RP-JAPAN PILOT FARM PROJECT
BARCENAGA, NAUJAN, ORIENTAL MINDORO, REPUBLIC OF THE PHILIPPINES

Final Report
(Follow-up Cooperation)

July, 1974 - July, 1976

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Agricultural Development Cooperation Department
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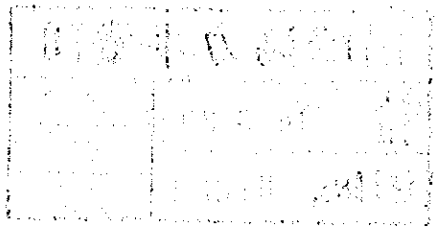

Agricultural Development Cooperation Department
Japan International Cooperation Agency

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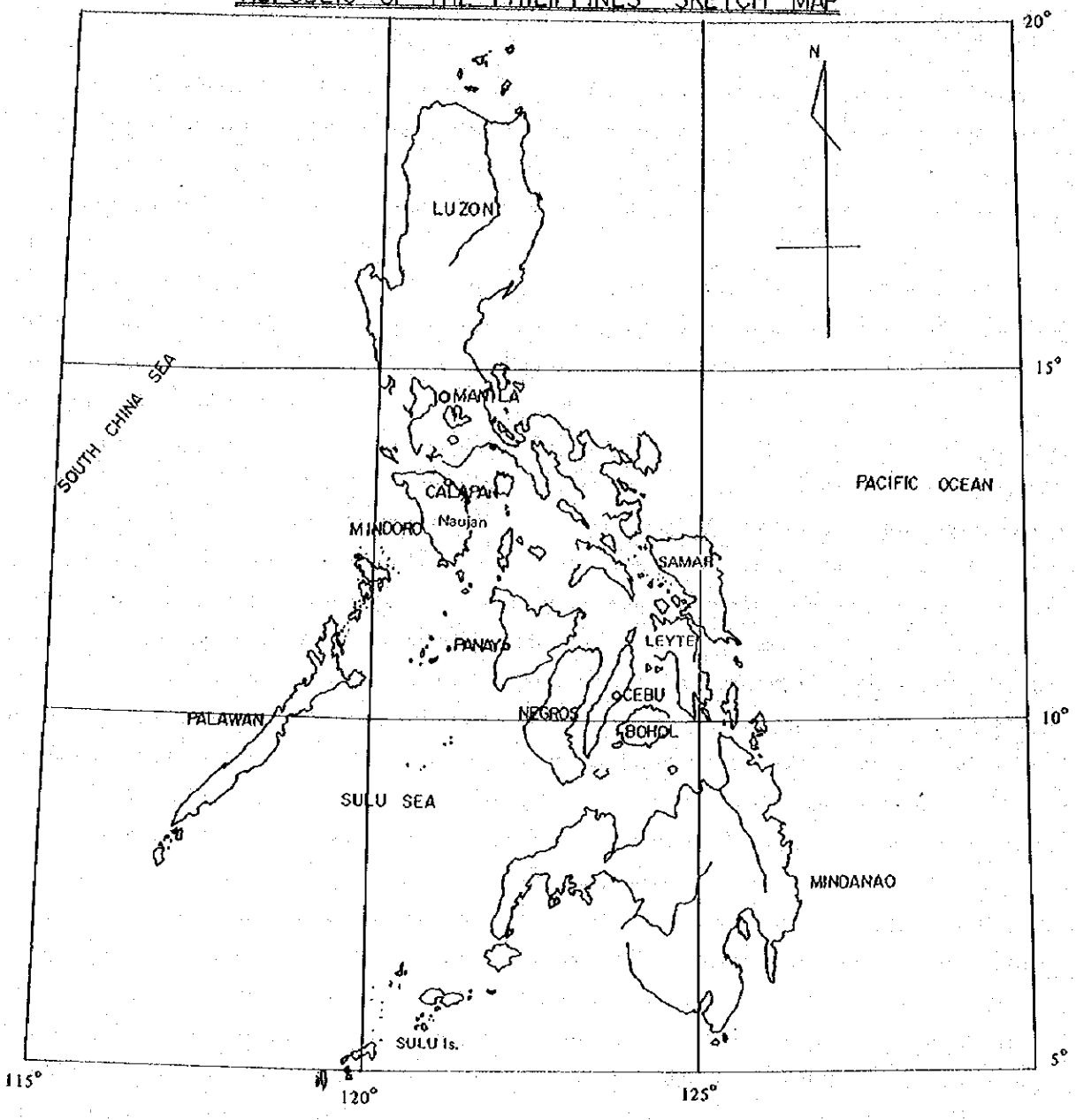
A. Part of Rice Cultivation and Training of Farmers or Technicians

Naomichi Goto
Yutaka Hirosaki

REPUBLIC OF THE PHILIPPINES SKETCH MAP



Preface

The Government of Japan and that of Republic of the Philippines signed the Japan-Philippine Agricultural Technological Agreement on June 17, 1967, in order to promote the economic and technological cooperation and friendship between two countries. A pilot farm was opened in Naujan of Mindoro Island as a part of the rice cultication development project.

The agreement between the two countries was expired on June 16, 1974 and extended for two years. Subsequently, it was renamed as Regional Demonstration and Training Center. I have been assigned to the RP-Japan Pilot Farm since July 18, 1974, for two years as an adviser under Colombo plan.

I am rather afraid of making conclusion which is the best method of rice cultivation in the Philippines because of the environment of Japan is quite different from that of the Philippines. However, I have searched for better methods for increasing the rice production in the Philippines and obtained satisfactory yield at the pilot farm. Therefore, I believe that the method from which I obtained may be widely spread as a guidance for those general farmers and technicians who are working under the same conditions as the pilot farm. More than four hundred farmers and technicians have been trained on the basis of present results of test and demonstration. It will be important to spread the technics which the trainees get in the training center, from farmers to farmers, and from technicians to technicians until the average yield becomes 80 to 90 cavans of palay per ha.

I hope that further developments of my experiences and experiments should promote the economic, technological cooperation and development of the countries.

Finally, I would like to express my deep gratitude to Ambassador Masao Sawaki, Secretary Norito Muraoka in Manila, Director Harushige Yoshida and Mr. Hiroshi Goto of JICA, Director Frolentino Navarro of Training and Demonstration Center, Specialists Naomichi Goto and Haruo Miyaishi, Philippine engineers and employees in the pilot farm, the Ministry of Foreign Affairs, the Ministry of Agriculture and Forestry, Japan International Cooperation Agency, the Philippine Government and residents of Mindoro Island.

1. Agricultural Environment and Production in Oriental Mindoro Province

The population and the total area of Oriental Mindoro Province are 370, 000 and 430, 000 ha, respectively. It has 105, 731 ha of paddy field, regular crop : 56, 609 ha, palagad crop 49, 122 ha. Masagana 99 movement was advocated for increasing of rice production in irrigated area of 11, 000 ha in Oriental Mindoro as well as all over the Philippines.

The yield of palay is usually 50 to 60 cavans in irrigated area, however, 30 to 40 cavans in non-irrigated area. (1 cavan = 45 kg)

The total planted area of rice plant in the Republic of the Philippines was 3,113,000 hectares last year and the total production of palay was 5,149,000 tons.

2. Philosophy of Demonstration and Training

(1) The primary object is to set up rice cultivation techniques based on those of Japanese such as water management, proper use of nitrogen fertilizer, raising of healthy seedlings, plant protection etc., in consideration of natural environment, food shortage situation in the Philippines.

(2) Secondary object is to introduce the high yielding new varieties (IRRI type, college of Agriculture, University of Philippine type) after testing their adaptability in this area.

(3) Third object is to improve the soil condition within the pilot farm by using the farm machine and fertilizers provided by the Japanese Government.

(4) The fourth object is to produce good seed and deliver it to the farmers.

(5) Another object was to introduce modern farming among the farmers according to their ability.

(6) A prize system was introduced in order to encourage the farmers in raising the healthy seedlings.

(7) Profitable rice culture was introduced in farm management.

3. Natural Environment

(1) Weather Conditions

The weather conditions in Naujan are summarized in the following tables. It is located at lat. 13°25' N. and long. 121°11' E. and belongs to a tropical zone. See the attached materials.

(2) Soil Conditions

Alluvial soil, poor drained land. Thirty (30) hectares of project area are occupied by humus soil and sandy soil. The pilot farm area of 100 hectares was consisted of sixteen (16) hectares of swampy and rain fed area, eight (8) hectares of sandy area, fifteen (15) hectares of shrub and coconut trees, sixty (60) hectares of grass land, and one (1) hectare of residencial area before the development of paddy fields.

The character of soil was examined by using Yanagida type soil detector. The results are summarized as follows.

P. H.	6. 4 to 7. 6	Aluminum	Good
Nitrogen in ammonia form	Very little	Silicic acid	Extremely slight
Nitrogen in nitric acid form	"	Mangan	"
Effective phosphoric acid	"	Lime	Quite rich
Effective potassium	Just right	Rain water	P. H. 5 to 6
Iron (trivalent)	"	Irrigation water	P. H. 7. 2
Magnesium	Extremely slight		

(3) Irrigation Water

The pilot farm is irrigated by the water of Patai Creek running in the north of the pilot farm through the pump attached with 53HP engine. Irrigation channels facilitate completely in project site. See the attached paper.

(4) Farm Machines and Materials

Some were locally acquired, but most of them were sent by the Japanese Government. See the report of the Machine specialists.

We demonstrated rice plant cultivation, trained farmers or technicians advisors and gave field instructions in some farmer's fields outside of pilot farm in response to the request of Philippine side.

YEARLY AVERAGE OF THE WEATHER REPORT

June 1974 - - May 1975

Month/Year	Temperature		Total Precipitation (mm)
	Maximum (°C)	Minimum (°C)	
June 1974	35.8	30.6	147.5
July	No Record		No record
August	31.1	27.1	- do -
September	31.8	25.3	- do -
October	31.9	26.2	- do -
November	30.2	22.6	- do -
December	30.4	22.2	- do -
January 1975	30.2	21.8	- do -
February	29.5	21.1	70.1
March	30.1	21.7	62.7
April	31.8	25.6	253.1
May	32.3	24.8	139.2
AVERAGE	31.9°C	24.4°C	627.6 mm.

WEATHER REPORT

January 1975 - - December 1975

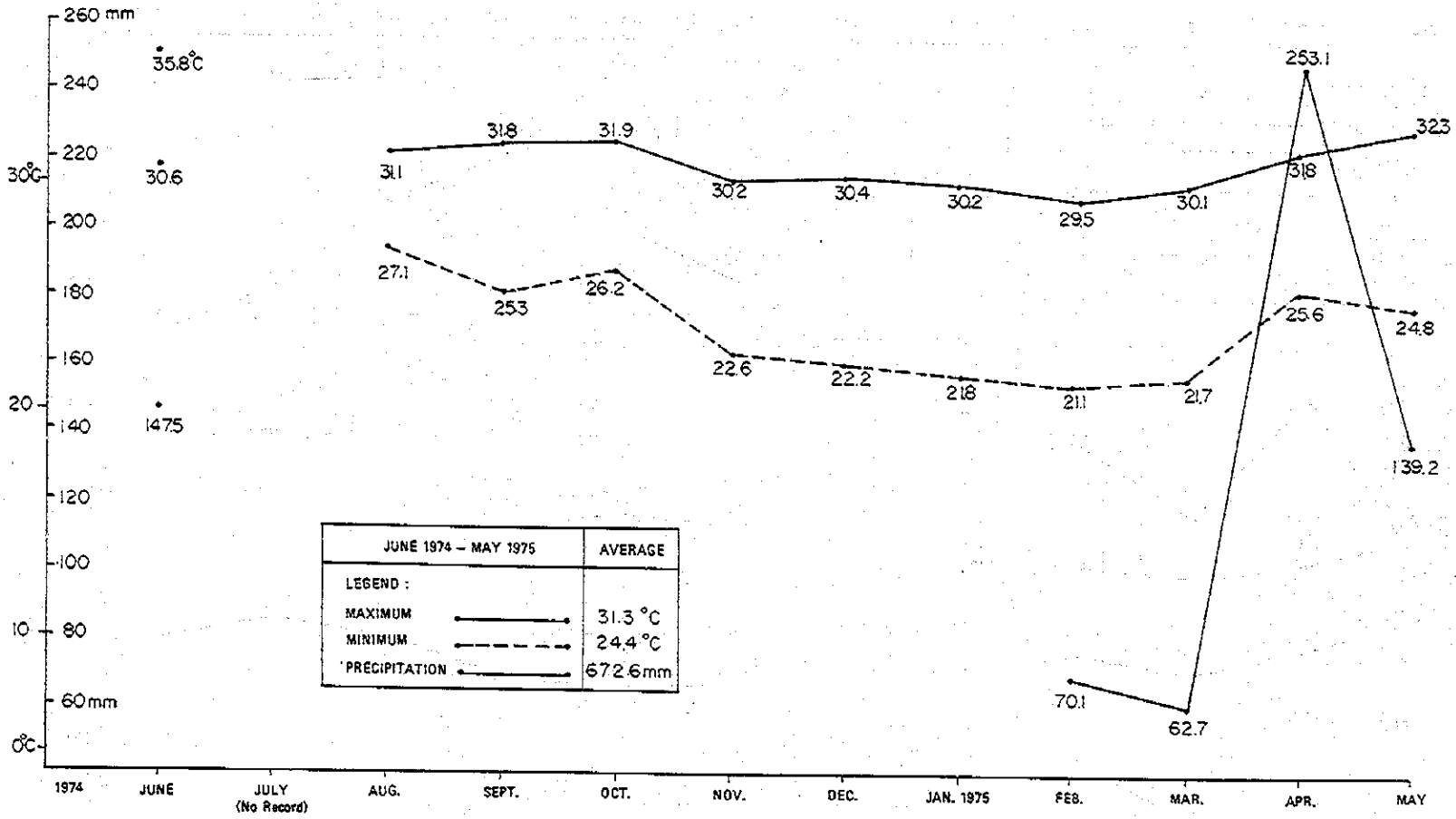
1975	Monthly Ave. of Temp		Humidity (%)	Total Amt. of Rainfall	Monthly Ave. of Sunlight	No. of Days rained
	Maximum	Minimum				
January	30.2	21.8	76	0	4.04	10
February	29.5	21.1	75	70.1	5.12	8
March	30.1	21.7	73	62.7	5.30	8
April	31.8	25.6	72	253.1	4.22	19
May	32.3	24.8	70	139.2	6.28	12
June	32.1	25.1	75	176.4	4.38	18
July	-	-	-	-	-	-
August	31.2	26.6	77.5	273.3	3.31	14
September	30.9	26.8	78.2	423.1	3.09	22
October	31.4	27.4	79.8	457.1	4.46	17
November	30.2	26.8	77.2	300.4	4.16	26
December	29.0	25.6	80.9	261.2	2.27	27
AVERAGE	30.9°C	24.8°C	75.8%	2,416.6mm	4.24 hrs	181 days

