipment maintenance; 2) laboratory analysis; and 3) health and safety.

4. Other fields

Improvement of Cropping Pattern. This year's emphasis will be on high yielding rice cultivation with combination of dry season (DS) crop (i.e., corn, legumes, tomato and sweet potato) and soil fertility management. It was suggested that an expert be dispatched towards the end of the wet season (WS) so that he can be actively involved in the organization and establishment of the DS crop. If this is not possible, them the PhilRice researchers will communicate with Dr. Sumida (the expert) earlier to be able to prepare the data requirements for the collaborative work. At the earliest, Dr. Sumida can come January 1996.

Integrated Pest Management. An expert will be dispatched for three months, specifically on computerization of data concerned to IPM. It was recognized that the thrust of the national IPM program is the enhancement of the activity/effectiveness of natural enemies, but an expert in this field of rice crop protection in Japan is not available. Therefore, the collaboration can emphasize on other important aspects of IPM, such as information management. An expert in IPM information management can help set up an information system in order to systematize the collection, organization, storage and utilization of IPM data. Other experts requested by PhilRice, for future consideration, are: (1) expert in insect rearing using artificial diets, especially for yellow stemborer; (2) expert in mechanisms of rice resistance; and (3) yield damage assessment/relationships under pest complexes.

Farm Mechanization. To date, three experts have been dispatched to help develop two farm equipment -- the reaper and paddy seeder. In FY 1995, two more experts will arrive to help evaluate the equipment. It was suggested that the reaper expert come during the regular harvesting period (April-May), so that repeated and extensive testing can be done.

Farm Models. In 1995, an expert will be dispatched to develop an English version of an existing farm management simulation program in Japan. Dr. Nanseki (the expert) himself developed this software, and he will be dispatched to translate the output to English, as well as give some briefings/training on the use of the program. If the manual is translated to English in Japan, Dr. Nanseki can finish program modification and briefing in one month.

Preliminary arrangements with the expert will be coordinated by Mr. Fukase and Dr. Francisco to facilitate the work.

Grain Quality Evaluation. Two experts were already dispatched on sensory and physico-chemical evaluation of rice, and the collaboration has been successful. Future work (next phase of the project) can emphasize on the development of rice food products. This will complement the work on farm mechanization, which aims to optimize labor in rice production. Farm labor can then be diverted to (other) off-farm activities, such as rice food products manufacture and marketing.

Seed Science and Technology. The present collaboration has not emphasized on this area. It was suggested that future work include a strengthening of the seed health inspection capability of PhilRice, which plays a vital role in the production of high quality breeder and foundation seeds for distribution to cooperating researchers and seed producers nationwide.

B. PROGRAM OF ACTIVITIES

28 March, Tuesday

1:30	Arrival at NAIA Proceed to Hotel Nikko Manila Garden	Dr. H Takahashi/ Mr. M Imamura
3:30	Courtesy Visit: Embassy of Japan	Dr. H Takahashi/ Mr. M Imamura
4:30	Courtesy Visit: JICA Philippine Office	Dr. H Takahashi/ Mr. M Imamura

29 March, Wednesday

9:00	Courtesy Visit: Sec. Roberto S. Sebastian Department of Agriculture	Dr. SR Obien/ Dr. H Takahashi
9:30	Move to PhilRice Maligaya	
1:00	Arrival at PhilRice Maligaya Check in at PhilRice Dormitory Lunch at PhilRice Cafeteria	Ms. EL Retales/ Ms. CJ Tibayan Hosts: Dr. RT Cruz, Dr. HD Justo Dr. H Takahashi JICA Experts
2:00	Viewing of PhilRice Story	Ms. FG Joson

2:30	Visit to PhilRice Buildings and Facilities	Dr. SR Obien/ Dr. H Takahashi
	Laboratory Building	
	Rice Chemistry and Food Science Division	Mr. JA Patindol
	Plant Breeeding and Biotechnology Division	Mr. HC dela Cruz/ Dr. LS Sebastian
	Agronomy and Soils Division	Dr. RT Cruz
	Crop Protection Division	Dr. VP Gapud
	Technology Transfer Department	
	Communication	Mr. RF Barroga
	Library	Ms. LdR Abaoag/ Ms. B Lagao
	Video Production	Ms. KET Barroga
	Field Service Building/Engineering	Engr. EU Bautista
	Experimental Farm (JICA-PhilRice experiments)	Dr. T Motomatsu/ Mr. T Ito
5:00	Break	
6:00	Reception Cocktails and Dinner	PhilRice Officials & JICA Experts