January 1976 - - March 1976

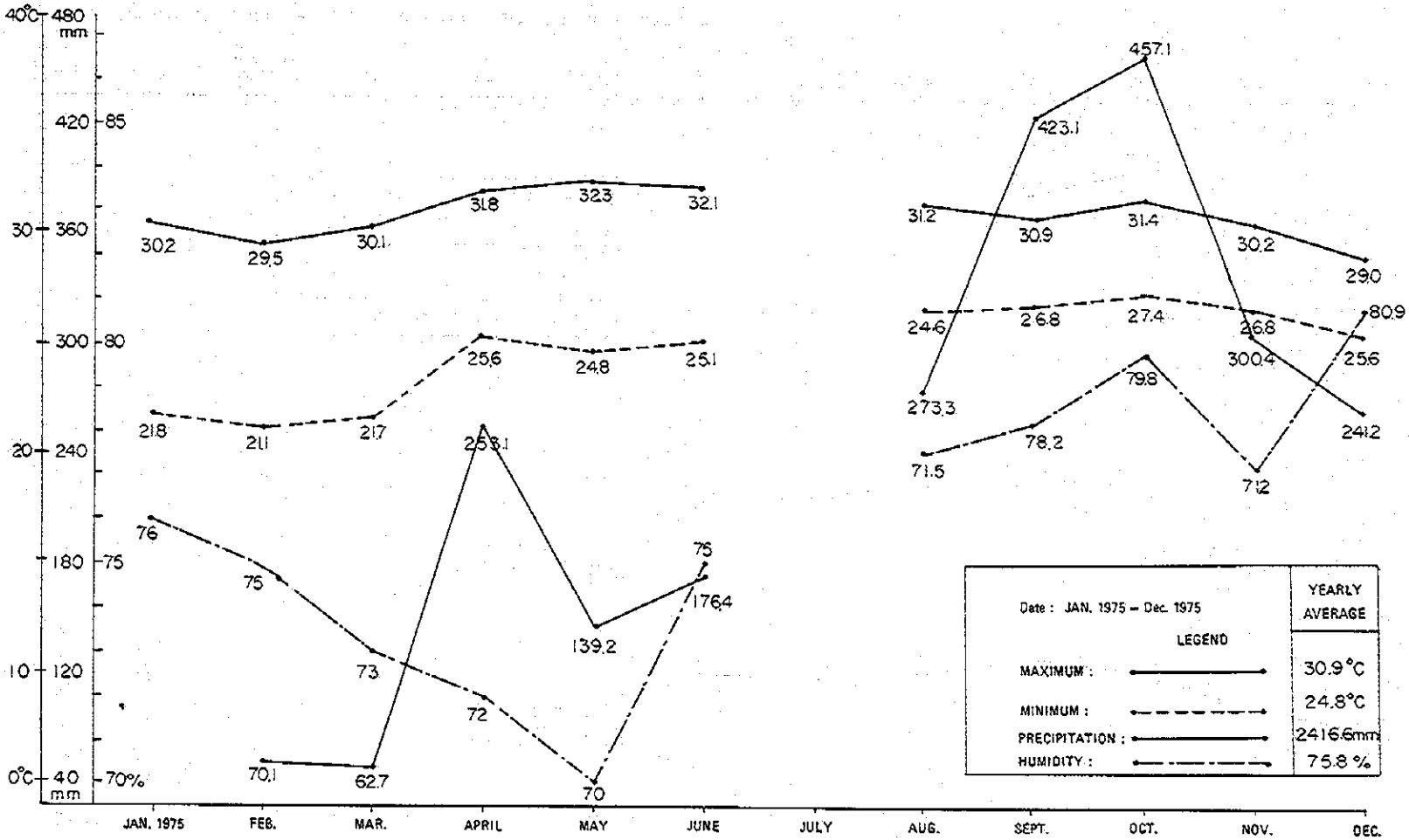
January 1976	27.6	24.4	79.4	209.5	3.03	20
February	28.1	24.6	76.6	62.7	4.54	11
March	28.7	26.3	76.2	132.0	5.56	13

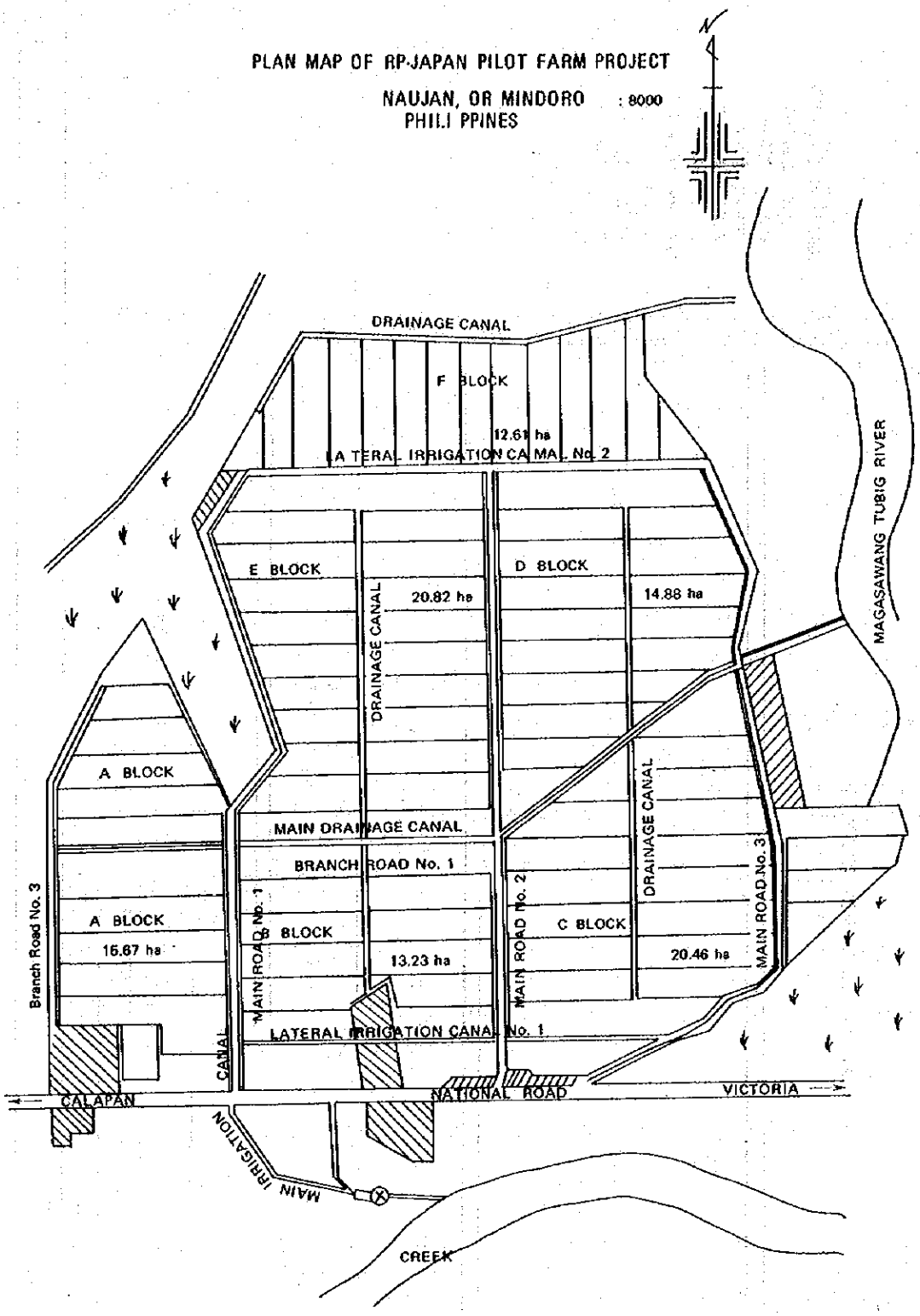
* Recorded at Barcenaga, Naujan, Oriental Mindoro.

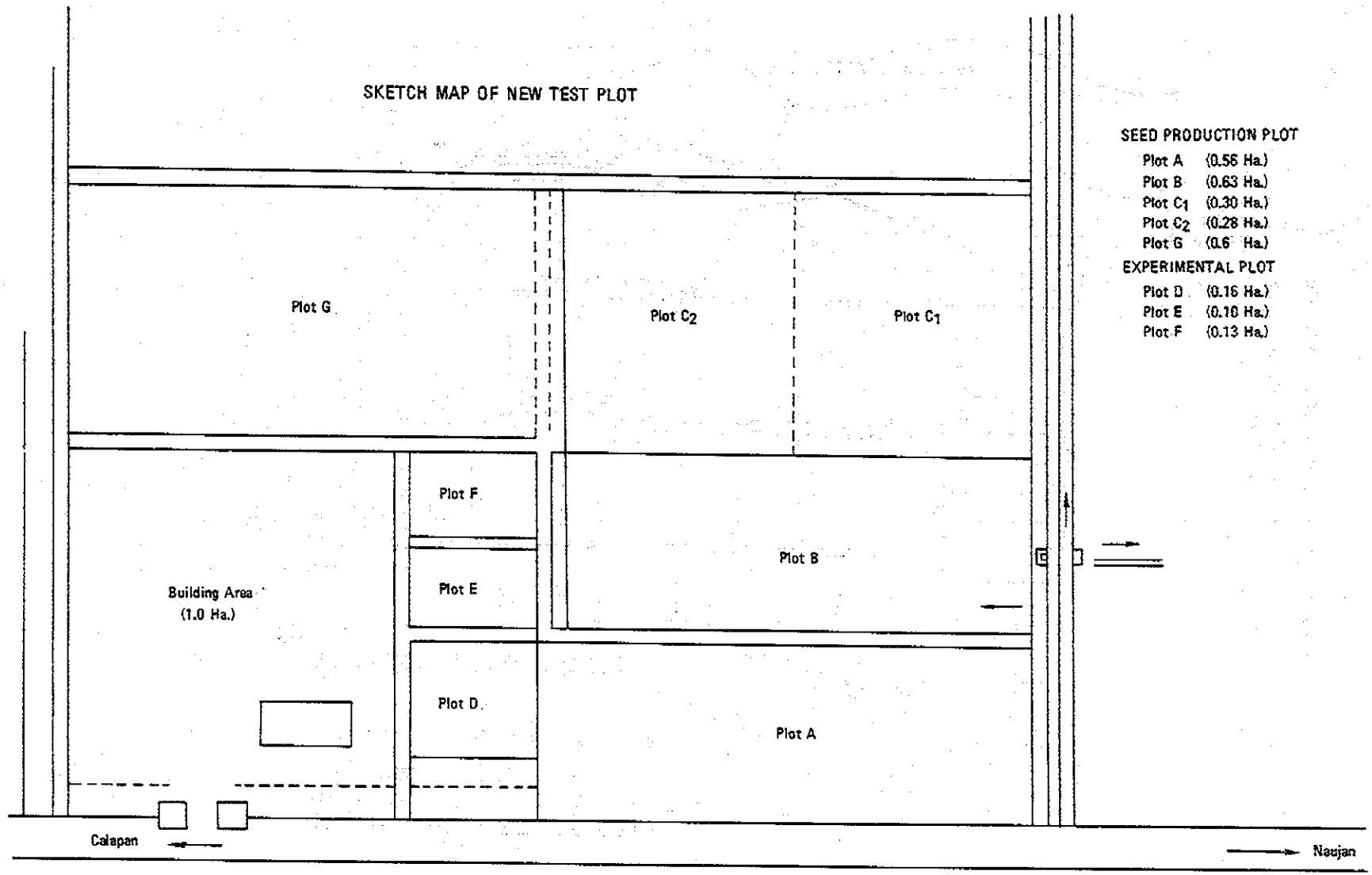
Graph of Wether Report



NOTE : FROM JULY 1974 TO JAN. 1975 THERE ARE NO AVAILABLE DATE FOR RAIN PRECIPITATION.


40°C
480 mm
420
85
30
360
300
80
20
240
180
75
10
120
0°C
40 mm
70%
JAN. 1975
FEB.
MAR.
APRIL
MAY
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
30.2
29.5
30.1
31.8
32.3
32.1
21.8
21.1
21.7
25.6
24.8
25.1
76
75
73
72
70
75
70.1
62.7
253.1
139.2
176.4
457.1
423.1
31.2
30.9
31.4
30.2
29.0
24.6
26.8
27.4
26.8
25.6
273.3
78.2
79.8
71.2
300.4
241.2
80.9
Date : JAN. 1975 – Dec. 1975
LEGEND
YEARLY AVERAGE
MAXIMUM :
30.9°C
MINIMUM :
24.8°C
PRECIPITATION :
2416.6mm
HUMIDITY :
75.8 %


PLAN MAP OF RP-JAPAN PILOT FARM PROJECT
NAUJAN, OR MINDORO : 8000
PHILIPPINES
N
DRAINAGE CANAL
F BLOCK
12.61 ha
LATERAL IRRIGATION CANAL No. 2
E BLOCK
20.82 ha
D BLOCK
14.88 ha
DRAINAGE CANAL
MAGASAWANG TUBIG RIVER
A BLOCK
MAIN DRAINAGE CANAL
BRANCH ROAD No. 1
A BLOCK
16.67 ha
B BLOCK
13.23 ha
C BLOCK
20.46 ha
DRAINAGE CANAL
MAIN ROAD No. 3
Branch Road No. 3
MAIN ROAD No. 1
MAIN ROAD No. 2
LATERAL IRRIGATION CANAL No. 1
CANAL
CALAPAN
NATIONAL ROAD
VICTORIA
MAIN IRRIGATION
CREEK


SKETCH MAP OF NEW TEST PLOT
SEED PRODUCTION PLOT
Plot A (0.56 Ha.)
Plot B (0.63 Ha.)
Plot C1 (0.30 Ha.)
Plot C2 (0.28 Ha.)
Plot G (0.6 Ha.)
EXPERIMENTAL PLOT
Plot D (0.16 Ha.)
Plot E (0.10 Ha.)
Plot F (0.13 Ha.)
Plot G
Plot C2
Plot C1
Plot F
Plot B
Building Area
(1.0 Ha.)
Plot E
Plot D
Plot A
Calapan
Naujan

The progress in two years

1. Demonstration of Rice Plant Cultivation

A. On Regular Crop (1974)

(1)	Variety and area	C-12 : 0.7 ha, IR-26 : 0.6 ha, C_4-63G : 0.2 ha
(2)	Rice seedling bed	DAPOG method : Seeds are densely sowed on banana leaves and left to grow in shade. When seedlings become 15 cm high, they are pulled.
	a. Fertilizer	No fertilization
	b. Pretreatment of seeds	Selection of good seed by soaking in salt water (specific gravity 1.05) and Riogen solution (1 : 1000) ; 24 hours of soaking.
	c. Sowing density	60 kg per ha ; cut the seed bed in the size of 58 cm x 28 cm for mechanical trans-planting, 250 to 280 pieces of 58 cm x 28 cm per ha.
	d. Date of sowing	July 24 to July 26
	e. Plant protection	E. P. N. solution ($\frac{1}{1,500}$), one time
(3)	Paddy Field	
	a. Plowing	Plowing by 35 HP tractor on Aug. 6 ~ Aug. 13; Leveling and puddling by tractor was difficult.
	b. Period of nursing	15 ~ 23 days ; Transplanting was delayed because of heavy rain.
	c. Basal application of Fertilizer	Fertilizers were applied during puddling before transplanting. N : 28 kg, P_2O_5 : 28 kg, K_2O : 28 kg per ha; compound fertilizer : (14-14-14)
	d. Date of transplanting	Aug. 7 ~ Aug. 15
	e. Planting density	IR-26 row transplanting 10 cm x 30 cm (33 stubs per square m) by mechanical transplanting C_4-63$_G$ square transplanting 25 cm x 25 cm (16 stubs per square m), by manual transplanting C-12 square transplanting 25 cm x 25 cm (16 stubs per square m), by manual transplanting
	f. Fertilizer quantity	N 25 kg per ha, 14 days after transplanting N 25 kg and K_2O 15 kg per ha, 14 days before heading
	g. Plant protection	For protection from stem borer, rice leaf hoppers, rice bag, rice whole maggot, bacterial leaf flight, green rice leaf hopper 30 kg per ha of B. H. C. gamma (Aug. 20), 3% powder B. H. C. (Sep. 15) and E. P. N. powder (Sep. 27) as well as 500l per ha of E. P. N. powder (Oct. 8) and E. P. N. phenazine compound were spread.
	h. Weeding	Japanese style mechanical weeding (once), hand weeding (twice)

i. Water control — Water was kept shallow. Intermediate drying on 40～45 days after transplanting ; intermittent irrigation from ear primordia stage to heading.

(4) Harvest and processing — Reaping with Philippine sickles on Dec. 5 ～ Dec. 23.

a. Drying and threshing — Threshing by automatic thresher or foot-thresher after one day of drying by sun or without drying due to rain on Dec. 7 ～ Dec. 31.

(5) Storage — Storage in jute bags (45 kg in each bag) after drying in sun.

(6) Yield

1 cavan = 45 kg

Variety	Area	Actual Yield	Yield per ha
IR-26	0.6 ha	47.4 cavan	79 cavans
C-12	0.7 "	47.6 "	68 "
C_4-63G	0.2 "	15.0 "	75 "
Total	1.5 "	110.0 "	Average 74 "

Review on This Season and Opinion on Next Season

(1) It is important to establish such a scientific planting method that can be recommended to local farmers and meets farmers' demands or economic requirements.

(2) Selection of varieties: IRRI type is good for increasing production; C type is tasty; C_4-63G is easy to grow.

(3) Healthy nursery plants: Water seedling bed is better at barren land like pilot farm.

(4) Use of nitrogen: fertilization for heads is effective.

(5) Irrigation and Drainage technique: Surface soil must be dried especially during tillering period.

(6) Potasium fertilization is effective for prevention of AKAGARE disease.

(7) Protection from diseases and insects, especially rice bag, rats and sparrows.

(8) Positive efforts for improving soil fertility.

B. On First Palagad Crop (1975)

(1) Variety — IR-26, C_4-63G

(2) Rice seedling bed — Water rice seedling bed : 300 m^2 per 1 ha of paddy field

a. Fertilizer — N : 30 kg, P_2O_5 : 30 kg, K_2O : 30 kg per ha, no after manuring.

b. Pretreatment of seeds — Seed sorting by soaking in salt water (specific gravity 1.05) and Riogen solution (1 : 1000) ; 24 hours of soaking and 24 hours of budding.

c. Seeding density — 45 kg per ha (Germination rate : 90 %)

d. Date of Seeding — January 6

e. Plant protection — E. P. N. solution (1 : 1000) (twice) for black tipped leaf hopper, stem borer and case worm.

(3) Paddy Field

a. Plowing (Soil drying effect) — Plowing by 35 HP tractor January 3 ~ 25, Puddling by tiller before transplanting, levelling by carabao after transplanting

b. Period of nursery plant — About 20 days (about five foliage leaves stage)

c. Basal application of Fertilizer — N : 28 kg, P_2O_5 : 28 kg, K_2O : 28 kg per ha during puddling before transplanting

d. Date of transplanting — January 27 ~ 29

e. Planting density — 20 cm × 20 cm square planting, 3 ~ 4 pieces per stub.

f. Fertilizer quantity — Fertilization at each stage, see attached paper.

g. Plant protection — See the attached paper : Stem borer, black tipped leaf hopper, rice leaf-hopper, bacterial leaf flight, AKAGARE disease, rice bag, case worm, rice whole maggot.

h. Weeding method — Japanese style mechanical weeding (once), Hand weeding (twice)

i. Water control — Water was kept as shallow as possible. It was dried once ~ twice even during tillering period. One week long intermediate drying from the 35th day after transplanting. Intermittent irrigation from ear primordial stage to heading.

(4) Harvest and processing — Reaping with Philippine sickles. IR 26 : May 16 ~ 18, C_4-63_G : April 30 ~ May 27

a. Drying — One ~ two days long drying by sun then threshing by automatic thresher.

(5) Storage — Storage in jute bags (45 kg, or 1 cavan, in each bag)

(6) Yield

Plot	Variety	Area	Yield		
			Actual	kg/ha	Cavan per ha
A	C_4-63_G	0.55 ha	1936 kg	3509 kg	78.0
B	IR26	0.63	3346	5311	118.0
C_1	IR26	0.30	1215	4050	90.0
C2	C_4-63_G	0.27	1005	3680	81.8

Continued

Plot	Variety	Area	Yield		
			Actual	kg/ha	Cavan per ha
G	C_4-63_G	0.60	2222	3703	82.3
Total	---	2.35	9718	4135	91.9
Total	of C_4-63_G	1.42	5157	3632	80.7
Total	of IR26	0.93	4561	4904	109.0
DEF	C_4-63_G	0.39	Test plot		

Review and Opinion

(1) Efforts were made to raise healthy roots by water control.

Shallow planting to avoid the two stage rooting and delayed growing, shallow water, intermediate drying (twice) during tillering period, intermittent irrigation ... Submerging and drying to deprive of nitrogen in soil. Ununiformity of heading seems based on root rottening.

(2) Improvement of soil fertility

Green manure (for soliditying ammonium content ... to prevent the discharge of nutrients from soil due to rain), organic substances, soil drying effect, additional phosphoric acid and potassium to prevent cercospora leaf spot.

(3) Study on time for nitrogen fertilization

Basal application and three times of top dressing are seem to be the best.

(a) Basal application of fertilizer (b) Tillering stage (two weeks after transplanting)
(c) Reductive division stage (d) Heading stage

Excessive nitrogen will inhibit potassium and magnesium absorption, promote the withering of lower leaves, lower dry matter production, and cause lodging or diseases and damages by insects. It is important to use adequate amount of nitrogen to ensure the best assimilation. If leaves become yellow, sufficient grains cannot be obtained from each spike. Ear mauring is most effective. It should be done two weeks before heading. At this stage, growth of lower internodes and flower primordia have ended. However, ear mauring is suspected to contribute to the prevention of glumous flower degeneration, which is unique to Indica varieties, and to the ripening of palay.

(4) Addition of potassium at discovery of dead leaves and rotten roots. Patassium carries carbohydrates.

(5) Supply of nutrients lacking in soil like Phosphoric acid when insufficient.

(6) Selection of varieties of short culm (no-lodging) and high yield.

IR-28, IR-30, C-168, C-22, Masuri, Marengia sent by Ala Center in India are being tested.

(7) Rice sheath blight — additional supply of silicic acid.
AKAGARE — additional supply of potassium, supply of oxygen to roots.
Zn deficiency — additional supply of zinc sulfate.
study on other plant protection methods

C. On Second Regular Crop in 1975

(1) Variety — IR-26, IR-28, IR-30, C-168, C-22, C_4-63_G

(2) Rice seedling bed — Water rice seedling bed ; bed width : 1 m, ditch width : 30 cm

a. Fertilizer — N : 30 kg, P_2O_5 : 30 kg, K_2O : 30 kg per ha

b. Pretreatment of seeds — Seed sorting by soaking in salt water (specific gravity : 1.1) and Riogen solution (1 : 1000) ; 24 hours of soaking and 24 hours for germination

c. Seeding density — 45 kg per ha (germination rate 90%)

d. Date of seeding

Order	Date of seeding	Variety
1st	June 5	IR-26, C-168
2nd	June 11	IR-26, C_4-63_G
3rd	June 18	IR-28, IR-30 IR-26, C-22, Marensia

e. Plant protection — Diazinon solution (1 : 700)

(3) Paddy Field

a. Plowing — Plowing by 35 HP tractor on June 6～10.
Soil drying effect, protection from methane gas.
Puddling by tiller and levelling before transplanting.

b. Period of seedling — About 20 days of five foliage leaves stage.

c. Basal fertilization — Fertilizers were applied during levelling before transplanting.

d. Day of transplanting — See the attached papers.

e. Planting density — 20 cm x 20 cm, 3～4 pieces per stub, 25 stubs per squre meter.

f. Fertilizer quantity — See the attached papers.

g. Plant protection — See the attached papers.

h. Weeding method — Japanese style mechanical weeding (once), hand weeding (twice).

i. Water control — Water was kept as shallow as possible. Drying (once ～ twice) even during tillering period ; one week long intermediate drying at 30 ～ 40 days before heading ; intermittent irrigation from ear primordia stage to heading.