30 March, Thursday

8:00 Discussion on the JICA-PhilRice Technical Cooperation
Venue: Conference Room
Participants: JICA Experts and Survey Mission Team

12:00 Lunch break

1:30 Discussion on the Progress of the JICA-PhilRice Technical Cooperation
Participants: JICA Experts, Survey Mission Team,
PhilRice Officials and counterparts
Venue: Conference Room

3:00 Seminar: Report of Dr. Takashi Wada
JICA Short Term Expert in Entomology

4:00 Farewell Program for Dr. Wada

6:30 Dinner — PhilRice Officials and JICA Experts

31 March, Friday

8:00 Group Discussion on Progress of the T/C

Group 1: Varietal Improvement
Participants: Mr. T Hoshino, Mr. T Ito, Mr. HC dela Cruz, Ms TF Padolina
Dr. LS Sebastian, Dr. HX Truong, Dr. NV Desamero
Documentor: Ms. ER Corpuz
Venue: Seminar Room 1

Group 2: Soils and Fertilizers, and Crop Modeling
Participants: Mr. K Wakimoto, Dr. T Motomatsu,Dr. RT Cruz,
Dr. PC Sta. Cruz, Dr. W Obcemea, Dr. TM Corton,
Ms. JA Prudente, Mr. FD Garcia, Mr. PR Casayuran
Documentor: Ms. MC Casimero
Venue: Training Room 3

Group 3: Management matters and other fields
Participants: Dr. M Suzuki, Dr. SR Obien, Dr. H Takahashi,
Mr. RA Beronio, Mr. M Imamura, Mr. Y Fukase,
Dr. VP Gapud, Dr. HD Justo, Mr. RO Retales,
Engr. EU Bautista, Dr. SR Serrano, Dr. SR Francisco,
Mr. JA Patindol, Mr. RF Barroga,Ms. ZC Macasieb,
Mr. RJ Lara, Ms. EL Retales
Documentor: Ms. VF Recta
Venue: Conference Room

12:00 Lunch break — All participants

1:30 General Discussion
Participants: JICA Experts, Survey Mission Team,
PhilRice Officials and counterparts
Venue: Conference Room

3:00 Coffee break

3:15 Wrap-up/Summary — Dr. H Takahashi
Concluding Remarks — Dr. SR Obien
Response — Dr. M Suzuki

4:00 Other matters

5:00 Break
6:30 Dinner in Cabanatuan City — Hosts: Dr. H Takahashi

01 April, Saturday

8:00 Move to Banaue
Stay overnight

02 April, Sunday

10:00 Move to PhilRice Maligaya
5:00 Arrival at PhilRice Maligaya
6:30 Dinner at Director's Cottage

03 April, Monday

8:00 Move to Manila via Pampanga and Tarlac
3:00 Visit Soils Research and Development Center
5:00 Break/Return to Hotel

04 April, Tuesday

9:00 Visit NEDA-Project Monitoring Staff
10:30 Visit DA-IADCCO

05 April, Wednesday

9:00 Joint Committee Meeting
Participants: Joint Committee Members, JICA Survey Mission, and PhilRice Officials and counterparts
Venue: DA-NAFC Conference Room, Department of Agriculture

9:00	Opening Remarks	Hon. Roberto S. Sebastian
9:10	Project Background & Introduction of Participants	Mr. Ronilo A. Beronio
	Presentation and Discussion of 1994 Accomplishments	
9:30	Overall Accomplishments	Dr. Santiago R. Obien
9:45	Research Planning	Dr. Hitoshi Takahashi
9:55	Rice Varietal Improvement	Mr. Toshio Ito
10:10	Fertilizer Management	Dr. Rolando T. Cruz
10:35	Crop Modeling	Dr. Pompe C. Sta. Cruz

11:55	Farm Mechanization	Engr. Eulito U. Bautista
11:05	Improvement of Cropping Pattern	Mr. Rolando O. Retales
11:15	Grain Quality Evaluation	Mr. James A. Patindol
11:25	Biotechnology	Dr. Nenita V. Desamero
11:35	Plans for the Technical Cooperation in FY 1995	Dr. Hitoshi Takahashi
11:55	Discussion	
12:10	Closing Remarks	Hon. Akihiko Hashimoto
12:20	Lunch Break	
1:00	Open	
6:00	Cocktails/Dinner	Hosts: JICA Survey Mission