(4) Harvest and processing

Reaping with Philippine sickles
IR-28, Sep. 5 ; IR-30 Sep. 16
IR-26 Oct. 10 ~ Oct. 14
C-168 Oct. 11 ~ Oct. 15 C-22 Oct. 28

a. Drying and threshing method

One day of drying in farm if weather is good ; threshing mostly by Philippine thresher and combine (Iseki H. D. 50 type) (speed of 500 with No. 2 port open)

(5) Storage

Storage in jute bags (45 kg, namely, 1 cavan, per bag)

(6) Yield

Plot	Variety	Area	Yield		
			Actual	kg/ha	Cavan per ha
A_1	C_{22}	0.19 ha	756 kg	3979 kg	88.4 cav.
A_2	IR_{28}	0.17	520	3059	67.9
A_3	IR_{30}	0.19	614	3232	71.8
B	IR_{26}	0.63	3024	4800	106.7
C	IR_{26}	0.58	2174	3748	83.3
G	C_{168}	0.60	2552	4253	94.5
Total		2.36	9640	4085	90.7
Total of	IR_{26}	1.21	5198	4296	95.5
DEF	...	...	Experimental field		

RATE OF FERTILIZER & CHEMICALS APPLIED IN THE RDTC's DEMONSTRATION AREA

(Wet Season – 1975)

Plot / Item	A–(0.55 ha.)	B–(0.63 ha.)	C_1 (0.30 ha.)	C_2 (0.27 ha.)	D–(0.16 ha.)	E–(0.10 ha.)	F–(0.13 ha.)	G–(0.60 ha.)
Variety	IR–28, IR–30, C22	IR–26	IR–26	C–168	IR–26, C_4–63G	IR–26, IR–28, C_4–63G Malenia, Masuri	IR–26	C–168
Sowing	1975 June 18	June 5	June 5		June 18	June 18	June 18	June 5
Transplanting	July 10	June 25	June 26		July 18	July 15	July 17	June 27

FERTILIZATION

DATE	NAME OF FERT.	AMT. OF FERT.	Single elem. per ha. N	P	K
A–(0.55 ha.)		kg			
7-10	14-14-14	180	46	46	46
7-29	21-0-0	78	30	–	–
8-21	0-0-60	30			30
8-25	21-0-0	50	29	–	–
	(IR30, IR28)				
C-22					
9-5	45-0-0	10	23	–	–
	HEADING STAGE				
9-5	IR-28				
9-10	IR-30				
9-28	C-22				
	HARVESTING				
10-7	IR-28				
10-8	IR-30		105	46	76
10-28	C-22		99		
B–(0.63 ha.)		kg			
6-17	0-32-0	100	–	50	–
6-17	AZUMIN	80	–	–	–
6-23	14-14-14	140	31	31	31
7-9	21-0-0	60	20	–	–
8-12	0-0-60	30	–	–	28
8-18	45-0-0	40	28	–	–
9-1	HEADING STAGE				
10-10 ~15	HARVESTING				
			79	81	59
C_1 (0.30 ha.)		kg			
6-17	0-32-0	100	–	50	–
6-17	AZUMIN	80	–	–	–
6-23	14-14-14	160	39	39	39
7-9	21-0-0	70	25	–	–
8-12	0-0-60	30	–	–	31
8-18	45-0-0	40	28	–	–
9-5	HEADING STAGE				
10-14	HARVESTING				
			92	89	70
C_2 (0.27 ha.)					
D–(0.16 ha.)		kg			
7-17	14-14-14	40	35	35	35
7-17	AZUMIN	30			
7-17	0-32-0	40	–	50	–
8-12	45-0-0	8	22	–	–
9-5	45-0-0	10	28	–	–
9-23	HEADING STAGE				
10-27 ~28	HARVESTING				
			85	115	35
E–(0.10 ha.)	EXPERIMENTAL AREA				
F–(0.13 ha.)					
G–(0.60 ha.)		kg			
6-17	0-32-0	100	–	50	–
6-17	AZUMIN	80			
6-23	14-14-14	200	46	46	46
7-9	21-0-0	80	28	–	–
8-5	45-0-0	20	15	–	–
8-19	45-0-0	50	37	–	–
9-8	HEADING STAGE				
10-11 ~15	HARVESTING				
			126	96	46

SPRAYING

DATE	NAME OF CHEMICAL	FORMULATION	Q'ty
A–(0.55 ha.)			
7-29	E.P.N.		22 kg
8-5	B.H.C. gamma	6% A.I	20
8-14	Sumithion		19
8-28	B.H.C. gamma	6%	20
9-1	B.H.C. granule	6%	4
B–(0.63 ha.)			
7-7	B.H.C. gamma	6% A.I	25 kg
7-29	E.P.N.		24
8-14	Sumithion	2%	22
8-25	B.H.C. granule	6%	25
C_1 (0.30 ha.)			
7-7	B.H.C. gamma	6%	25
7-29	E.P.N.		23
8-15	Sumithion		17
8-25	B.H.C. granule	6%	25
C_2 (0.27 ha.)			
D–(0.16 ha.)			
7-29	E.P.N.		6.4
8-14	Sumithion		5.5
8-28	B.H.C. granule	6%	5.0
E–(0.10 ha.)			
7-29	E.P.N.		4 kg
8-14	Sumithion		3.5
F–(0.13 ha.)			
7-29	E.P.N.		5 kg
8-14	Sumithion		4.5
G–(0.60 ha.)			
7-7	B.H.C. gamma	6% A.I	25 kg
7-29	E.P.N.		25
8-15	Sumithion		18
8-25	B.H.C. gamma	6%	25

RATE OF FERTILIZER & CHEMICALS APPLIED IN THE RDTC's DEMONSTRATION AREA

(Dry Season – 1975)

Item \ Plot	A–(0.55 ha.)						B–(0.63 ha.)						C_1–(0.30 ha.) C_2–(0.28 ha.)						D–(0.16 ha.)						E–(0.10 ha.) F–(0.15 ha.)						G–(0.60 ha.)					
Variety	C4–63G						IR–26						IR–26 C4–63G						IR–26, Masuri, Malenja						C4–63G						C4–63G					
Sowing	1974 Dec. 1						Jan. 6						Jan. 6						Jan. 31						Jan. 10						Jan. 6					
Transplanting	December 19						Jan. 28						Jan. 28						Feb. 20						Feb. 1						Jan. 28					
FERTILIZATION	DATE	NAME OF FERT.	AMT. OF FERT.	Single elem. per ha. N	P	K	DATE	NAME OF FERT.	AMT. OF FERT.	Single elem. per ha. N	P	K	DATE	NAME OF FERT.	AMT. OF FERT.	Single elem. per ha. N	P	K	DATE	NAME OF FERT.	AMT. OF FERT.	Single elem. per ha. N	P	K	DATE	NAME OF FERT.	AMT. OF FERT.	Single elem. per ha. N	P	K	DATE	NAME OF FERT.	AMT. OF FERT.	Single elem. per ha. N	P	K
			kg																																	
	12-16	compost	200	1	0.5	1	1-26	complete	7 bags				1-26	complete	6 bags				2-18	complete	2 bags										1-26	complete	12 bag			
	12-17	complete	6 bags					14-14-14	140	31	31	31		14-14-14	120 kg	29	29	29		14-14-14	40 kg	35	35	35								14-14-14	240 kg	56	56	56
		14-14-14	120	30	30	30	2-14	complete	6 bags				2-14	complete	6 bag				3-6	complete	2 bag										2-14	complete	6 bag			
	1-12	45-0-0	20	16	–	–		14-14-14	120	27	27	27		14-14-14	120 kg	29	29	29		14-14-14	40	35	35	35								14-14-14	120	28	28	28
	1-22	14-14-14	40	10	10	10	3-24	45-0-0	30	23	–	–	2-24	45-0-0	20	16	–	–	3-17	45-0-0	5	14	–	–							3-15	0-0-60	20	–	–	20
	2-18	45-0-0	30	24	–	–	3-26	0-0-60	20			19	C-2						5-5		HEADING STAGE										3-24	45-0-0	40	30	–	–
	3-7	45-0-0	20	16	–	–	4-10		HEADING STAGE				3-15	0-0-60	20	–	–	20	6-24		HARVESTING										4-23		HEADING STAGE			
	3-5		HEADING STAGE				5-16		HARVESTING				3-24	45-0-0	40	30	–	–													5-27		HARVESTING			
	4-3		HARVESTING										4-12		HEADING STAGE																					
													5-26		HARVESTING																					
				97	40	41				81	58	77				104	58	78				84	70	70										114	84	104
SPRAYING	DATE	NAME OF CHEMICAL	FOR-MULA-TION	Q'ty			DATE	NAME OF CHEMICAL	FOR-MULA-TION	Q'ty			DATE	NAME OF CHEMICAL	FOR-MULA-TION	Q'ty			DATE	NAME OF CHEMICAL	FOR-MULA-TION	Q'ty			DATE	NAME OF CHEMICAL	FOR-MULA-TION	Q'ty			DATE	NAME OF CHEMICAL	FOR-MULA-TION	Q'ty		
	1-10	B.H.C. gamma	3%	6 bags			2-5	B.H.C.	3%	20 kg			2-6	B.H.C.	3%	20 kg			2-24	Sumithion	2%	6 kg			2-14	Sumithion	2%	6 kg			2-6	B.H.C.	3%	20 kg		
	1-14	B.H.C. gamma	3%	18			2-14	Sumithion	2%	20			2-14	Sumithion	2%	18			3-10	Sumithion	2%	6			2-24	Sumithion	2%	6			2-15	Sumithion	2%	18		
	1-23	Rat control					2-24	Sumithion	2%	20			2-24	Sumithion	2%	20			3-25	E.P.N.	1.5%	6			3-10	Sumithion	2%	6			2-25	Sumithion	2%	20		
	2-5	B.H.C.	3%	20			3-10	Sumithion	2%	20			3-10	Sumithion	2%	20			4-15	B.H.C. granule	6%	3			3-25	E.P.N.	1.5%	6			3-10	Sumithion	2%	20		
	2-14	Sumithion	2%	18			3-20	E.P.N.	1.5%	20			3-20	E.P.N.	1.5%	20			4-28	Sumithion	2%	6									3-20	E.P.N.	1.5%	6		
	2-24	Sumithion	2%	20			3-26	B.H.C. gamma	6%	25			3-25	B.H.C. granule	6%	25															3-26	B.H.C. granule	6%	25		
							4-28	Sumithion	2%	25			4-28	Sumithion	2%	25															4-28	Sumithion	2%	25		

Review and Opinion

(1) Tilling about sixty days before planting for root protection by means of methane gas and organic acid.

(2) Measure for hydrogen sulfide (intermediate drying)

(3) Encouragement of shallow planting

(4) Prevention of rice sheath blight

The experimental data showed that yield is lowered by 3 % by spraying organic arsenic chemical as Monzet. However, it was sprayed to leaves in booting stage when rice sheath blight broke out during the previous season.

(5) Protection from sparrows, wild ducks and rats.

Sparrow ..... Group cultivation, spread vinyl tape

Rat ..... Scattering zinc phosphate wrapping in vinyl bags for prevention of gas generation by water absorption

Report on Yield of 1975

The management of demonstration farm was transferred to the Philippio side after the expiration of the Agreement. However, we made active efforts to develop rice planting techniques during the time as long as we resided at the field. No carabao could be used for this regular crop because of foot and mouth disease. Levelling was difficult because of immediately after opening field. AKAGARE broke out during the palagad crop. We made all the efforts in the management, praying for God's help. We obtained 200 cavans (9000 kg) per ha in the two cropping seasons in a year. We were able to obtain helpful experience for farmers in the pilot farm and for the trainee farmers from various regions outside of pilot farm. We are thankful that the good harvest is the result of God's help, advantages of the field and unity among the workers.

D. On Palagad Crop in 1975

(1)	Variety	IR-26, C-168, C4-63G, IR-29, IR-30, IR-32, IR-34, C-22
(2)	Rice seedling bed	Water type
	a. Fertilizer	N: 20 kg, P_2O_5: 20 kg, K_2O: 20 kg per ha
	b. Pretreatment of seeds	Seed sorting by soaking in salt water (specific gravity : 1.1) and Riogen solution (1 : 1000) ; 24 hours of soaking and 24 hours for germination
	c. Seeding density	45 kg per ha as of germination rate is 90 %
	d. Date of seeding	1st : Dec. 4 ~5 2nd : Dec. 8 3rd : Dec. 28 4th : Jan. 19
	e. Plant protection	E. P. N. solution (1 : 1000) (twice)

(3) Paddy Field

a.	Plowing	Plowing by 35HP tractor. (Dec. 10 ~ Feb. 10) Tilling by tiller and leveling by carabao before transplanting
b.	Period of nursery plant	About 20 ~ 25 days (6 ~ 7 foliage leaves stage)
c.	Basal fertilization	It was done at the time of tilling before transplanting. See the attached sheet.
d.	Date of transplanting	Dec. 22 ~ Feb. 19
e.	Planting density	20 cm x 20 cm square planting, 3 ~ 4 pieces per stub
f.	Fertilization quantity	See the attached paper
g.	Plant protection	See the attached paper.
h.	Weeding method	Japanese style mechanical weeding (once), hand weeding (twice)
i.	Water control	Water was kept as shallow as possible. Drying (once ~ twice) even during tillering period ; one week long intermediate drying at 35 ~ 40 days after transplanting ; intermittent irrigation from ear primordia to heading stage.

(4) Harvest — Not completed until the submission of this report.

Annex No. 2

Yield (Dry season, 1976)

Plot	Variety	Area	Harvest (1 cavan = 45 kg)		
			Actual	kg/ha	cavan/1 ha
A-1	Variety and plant protection test on 20 IR-varieties	0.22 ha	- - -	- - -	- - -
A-2	IR-26	0.34 "	1,354 kg	3,984 kg	88.05 cav.
B	IR-26	0.60 "	2,830 "	4,717 "	104.80 "
C	C-138	0.57 "	3,015 "	5,289 "	117.54 "
D	C_4-63$_G$	0.16 "	994 "	6,212 "	138.05 "
E	6C-varieties varietal test	0.10 "			
F	IR-30	0.13 "	579 "	4,454 "	98.97 "
G	C-22	0.60 "	2,345 "	3,908 "	86.85 "
Total and Average		2.40 ha	11,117 kg	4,760 kg	105.70 cav.

Harvesting had not been completed by the submission of the present report. Rainfall was big even before the plowing of paddy fields. Although efforts were made to drain water, water remained in some plots and promoted the reductive state of soils. Heavy concentrated rainning occurred after transplanting also. Occasionally,

rice was completely submerged in water for one or two days and even the tip of leaves could hardly been seen. Although all the draining attempts were made, it inhibited firm setting of roots and initial growth. Strong soil reduction occured in some plots. In other words, lower leaves died and roots became inactive. As a result of this vicious circle, nutrients deficiency occurred and growth was slowed down. We were worried about poor harvest.

Weather recovered at the end of February, soil became dry enough to form some cracks for oxygen supply although soil nutrients were lost. Immediately after this, potassium was applied for strengthening rice plant and increasing its photo-synthesizing ability.

We are hoping for better harvest than the last year since the subsequent weather was good or adequate plant protection and water control measures were taken.

Review and Opinion

(1) Mathane gas in soil and soil reduction

Rice plants grow in water. After plowing weeds in the soil when they are dense, poisonous gas, such as methane gas, is heavily generated from soil. It inhibit the growth of rice plants especially roots. Therefore, fields must be dried after transplanting until light cracks are formed. Then, they must be irrigated.

Some farmers in hot regions keep water in fields to prevent the growth of weeds. We believe it the best to dry soil until transplanting, to drain water immediately before transplanting, to till and level from the view point of reduction. However, non-irrigated areas and well-draining fields are exceptions.

(2) Top dressing of potassium

Methane gas and reduction damage roots and inhibit the absorption of nutrients. Fertilization becomes less effective. Lower leaves wither and become brown. Rice plants become ready to die in serious cases. However, drying and potassium fertilization (20 ~ 30 kg) increase photo-synthesizing ability and promote recovery.

(3) Ammonium sulfate is more effective than urea for sterile land

Urea tends to be inhibited in soil of high P. H. and its decomposition is slowed down in sandy area. Ammonium sulfate becomes decomposed quickly in poor soil in this pilot farm. The two do not seem to differ in case of fertile land.

2. Report on Results of Experimental Fields

Experimental fields were used to study adequate chemical fertilizers, self-supporting fertilizer (compost) and rice planting density, since such knowledges are important for farm management, and for training of farmers and technicians. The results are reported as follows.

(1) Comparative Test of Fertilizing Time and Fertilizer Quantity

Method

1. Variety C_4-63$_G$
2. Blocks and area Two blocks (408 m^2)
3. Date of seeding Jan. 10, 1975
4. Rice seedling bed Water rice seedling bed
5. Date of transplanting Feb. 1, 1975
6. Planting density 20 cm x 20 cm
7. Date of harvesting May 19, 1975
8. Period of growth 129 days

Method of Application of Fertilizer

		N				P	K
		Basal application	Tillering fertilization	Ear fertilization	Top dressing at the stage of ripening		
A	Control	25 kg	25 kg	25 kg		50	30
B	Plot sprayed with N four times of top dressings	20	20	20	15	50	30
C	Plot with emphasis on basal application	50		25		50	30
D	Plot with emphasis on ear fertilization	25		50		50	30

Result of Experiment (1)

Kind of Application of fertilizer	A	B	C	D
Number of panicles per 10 stubs	114.0	125.5	115.0	108.5
Number of panicles per m^2 (25 stubs)	285.0	314.0	289.0	271.0
Number of grains per panicle	92.3	97.9	89.0	86.9
Number of fertile grains per panicle	68.3	66.3	63.3	54.1
Number of sterile grains per panicle	24.1	31.6	26.6	32.8
Sterility ratio (%)	26.1	32.5	29.7	38.1
Weight of 1,000 grains (g)	21.2	22.6	21.9	22.2
Weight of palay per m^2 (g)	385.7	474.3	398.0	333.9
Hulling ratio (%)	78.0	77.8	77.5	79.0
Weight of straw per 10 stubs (g)	300.0	439.0	328.5	335.5
Weight of straw per m^2 (g)	750.0	1097.5	821.3	838.8
Yield of palay per ha (kg)	3856.0	4743.0	3980.0	3339.0
Yield of straw per ha (kg)	7500.0	10975.0	8213.0	8388.0
Straw and palay ratio (%)	65.1	69.9	64.4	71.3

(2) (Continued)

	First	2nd	3rd	4th		First	2	3	4
Number of panicle per stub	B	C	A	D	Hulling ratio	D	A	B	C
Number of grains per panicle	B	A	C	D	Yield of palay	B	C	A	D
Ripening ratio per panicle	A	C	B	D	Yield of straw	B	D	C	A
Weight of 1000 grains	B	D	C	A	Number of fertile grains per panicle	A	B	D	D
Per centage of fruitful culm	B	C	A	D					

(2) Comparative Test of Planting Density

Method

1. Variety : C_4-63_G
2. Blocks and area : Two blocks (408 m^2)
3. Date of seeding : Jan. 10, 1975
4. Rice seeding bed : Water rice seedling bed
5. Date of transplanting : Feb. 1, 1975
6. Fertilizer quantity : N : P : K = 75 : 50 : 30 kg
7. Date harvesting : May 19, 1975
8. Period of growth : 129 days

Method of treatment

	Form	Inter-stub distance	Inter-row distance	Number of stubs per m^2
(A)	Square transplanting	20 cm	20 cm	25
(B)	"	18	18	30.8
(a)	Single row transplanting	16	25	25
(b)	"	13	25	30.8

Result of experiment (1)

	(A)	(a)	(B)	(b)
Number of panicles per 10 stubs	109.0	95.7	109.7	107.5
Number of panicles per m^2 (25 stubs)	273.0	239.0	338.0	331.0
Number of grains per panicle	67.5	82.2	69.8	77.4
Number of fertile grains per panicle	45.1	54.0	42.5	52.6
Number of sterile grains per panicle	22.4	28.2	27.4	24.8
Sterility ratio (%)	32.8	34.2	39.5	32.1
Weight of 1,000 grains (g)	20.9	21.4	20.6	22.5
Weight of palay per m^2 (g)	256.0	273.3	359.9	318.8
Hulling ratio (%)	77.4	75.0	71.4	78.4
Weight of straw per 10 stubs (g)	288.0	233.0	236.0	330.0
Weight of straw per m^2 (g)	720.0	583.0	727.0	1016.0
Yield of palay per ha (kg)	2561.0	2733.0	3599.0	3188.0
Yield of straw per ha	7200.0	5830.0	7270.0	10160.0
Straw and panicle ratio	69.1	73.2	66.9	76.1

Continued (2)

	1st	2nd	3rd	4th		1st	2nd	3rd	4th
Number of panicles per stub	(B)	(A)	(b)	(a)	Hulling ratio	(b)	(A)	(a)	(B)
Number of grains per panicle	(a)	(b)	(B)	(A)	Yield of palay	(B)	(b)	(a)	(A)
Ripening ratio per panicle	(b)	(A)	(a)	(B)	Yield of straw	(b)	(B)	(A)	(a)
Weight of 1,000 grains	(b)	(a)	(A)	(B)	Number of fertile grains per panicle	(a)	(b)	(A)	(B)
Per centage of fruitful culm	(B)	(A)	(a)	(b)					

(3) Comparative Test of Phosphate Fertilizer

Method

1. Variety : C_4-63$_G$
2. Blocks and area : 2 blocks (408 m^2)
3. Date of seeding : Jan. 10, 1975
4. Rice seedling bed : Water rice seedling bed
5. Date of transplanting : Feb. 1, 1975
6. Planting density : 20 cm x 20 cm
7. Date of harvesting : May 19, 1975
8. Period of growth : 129 days

Method of Treatment

		N			P	K
		Basal application	Tillering fertilization	Ear fertilization		
A	No fertilizer plot	0	0	0	0	0
B	Standard plot	25	25	25	50	30
C	Heavily fertilized plot	25	25	25	100	30

Result of Experiment (1)

	A	B	C
Number of panicles per 10 stubs	112.5	120.0	117.5
Number of panicles per m^2 (25 stubs)	181.3	300.0	293.8
Number of grains per spike	87.2	88.4	92.1
Number of fertile grains per panicle	54.1	58.4	64.1
Number of sterile grains per panicle	33.1	30.0	28.0
Sterility ratio (%)	38.0	34.0	30.7
Weight of 1,000 grains (g)	22.0	21.7	21.6
Weight of palay per m^2 (g)	334.9	379.0	403.2
Hulling ratio (%)	74.1	73.6	73.8
Weight of straw per 10 stubs (g)	317.0	356.5	379.5
Weight of straw per m^2 (g)	792.5	891.3	948.6
Yield of palay per ha (kg)	3349.0	3790.0	4032.0
Yield of straw per ha	7925.0	8913.0	9486.0
Straw and palay ratio	70.2	70.1	70.3

(2)

	1st	2nd	3rd		1st	2nd	3rd
Number of panicles per stub	B	C	A	Per centage of fruitful culm	A	B	C
Number of grains per panicle	C	B	A	Hulling ratio	A	C	B
Number of fertile grains per panicle	C	B	A	Yield of palay	C	B	A
Ripening ratio	C	B	A	Yield of straw	C	B	A
Weight of 1,000 grains	A	B	C				

(4) Comparative Test of Effects of Nitrogen Fertilizer

Method

1. Variety : C_4-63$_G$
2. Blocks and area : Two blocks (408 m^2)
3. Date of seeding : Jan. 10, 1975
4. Rice seedling bed : Water rice seedling bed
5. Date of transplanting : Feb. 1, 1975

6. Planting density 20 cm × 20 cm

7. Date of harvesting May 19, 1975

8. Period of growth 129 days

Method of treatment

		N			P	K
		Basal application	Tillering fertilization	Ear fertilization		
(A)	Unfertilized block	0	0	0	0	0
(B)	Standard ammonium sulfate fertilized block	25	25	25	50	30
(C)	Heavily ammonium sulfate fertilized block	40	40	40	50	30
a	Unfertilized block	0	0	0	0	0
b	Standard urea fertilized block	25	25	25	50	30
c	Heavily urea fertilized block	40	40	40	50	30

Result of experiment (1)

	(A) a	(B)	b	(C)	c
Number of panicle per 10 stubs	113.5	120.5	126.5	133.5	133.0
Number of panicle per m^2 (25 stubs)	283.8	301.3	316.3	333.8	332.5
Number of grains per panicle	69.0	94.6	81.2	88.8	78.1
Number of fertile grains per panicle	45.6	61.6	57.7	56.9	55.3
Number of sterile grains per panicle	23.5	33.6	23.5	32.0	22.9
Sterility ratio (%)	34.0	35.5	28.9	36.0	29.3
Weight of 1,000 grains (g)	21.8	22.1	20.4	22.1	21.9
Weight of palay per m^2 (g)	275.7	406.8	375.6	418.3	400.7
Hulling ratio (%)	75.0	76.0	79.3	75.0	71.7
Weight of straw per 10 stubs (g)	275.5	355.0	283.5	446.0	340.5
Weight of straw per m^2 (g)	688.9	887.5	708.8	1115.0	851.3
Yield of palay per ha (kg)	2757.0	4068.0	3756.0	4183.0	4007.0
Yield of straw per ha	6889.0	8875.0	7088.0	11150.0	8513.0
Straw and palay ratio (%)	71.1	68.4	64.9	72.6	68.1

(2)

	1st	2nd	3rd	4th	5th		1st	2nd	3rd	4th	5th
Number of panicles per stub	(C)	c	b	(B)	(A) a	Per centage of fruitful culm	c	(B)	(C)	A	b
Number of grains per panicle	(B)	(C)	b	c	A a	Hulling ratio	b	(B)	(C)	A	c
Number of fertile grains per panicle	(B)	b	(C)	c	A	Yield of palay	(C)	(B)	c	b	A
Ripening ratio	b	c	A	(B)	(C)	Yield of straw	(C)	(B)	c	b	A
Weight of 1,000 grains	(C)	(B)	c	A	b						

The results of the test show that N fertilization is most effective when given at various stages like basal application, tillering stage, reductive division stage, and heading stage. Square planting 18 cm x 18 cm (100 stubs per tsubo) gave better results than 20 cm x 20 cm (82 stubs per tsubo), indicating the advantage of dense planting.

(5) Comparison among Compost, Chemical Fertilizer (Ammonium Sulfate) and Mixture of Compost and Ammonium Sulfate

In tropical regions, compost is said to be effective as fertilizer component, but not so much as unorganic component. The necessity of compost is not so strongly preached in tropical regions as in Japan. However, the price of fertilizers has been risen with that of oils since the Oil Crisis. Price of ammonium sulfate is 50 kg = 80 pesos. Although the cost of fertilizers is a large burden for ordinary farmers, rice straws are burnt and thrown away. Compost has been encouraged to make since this region has sufficient rain for quick growth of weeds and enough labor force to produce the compost. This comparative test was made for this reason.

I. Ammonia Sulfate District

1.	Variety	IR-26
2.	Blocks and area	Two blocks (360 m^2)
3.	Date of seeding	June 28, 1975
4.	Rice seedling bed	Water type, 21 days old nursery plant
5.	Date of transplanting	July 17, 1975
6.	Fertilizer	Ammonia sulfate 21-0-0
7.	Planting density	20 cm x 20 cm
8.	Date of harvesting	Oct. 27, 1975
9.	Period of growth	122 days
10.	Number of stubs per m^2	25 stubs
11.	Fertilizing method	Basal application, tillering stage, reductive division stage

Result

Item \ Treatment		T - A No fertilizer	T - B Nitrogen 40kg/ha	T - C Nitrogen 60kg/ha	T - D Nitrogen 80kg/ha	T - E Nitrogen 100kg/ha
Date of investigation		Aug. 27, 1975	Aug. 27, 1975	Aug. 27, 1975	Aug. 27, 1975	Aug. 27, 1975
Maximum tillering stage (Number)		14.3	17.2	16.5	18.7	19.6
Date of investigation		Oct. 8, 1975	Oct. 8, 1975	Oct. 8, 1975	Oct. 8, 1975	Oct. 8, 1975
Maximum height	cm	81.4	89.0	89.4	91.5	88.4
Weight of palay and straw	g 10 stubs	184.0	220.0	237.5	274.5	267.5
Weight of straw	g 10 stubs	74.0	86.0	87.5	103.0	95.5
Weight of palay	g 10 stubs	110.0	134.1	150.0	171.5	172.2
Maximum number of tillers	Average 10 stubs	14.3	17.2	16.5	18.17	19.6
Number of panicles	10 stubs	96.0	114.0	103.5	117.0	120.0
Effective stems percentage of fruitful culm	%	67.13	66.28	62.72	62.56	61.48
Weight of 1,000 grains	g	18.62	19.10	19.64	19.70	20.57
Number of grains	10 stubs	6721.6	7835.1	8416.4	10205.9	9183.6
Number of fertile grains	10 stubs	5342.4	6439.6	6898.3	8096.4	8020.8
Number of sterite grains	10 stubs	1379.2	1395.5	1518.1	2109.6	1162.8
Number of grains per	m^2	13357.0	16099.0	17246.0	20241.0	20052.0
Number of grains per panicle		69.92	68.61	81.11	87.6	76.6
Number of fertile grains per panicle		55.65	56.49	66.65	69.2	66.56
Number of sterile grains per panicle		14.27	12.12	14.46	18.4	10.04
Sterility ratio	%	20.52	17.81	18.04	20.66	12.66
Straw and palay weight ratio	%	39.67	39.07	36.84	37.52	35.7
Yield (per ha)	cavan (45 kg)	55.27	68.33	75.27	88.61	91.66