06 April, Thursday

10:00	Visit IRRI	Dr. T. Imbe

07 April, Friday

10:00	Report to JICA Office
11:00	Report to Embassy of Japan

08 April, Saturday

Return to Japan

C. PARTICIPANTS

Joint Committee for the Technical Cooperation

1.	Hon. Roberto S. Sebastian *Chairman*	Secretary, Department of Agriculture (DA)
2.	Dr. Manuel M. Lantin *Vice Chairman*	Undersecretary for Research, Training and Field Operations, DA

Members:

3.	Dr. Santiago R. Obien	Executive Director, PhilRice
4.	Mr. Ronilo A. Beronio	Deputy Director, PhilRice
5.	Dr. Hitoshi Takahashi	Team Leader, JICA
6.	Mr. Masaru Imamura	Coordinator, JICA
7.	Mr. Toshio Ito	Plant Breeding Expert, JICA
8.	Mr. Teruhisa Motomatsu	Soil and Fertilizer Expert, JICA
9.	Hon. Akihiko Hashimoto	Resident Representative, JICA Philippine Office
10.	Ms. Zenaida Villegas	Officer-in-Charge, Project Packaging Division, DA-IADCCO
11.	Dr. Ernesto D. Bautista	Director, Public Investment Staff, NEDA
12.	Mr. Rolando Tungpalan	Director, Project Monitoring Staff, NEDA
13.	Dr. Beatriz P. del Rosario	Deputy Director for Research, PCARRD
14.	Dr. Cecilio Arboleda	Dean, College of Agriculture, UPLB
15.	Hon. Katsuhiko Yamauchi	First Secretary, Embassy of Japan

JICA Survey Team

1. Dr. Mamoru Suzuki *Team Leader*	Deputy Director Kyushu National Agricultural Expt. Station Ministry of Agriculture, Forestry and Fisheries (MAFF)
2. Mr. Takafumi Hoshino *Plant Breeding*	Director, Department of Crop Breeding National Agriculture Research Center MAFF
3. Mr. Kenzo Wakimoto *Soil & Fertilizer Management*	Chief, Laboratory of Lowland Soils Department of Lowland Farming Kyushu National Agricultural Expt. Station, MAFF
4. Mr. Yukata Fukase *Coordinator*	Staff, Agricultural Technical Coop. Div. Agricultural Development Cooperation Department, JICA

JICA Experts, JICA-PhilRice Technical Cooperation Project

1. Dr. Hitoshi Takahashi	Team Leader
2. Mr. Toshio Ito	Plant Breeding Expert
3. Dr. Teruhisa Motomatsu	Soil and Fertilizer Expert
4. Mr. Masaru Imamura	Coordinator

PhilRice Officials, Senior Staff, and Counterparts

1. Dr. Santiago R. Obien	Executive Director
2. Mr. Ronilo A. Beronio	Deputy Director
3. Mr. Hilario C. dela Cruz	Chief, Plant Breeding and Biotechnology Division (PBBD)
4. Dr. Rolando T. Cruz	Head, Agronomy and Soils Division (ASD)
5. Dr. Victor P. Gapud	Head, Crop Protection Division (CPD)
6. Engr. Eulito U. Bautista	Head, Rice Engineering and Mechanization Division
7. Mr. James A. Patindol	Head, Rice Chemistry and Food Science Division
8. Dr. Segfredo R. Serrano	Chief, Socio-economics and Statistics Division (SESD)
9. Mr. Roger F. Barroga	Head, Technology Transfer-Communication Division

10. Ms. Zyla C. Macasieb	Head, Technology Transfer-Training Division
11. Mr. Raul J. Lara	Head, Technology Transfer-On farm Technology Demonstration Division
12. Ms. Eleanor L. Retales	Chief, Administrative Division
13. Mr. Nestor C. Martin	Chief, Finance Division
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15. Dr. Pompe C. Sta. Cruz	Chief Science Research Specialist, ASD
16. Dr. Wilma N. Obcemea	Supervising Sci. Res. Specialist, ASD
17. Dr. Teodula M. Corton	Supervising Sci. Res. Specialist, ASD
18. Dr. Frisco M. Malabanan	Chief Science Research Specialist, Seed Production and Health
19. Dr. Leocadio S. Sebastian	Supv. Science Research Specialist, PBBD
20. Dr. Nenita V. Desamero	Research Fellow, PBBD
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22. Mr. Rolando O. Retales	Senior Science Research Specialist, ASD
23. Dr. Hilario D. Justo	Supv. Science Research Specialist, CPD
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29. Ms. Virginia F. Recta	Head, Planning & Collaborative Programs Office

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