II. Compost District

1.	Variety	IR-26
2.	Blocks and area	Two blocks (288 m^2)
3.	Date of seeding	June 28, 1975
4.	Rice seedling bed	Water type, 21 day old nursery plant
5.	Date of transplanting	July 17, 1975
6.	Fertilizer	Compost (as of N5%)
7.	Planting density	20 cm x 20 cm
8.	Date of harvesting	Oct. 27, 1975
9.	Period of growth	122 days
10.	Number of stubs per m^2	25 stubs
11.	Fertilizing method	Basal application (one time)

Result

Item \ Treatment		T - B Compost 8 tons/ha	T - C Compost 12 tons/ha	T - D Compost 16 tons/ha	T - E Compost 20 tons/ha
Date of investigation		Aug. 27, 1975	Aug. 27, 1975	Aug. 27, 1975	Aug. 27, 1975
Maximum tillering stage (Number)		15. 8	15. 3	13. 5	15. 7
Date of investigation		Oct. 8, 1975	Oct. 8, 1975	Oct. 8, 1975	Oct. 8, 1975
Maximum height	cm	89. 4	89. 5	87. 0	91. 1
Weight of palay and straw	g 10 stubs	242. 5	249. 6	231. 25	243. 5
Weight of straw	g 10 stubs	94. 5	106. 0	92. 5	103. 0
Weight of palay	g 10 stubs	148. 0	143. 6	138. 75	140. 5
Maximum number of tillers	Average 10 stubs	15. 8	15. 3	13. 5	15. 7
Number of panicle	10 stubs	105. 0	102. 0	92. 0	98. 0
Per centage of fruitful culm	%	66. 45	66. 66	68. 15	62. 42
Weight of 1, 000 grains	g	21. 26	21. 26	20. 16	19. 83
Number of grains	10 stubs	7649. 6	7929. 8	7377. 7	7214. 8
Number of fertile grains	10 stubs	6655. 9	6321. 2	6518. 2	6608. 0
Number of sterile grains	10 stubs	993. 7	1608. 6	859. 5	606. 8
Number of grains per	m^2	16639. 0	15803. 0	16295. 0	16520. 0
Number of grains per panicle		75. 46	177. 62	80. 16	73. 56
Number of fertile grains per panicle		63. 39	61. 97	70. 85	67. 43
Number of sterile grains per panicle		12. 07	15. 65	9. 33	6. 13
Sterility ratio	%	12. 99	20. 29	11. 64	8. 41
Straw and palay weight ratio	%	38. 98	42. 47	40. 0	42. 3
Yield (per ha)	1 cavan, 45 kg	78. 61	74. 66	73. 0	72. 8

III. Compost and Ammonium Sulfate District

1. Variety — IR-26
2. Blocks and area — Two blocks (288 m^2)
3. Date of seeding — June 28, 1975
4. Rice seedling bed — Water type, 21 day old nursery plant
5. Date of transplanting — July 17, 1975
6. Fertilizer — Compost and ammonium sulfate
7. Planting density — 20 cm x 20 cm

8. Date of harvesting — Oct. 27, 1975
9. Period of growth — 122 days
10. Number of stubs per m^2 — 25 stubs
11. Fertilizing method — Basal application: Compost and ammonium sulfate was given at various stages

Result

Item \ Treatment		T - B N20 kg + Compost 4 tons/ha	T - C N30 kg + Compost 6 tons/ha	T - D N40 kg + Compost 8 tons/ha	T - E N50 kg + Compost 10 tons/ha
Date of investigation		Aug.27,1975	Aug.27,1975	Aug.27,1975	Aug.27,1975
Maximum tillering period	(Number)	16.2	16.8	18.3	16.4
Date of investigation		Oct. 8, 1975	Oct. 8, 1975	Oct. 8, 1975	Oct. 8, 1975
Maximum height	cm	90.5	86.6	88.4	89.8
Weight of palay and straw	g 10 stubs	208.6	243.45	245.25	255.45
Weight of straw	g 10 stubs	88.5	103.0	98.0	102.0
Weight of palay	g 10 stubs	120.1	140.45	147.25	155.45
Maximum number of tillers	Average 10 stubs	16.2	16.6	18.3	16.4
Number of panicle	10 stubs	97.5	121.5	114.0	113.5
Percentage of fruitful culm		60.18	2.32	62.29	69.20
Weight of 1,000 grains	g	19.41	19.51	19.58	19.70
Number of grains	10 stubs	7231.24	7782.0	8233.92	7870.7
Number of fertile grains	10 stubs	5409.3	6688.9	6971.08	7385.5
Number of sterile grains	10 stubs	1821.9	1093.1	1262.84	485.2
Number of grains per	m^2	13523.2	16722.2	17427.7	18463.7
Number of grains per panicle		74.11	64.20	72.35	69.60
Number of fertile grains per panicle		55.48	55.05	62.15	65.07
Number of sterile grains per panicle		18.63	9.15	11.20	4.53
Sterility ratio	%	25.19	14.05	15.33	6.16
Straw weight ratio	%	42.42	42.31	39.96	39.93
Yield (per ha)	cavan, 45 kg	58.33	72.50	75.83	80.83

IV. Test on Effect of Compost on Yield (Heavy Fertilization due to Infertility of Soil)

1. Variety — IR-26
2. Blocks and area — Two blocks (40 m^2 per block)
3. Date of seeding — June 16, 1975
4. Rice seedling bed — Water type, 21 days old nursery plant
5. Date of transplanting — July 17, 1975
6. Planting density — 20 cm x 20 cm
7. Fertilizer
   - A. No fertilizer
   - B. Compost 5 tons per ha
   - C. Compost 10 tons per ha
   - D. Compost (5 tons per ha) + chemical fertilizer N : P : K = 100 : 100 : 30 kg per ha
   - E. Chemical fertilizer N : P : K = 100 : 100 : 30 kg per ha
8. Date of hervesting — Oct. 17, 1975

Result

Item \ Classification		A	B	C	D	E
		No fertilizer	Compost 5 tons	Compost 10 tons	Compost 5 tons + chemical fertilizer 100-100-30	Chemical fertilizer N. P. K. 100-100-30
Weight of palay and straw	10 stubs,g	182.10	228.8	229.2	269.3	269.0
Weight of straw	10 stubs	66.5	84.5	87.25	83.5	93.5
Weight of palay	10 stubs	115.6	144.3	141.95	185.8	177.5
Maximum number of tillers	Average 10 stubs	14.7	14.2	14.6	16.9	17.3
Number of panicle	10 stubs	107.5	92.0	89.5	105.5	106.5
Percentage of fruitful culm	%	73.12	64.78	61.30	62.42	61.56
Weight of 1,000 grains	g	18.95	19.6	18.3	19.8	19.85
Number of grains	10 stubs	6237.45	7762.56	7779.1	9982.35	9917.0
Number of fertile grains	10 stubs	5619.4	6892.3	7201.96	8660.9	8185.69
Number of sterile grains	10 stubs	618.05	870.26	577.14	1321.45	1731.4
Number of grains per m^2		14048.5	17230.8	18004.9	21652.27	20464.2
Number of grains per panicle		58.64	85.25	87.93	94.71	93.10
Number of fertile grains per panicle		52.27	74.91	80.46	82.09	76.86
Number of sterile grains		6.37	10.34	7.47	19.51	16.24
Sterility ratio	%	9.91	11.21	7.42	13.23	17.45
Straw and palay ratio	%	36.51	36.93	38.06	31.00	34.75
Yield	cavan	59.16	75.05	73.22	95.27	90.27

V. Comparison of High-yielding Varieties (Heavy fertilization due to infertility of soil)

1. Variety — IR-26, IR-28, C_4-63_G, Masri, Marensia
2. Blocks and area — Two blocks (40 m^2 per block)
3. Date of seeding — June 16, 1975
4. Rice seedling bed — Water type, 21 days old nursery plant
5. Date of transplanting — July 17, 1975
6. Fertilizer — N-P-K = 100-100-30 kg (ha) P, K = Basal application
   N = 30 : 30 : 25 : 15 kg at four stages
7. Planting density — 20 cm x 20 cm
8. Date of harvesting — Oct. 17~Nov. 10
9. Cultivation control — As at demonstration farm

Result

	Item \ classification		IR-28	IR-26	C_4-63_G	Marusi	Marensia
①	Weight of palay and straw	10 stubs, g	216.85	272.0	275.5	444.5	395.5
②	Weight of straw	10 stubs	81.0	96.0	105.5	261.0	222.5
③	Weight of unhusked rice	10 stubs	135.85	176.0	170.0	180.0	173.0
④	Maximum number of tillers	Average 10 stubs	15.2	18.3	14.6	13.8	12.9
⑤	Number of panicle	10 stubs	98.0	110.0	92.5	101.0	93.0
⑥	Effective stem ratio percentage of fruitful culm	%	64.47	60.10	63.35	73.18	72.09
⑦	Weight of 1,000 grains	10 stubs	19.0	19.9	19.0	19.9	18.75
⑧	Number of grains	10 stubs	7643.0	10949.0	9498.7	11317.8	13377.0
⑨	Number of fertile grains	10 stubs	6657.15	7938.9	7999.5	7486.7	8133.1
⑩	Number of sterile grains	10 stubs	985.85	3010.1	1499.2	3831.1	5243.9
⑪	Number of grains per m^2		16642.8	19847.4	19998.9	18716.8	20332.8
⑫	Number of grains per panicle		78.90	98.20	115.4	97.5	120.4
⑬	Number of fertile grains per panicle		67.93	72.17	86.48	74.12	87.45
⑭	Number of sterile grains		10.97	26.03	28.92	23.38	32.95
⑮	Sterility ratio	%	12.98	27.49	15.78	33.85	39.20
⑯	Straw and palay ratio	%	37.35	35.26	38.29	58.71	56.25
⑰	Yield	cavan	70.27	87.77	84.44	82.77	84.72

Calculation Method

⑥ = ⑤ ÷ ④ ⑭ = ⑩ ÷ 10

⑪ = ⑨ x 2.5 ⑮ = ⑩ ÷ ⑧

⑫ = 8 ÷ 10 ⑯ = ② ÷ ①

⑬ = 9 ÷ 10 ⑰ = ⑪ $\times \frac{10,000\ m^2}{1,000\ grain}$ x ⑦ ÷ 1,000 g (Kg) ÷ 45 kg (cavan)

These results show that compost is extremely useful for the yield of palay. Compost promotes the granulation of soil and improves its air circulation and physical properties. The yield was increased about 30% by application of compost.

3. Management of Pilot Farm

In the pilot farm the soil is poor since it was newly reclaimed. The pilot farm Administration chose 2 ha field for 1974 regular crop, 3 ha field for 1975 regular crop, another 3 ha field for 1975 palagad crop and 11 ha field for 1976 palagad crop. They were chosen from poor soil plot abandoned by farmers. These fields were managed like the demonstration farm. The yield of the 1975 palagad crop and that of the 1975 regular crop were 66 cavans and 75 cavans, respectively. Since the land conditions were improved, the farmers of these fields requested to return from Administration.

The 11 ha fields being managed directly by the administration have various difficulties, including poor drainage, soil reduction, methane gas generation. We worked hard to improve yields on the basis of previous experiences and available techniques, then returned them to farmers as soon as possible.

Cultivation of Green Manure Sasvenia for Soil Improvement

"Cultivate soil before cultivating rice plant". This is an old saying on rice cultivation. To improve the soil conditions in wet seasons, green manure of good quality must be used for nitrogen fixation of root nodule bacteria. Since green manure is locally unavailable, we obtained it from the Arrah Center in India through the kindness of the Japanese Embassy in Manila. We have secured a considerable amount of seeds from our seed farm.

We have obtained data ensuring the harvest of 5 tons of green manure per ha about fifty days after sowing. It is regrettable to say that this cannot be proved at this demonstration farm because of poor weather conditions. Seeds are distributed among trainees for wider uses.

Adaptability Test of IRRI Varieties

Cooperative research with IRRI and the demonstration farm was begun in January, 1976. The twenty varieties listed on the attached sheet (early maturing medium maturing) were given an adaptability test and an insect and disease resistance test. (See the attached sheet)

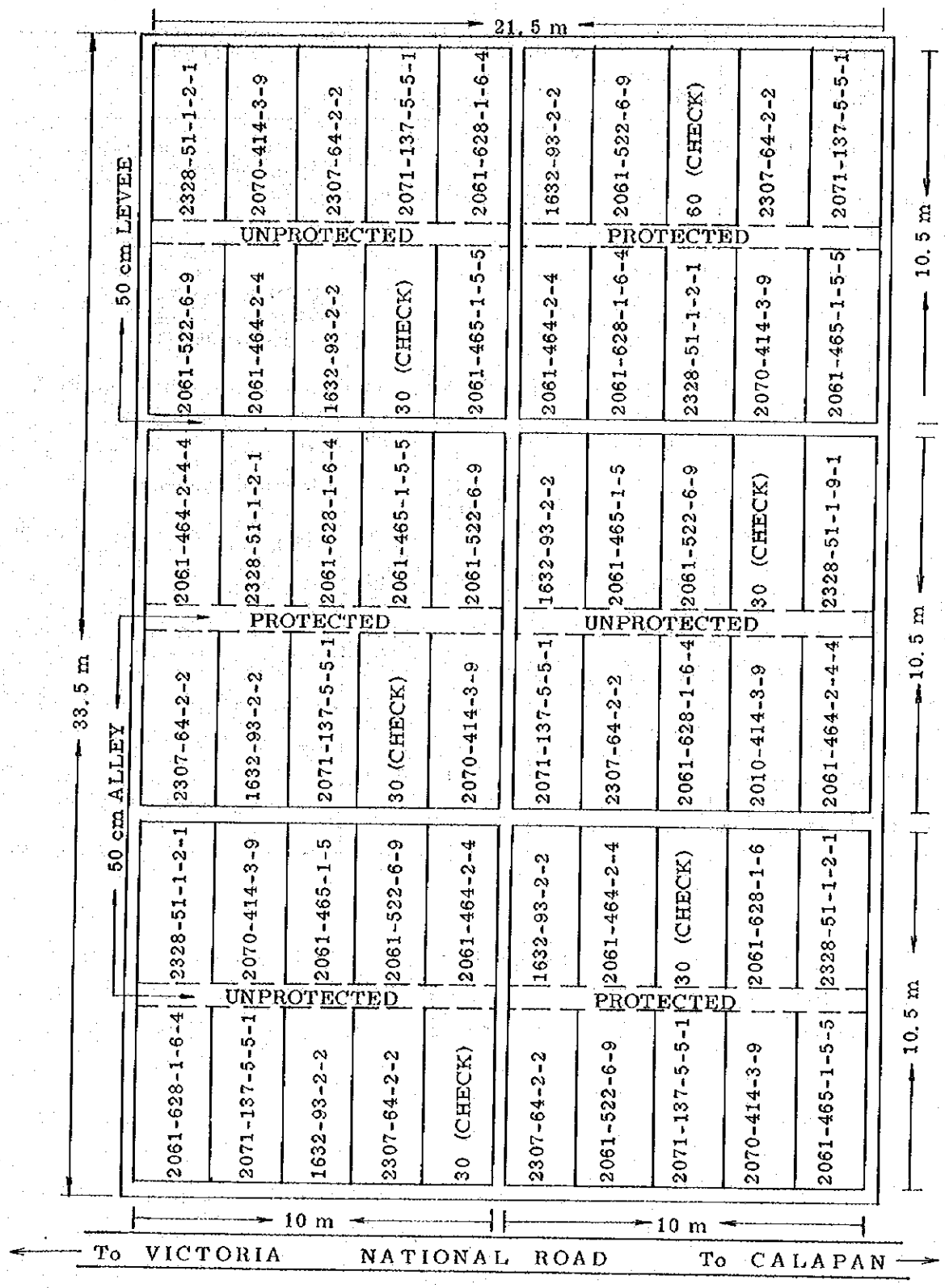
General Financial Report of Demonstration Farm (per ha)

Income		Expenditure		Remark
Item	Income	Item	Expenditure	
Palay	@/₱4, 135. 00	Seed	₱45. 00	Fertilizers recommended by Masagana 99 :
4, 135kg		Fertilizer	₱517. 00	
		@Urea 50ka=₱119. 00 Chemical compound fertilizer 50kg=₱86. 00 14-14-14		Urea : 2 bags 100kg Chemical compound fertilizer : 3 bags, 150kg ₱496. 00
		Chemicals	₱220. 00	Japan-Philippine Farm Urea 50kg
		Repairing	₱80. 00	@₱68. 75
		Fuel	@11 =1₱ ₱60. 00	Chemical compound fertilizer @₱60. 75
		Irrigation	₱135. 00	
		Labor	₱526. 00	
		67 workers @₱8. 00		
		Carabao	₱60. 00	
Total	₱4, 135. 00		₱1, 656. 00	
Profit	₱2, 479. 00			

IRRI NEW SELECTIONS APPLIED RESEARCH TRIAL

1976 - DRY SEASON

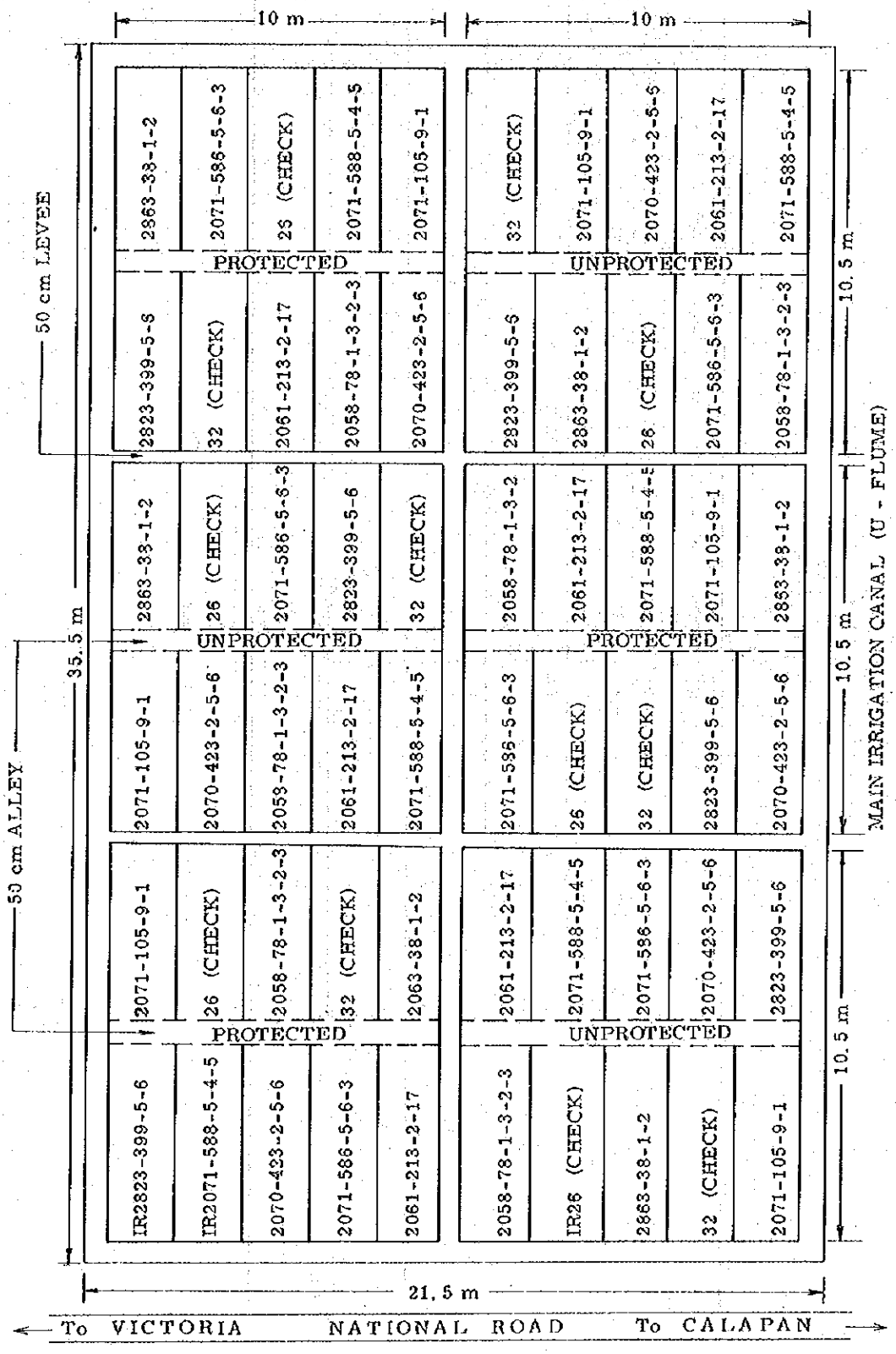
FIELD LAYOUT - EARLY MATURITY GROUP



IRRI NEW SELECTIONS APPLIED RESEARCH TRIAL

1976 - DRY SEASON

FIELD LAYOUT - MEDIUM MATURITY GROUP

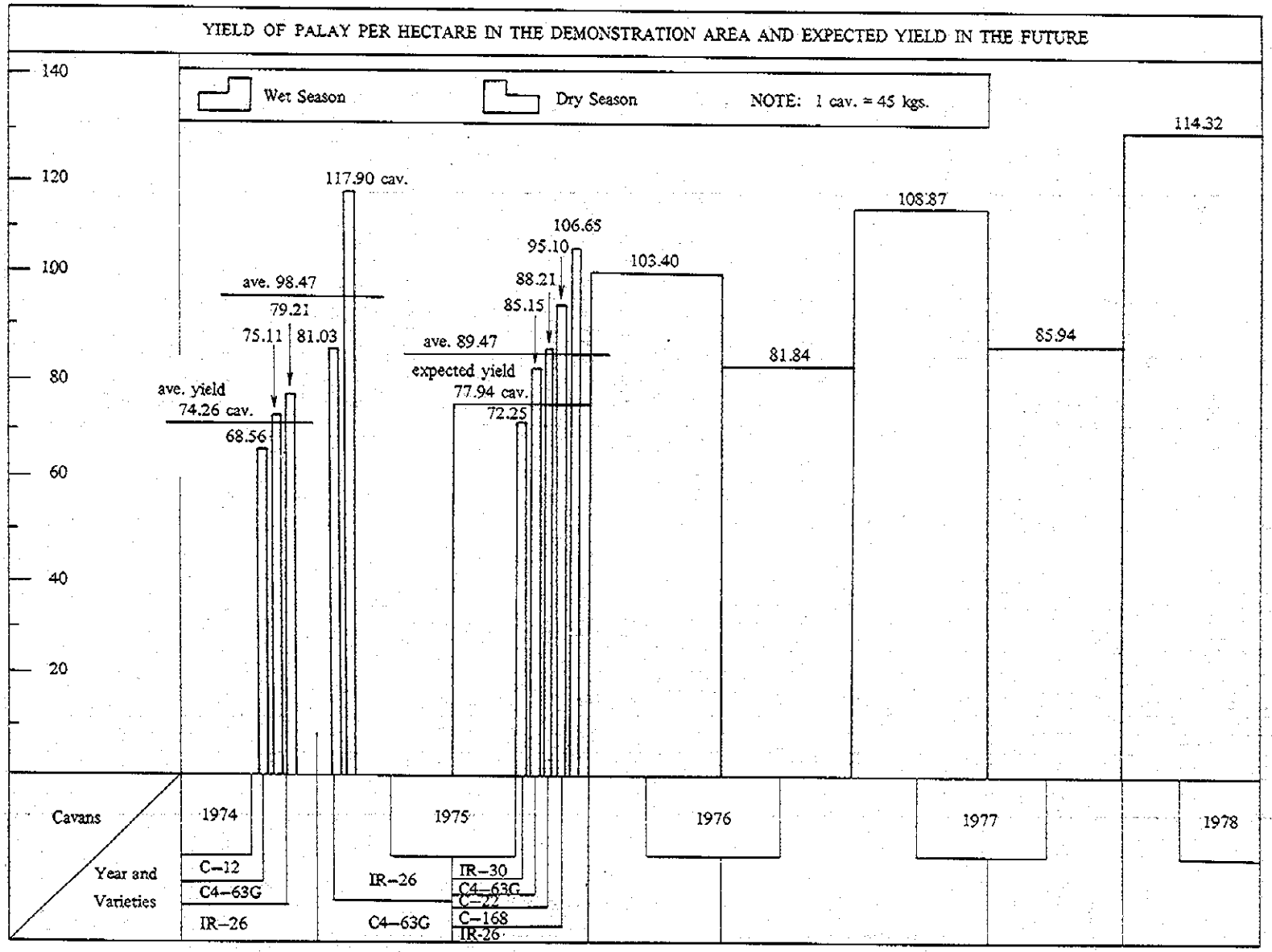


Plantation Schedule

Year	Variety	June			July			August			September			October			November			December			January			February			March			April			May		
		First Part	Middle Part	Last Part	First Part	Middle Part	Last Part	First Part	Middle Part	Last Part	First Part	Middle Part	Last Part	First Part	Middle Part	Last Part	First Part	Middle Part	Last Part	First Part	Middle Part	Last Part	First Part	Middle Part	Last Part	First Part	Middle Part	Last Part	First Part	Middle Part	Last Part	First Part	Middle Part	Last Part	First Part	Middle Part	Last Part
1974 Regular Crop 1975 Palagad Crop	IR-26 C4-63G C-12				○	- - -	- - -	- - -	- - -	×	———	———	———	———	———	———	———	———	◎			○	- - -	- - -	- - -	×	———	———	———	———	———	———	———	———	———	———	———	———	———	◎	
1972 Regular Crop	IR-26 IR-28 IR-30 C-168 C4-63G	○	- - -	×	———	———	———	———	———	———	———	———	———	◎						○	- - -	- - -	×	———	———	———	———	———	———	———	———	———	———	———	◎ Green Manure Cultivation		

○ Sowing × Transplanting ◎ Harvest

- - - - Period of nursery plant ——→ Period of growth


YIELD OF PALAY PER HECTARE IN THE DEMONSTRATION AREA AND EXPECTED YIELD IN THE FUTURE
Wet Season
Dry Season
NOTE: 1 cav. = 45 kgs.
140
120
100
80
60
40
20
117.90 cav.
ave. 98.47
79.21
75.11
81.03
ave. yield
74.26 cav.
68.56
106.65
95.10
88.21
85.15
ave. 89.47
expected yield
77.94 cav.
72.25
103.40
81.84
108.87
85.94
114.32
Cavans
Year and Varieties
1974
C–12
C4–63G
IR–26
1975
IR–26
C4–63G
IR–30
C4–63G
C–22
C–168
IR-26
1976
1977
1978

RATE OF FERTILIZER & CHEMICALS APPLIED IN THE RDTC's DEMONSTRATION AREA

(Dry Season – 1976)

Plot / Item	A–(0.55 ha.)						B–(0.62 ha.)						C_1–(0.30 ha.) C_2–(0.27 ha.)						D–(0.16 ha.)					
Variety	IR26 & IR var.						IR26						C168						C4–63G					
Sowing	Jan. 19, 1976						Dec. 4, 1975						Dec. 5						Dec. 18					
Transplanting	Feb. 19						Dec. 22						Dec. 23						Jan. 6					
FERTILIZATION	DATE	Name of Fert.	Amt. Fert.	Single elem. per ha. N	P	K	DATE	Name of Fert.	Amt. Fert.	Single elem. per ha. N	P	K	DATE	Name of Fert.	Amt. Fert.	Single elem. per ha. N	P	K	DATE	Name of Fert.	Amt. Fert.	Single elem. per ha. N	P	K
			kg						kg						kg						kg			
	1-17	14-14-14	100	25	25	25	12-12	14-14-14	140	31	31	31	12-19	14-14-14	140	34	34	34	1-5	14-14-14	40	35	35	35
							1-8	14-14-14	100	22	22	22	1-8	14-14-14	100	24	24	24	1-28	45-0-0	100	28	–	–
							1-18	45-0-0	15	11	–	–	1-18	45-0-0	15	12	–	–	3-1	45-0-0	100	28	–	–
							2-18	0-0-60	20	–	–	19	2-18	0-0-60	20	–	–	21	3-1	0-0-60	3	–	–	11
							3-2	45-0	20	14	–	–	3-2	45-0-0	20	16	–	–						
				25	25	25				78	53	72				86	58	79				91	35	46
							3-22	HEADING STAGE					3-16	HEADING STAGE					3-16	HEADING STAGE				
SPRAYING	Date	Name Chem.	Formulation	Q'ty			Date	Name Chem	Formulation	Q'ty			Date	Name Chem.	Formulation	Q'ty			Date	Name Chem.	Formulation	Q'ty		
	2-25	PCP		10 kg			1-8	BHC gamma		25 kg			1-8	BHC gamma		25 kg			1-11	BHC gamma	6%	5 kg		
	2-25	BHC granule		15			2-26	EPN Sumithion		9			2-26	EPN		12			1-14	PCP		5		
	3-16	EPN		12			3-9	Sumithion		9			3-9	Sumithion		9			2-25	EPN		5		
	3-30	Sumithion		12			3-9	Sinmon Kil		12			3-9	Sinmon Kil		9			3-30	Sumithion		12		
	3-30	Mongalen		12			3-30	Mongalen		12			3-30	Sumithion		12			3-30	Bungalon		12		
							3-30						3-30	Mongalen		12								

Plot / Item	E–(0.10 ha.)						F–(0.13 ha.)						G–(0.69 ha.)					
Variety	IR29, IR30, IR32, IR34						IR30						C22					
Sowing	Dec. 28						Dec. 28						Dec. 4					
Transplanting	Jan. 20						Jan. 20						Dec. 22					
FERTILIZATION	DATE	Name of Fert.	Amt. Fert.	Single elem. per ha. N	P	K	DATE	Name of Fert.	Amt. Fert.	Single elem. per ha. N	P	K	DATE	Name of Fert.	Amt. Fert.	Single elem. per ha. N	P	K
			kg						kg						kg			
	1-16	14-14-14	20	28	28	28	1-16	14-14-14	20	21	21	21	12-20	14-14-14	200	46	46	46
	1-22	45-0-0	20	9	–	–	1-22	45-0-0	20	69	–	–	1-8	"	100	23	23	23
	1-22	0-0-60	20	–	–	12	1-22	0-0-60	20	–	–	–	1-18	45-0-0	20	15	–	–
	2-9	45-0-0	100	22	–	–	2-9	45-0-0	100	17	–	–	2-18	0-0-60	20	–	–	20
	3-1	21-0-0	100	21	–	–	3-1	21-0-0	100	8	–	–	3-1	21-0-0	50	17	–	–
	3-1	0-0-60	2	–	–	12	3-1	0-0-60	40	–	–	9						
				80	28	52				135	21	39				202	69	89
	4-8	HEADING STAGE											3-22	HEADING STAGE				
SPRAYING	Date	Name Chem.	Formulation	Q'ty			Date	Name Chem.	Formulation	Q'ty			Date	Name Chem.	Formulation	Q'ty		
	1-30	BHC granule		5 kg			1-30	BHC granule		5 kg			1-8	BHC gamma		25
	2-25	EPN powder		5			2-25	EPN		5			2-26	EPN		18
	3-16	EPN		6			3-16	EPN		6			3-9	Sumithion		9
	3-30	Sumithion		12			3-30	Sumithion		12			3-9	Sinmon Kil		9
	3-30	Mongalen		12			3-30	Mongalen		12			3-29	EPN		18

How to get 100 cavans per hectare

We prepared "Method for Harvesting 100 cavans per ha," which is a guide of rice plant cultivation techniques. It is based on our four experimental rice crops at the field, the tests at the pilot farm and our observations of trainee farmers' field. It is our hope that it should help rice plantation as a part of the Masagana 99 Movement.

The following three factors are important for increasing rice production in the Philippines.

1. Selection of good seeds.
2. Improvement of agricultural environment and use of good machines and tools.
3. Introduction and adoption of scientific rice planting techniques.

1. Selection of Good Seeds

Good seeds should meet with the following conditions.

(1) Seeds have the properties of good seeds and have high hereditary purity.
(2) No other variety should be mixed.
(3) Seeds should be free from damages by insects and diseases.
(4) Their fertility must be high.
(5) They should not be checked.
(6) Their germination ratio should be above 80%.

High-yield varieties, except IRRI varieties, have about two month long resting period. Therefore, seeds should not be used at least two months after harvesting.

The first step toward high yield is to obtain good seeds. Since overripening causes checking, palay must be harvested when more than two thirds of panicles show matured color even with some greenness on leaves.

Renewal seed is enough in three year intervals unless obvious mixture of seed is found. Adequate varieties must be selected in consideration of their yield, resistance to insects and diseases, local adaptability, taste, soil quality, irrigation facilities etc. The following varieties are recommended based on the two years of experiences.

The improved varieties (IR, C types) have shorter culm and more tiller than the local varieties. They bring about larger harvest if sufficient fertilizers are used. They have been used more and more widely in regions with irrigation facilities and good soil conditions. However the local varieties give better results in some regions of poor soil conditions.

* IR-26 (Many tillering type)

The IRRI varieties are mostly recommended in the Philippines. This variety is especially adequate here. The period of growth is 120 ~ 125 days. It is characterized by

short culm, large resistance to fertilizers and high yield. The yield was 120 cavans per ha in RP-Japan Pilot Farm. It is especially suitable for fertile land. It has small resistance for sheath blight and AKAGARE disease.

* C-168 (Heavy panicle type)

This variety was raised by the Agriculture Department University of Philippine. It has large resistance against diseases such as sheath blight, and AKAGARE disease. The period of growth is 125 ~ 130 days. It is not so susceptible to fertilizer as IR series but get high yield. The yield in the Pilot Farm was 95 cavans per ha. This variety is very popular in the Philippines because of good taste and one of the best varieties to recommend.

* C_4-63_G (Heavy panicle type)

This variety was raised by the Agriculture Department University of Philippine. It is characterized by large resistance against diseases and fertilizers. The period of growth is 130 days. This variety is easy to raise. Although many sterile grains are produced high yield can be obtained by promoting ripening.

* C-22 (Heavy panicle type)

This variety was raised by the College of Agriculture University of Philippine. It is characterized by long culms and high yield. The period of growth is 120 days. The yield in the Pilot-Farm was 88 cavans per ha. Its resistance against stem borer and bacterial leaf blight is small. It is tasty, but slightly difficult to cultivate.

* C-12 (Heavy panicle type)

It was raised by the College of Agriculture University of Philippine. It is characterized by long culms, small grains, good taste and large resistance against disease. It is difficult to obtain high yield, but easy to cultivate. The period of growth is 140 days. The yield at the Pilot-Farm was 70 cavans per ha.

* IR-28, IR-30 (Tillering type)

The period of growth is 110 ~ 115 days. It is suitable for non-irrigatable regions. It is difficult to obtain high yield since it is of early maturing type. It has large resistance against diseases and not susceptible to fertilizers. The yield in the Pilot-Farm was 73 cavans per ha.

* Masuri, Marensia

They were raised by Japanese specialists in Malaysia. The period of growth is 140 days. It is suitable for regular crop, but unsuitable for palagad crop because of large sensitivity to light. Its heading becomes late in a dry season. It has large resistance against diseases and not susceptible to fertilizer, but its yield was lower than the IRRI varieties in the Philippine. The yield in the Pilot-Farm was 88 cavans per hectare. It is suitable for the taste of the Philippino. This variety was tried to cultivate while I was working at the Arrah Center in India. Subsequently, it was sent by Mr. Miyasaka because of the high evaluation obtained in Bihar Province in India.

Many farmers are used to use mixed varieties of seeds. They are suggested to select

healthy, physiologically good panicles in some early stage to obtain pure seeds. One worker can harvest about 2 cavans of panicles within a day. They should be dried at a cool place and stored apart from any other variety.

2. Arrangement of Agricultural Condition and Use of Good Machines and Tools.

A. On Field

Arrangement of farm.....Good farm roads can decrease labor since they facilitate transportation of fertilizers and harvests.

Area measurement.....It facilitates the estimate of quantity of seed and fertilizer.

Water channel.....It facilitates irrigation and draining.

Cleaning of ditch.....It facilitate water management.

B. Soil Survey

Soil survey is important for the determination of adequate fertilizing. Farmers should be well informed of soil qualities.

C. Deep Plowing

Deep plowing increases surface soil and expands rhizoshere. It has the same effect as soil dressing. Gradual deep plowing, instead of sudden deep plowing, is recommended for reclaimed land like this Pilot-Farm.

Once land is dried, soluble nitrogen in soil increases and results the number of panicles increases. About 30 day long soil drying before transplanting seems adequate.

D. Leveling

Field surface should be leveled as evenly as possible. Surface unevenness results in uneven irrigation water, uneven growth, water control difficulties and sometimes causes AKAGARE disease. Leveling is essential for increasing harvest. A 2 ~ 3 year leveling plan should be made when leveling is difficult.

E. Use of Organic Manure

Fertilizers can be classified into chemical fertilizers and organic manure. Chemical fertilizers contains some kind of nutrients alone, but organic manure such as compost, human manure, green manure contains various nutrients and help the maintenance of soil fertility. Soil is expanded and softened by addition of organic manure. It prevents the loss of chemical fertilizers, promotes bacterial growth, improves soil quality and increases yield.

Rice straw is burnt at farms in the Philippine. Compost can be prepared by using straw, weeds, carabao's dung. Its use will be financially advantageous in view of the high price of chemical fertilizers.

When 8 tons per ha of compost was used in an unfertilized plot in the Pilot-Farm, the yield increased by more than 30%. Sasvenia (green manure) is being tried in the Pilot-Farm. About 5 tons per ha of green manure (N: 25 kg, P_2O_5: 5 kg, K_2O: 25 kg)

can be obtained in fifty days by seeding at the rate of 40 kg/ha. This organic manure is suitable for the Philippine islands with frequent rains since it promotes nitrogen fixation of root nodule bacteria in the soil.

On the upland, reduction problem (oxygen deficiency) can be prevented by flooding fields immediately after tilling and then transplant seedlings ten days later. This method is strongly recommended for sandy soil.

Concerning machines and tools, see the report of a machine specialist.

3. Suggestions for Scientific Rice Culture

a. Rice seedling bed

Flat beds are mostly used in the Philippines. Since they have no draining ditch, water remains on the beds after heavy rainfall and seedlings are weakened as a result. Although rice seedling bed area per 1 ha of paddy field is extremely small (150 m^2), a large amount of seeds (90 kg) are used. That is to say too Thick Sowing.

Few farmers sterilize seeds and soak in salt water. They have no custom of fertilizing and weeding. They transplant about 30 day old nursery plants.

Healthy seedling increase the safety of rice cultivation, increase yield, prevent the growth of weeds and facilitate plant protection.

DAPOG type seedling beds are laso used in the Philippines. Banana leaves or vinyl sheets are laid in shade and seeds of palay (1,000 g/m^2) are spread on them and raised without soil. The area of a bed is about 60 m^2 per ha of paddy fields. Farmers transplant the seedlings after two weeks of sowing. However, they are not suitable for sterile land as this Pilot-Farm, because C-N ratio is low.

Generally speaking, water, temperature, oxygen and sunshine are the essential conditions not only for rice but for ordinary plants. The following ground conditions are desirable for raising healthy nursery plants.

b. Location of Nursery

1) It should be convenient for management.

2) It should have sufficient sunshine and fresh air.

3) Soil fertility must be high and soil itself should be plowed to adequate depth.

c. Area of Nursery

Since ordinary farmers obtain malnutrited thin seedlings by dense seeding. The standard area of nursery should be 300 m^2 ~ 500 m^2 per 1 ha of paddy fields. Raised seed bed, floor width : 1.5 m, ditch width : 30 cm, floor height : 15 cm, is recommended to facilitate management. Drainage should be considered according to soil conditions.

Seedling can be classified into water rice nursery and upland nursery. The farmer should raise water rice nursery because of large rainfall in the Philippines.

Indica type rice plant consumes more oxygen in budding and rooting than the Japonica type. Although budding takes place quickly at the water depth of 0 cm, it

is delayed at the water depth of 4 cm. Since oxygen deficiency occasionally inhibits budding, nursery should be exposed as much as possible for at least a few days.

To submerge the seedling is necessary during a heavy rainy to prevent plant falling. However, water should be drained as soon as possible after weather recovers.

Upland nursery is frequently adopted in non-irrigated area and its seedlings grow well in upland area especially the roots. They are strong in the case of drought.

d. Seed Quantity

A large amount of seeds are used in the Philippines. About 90 kg is used per ha. This is extremely uneconomical in view of the shortage of food in this country. If seeds are sorted by soaking in salt water, 45 kg will be sufficient per ha.

e. Seeding Time

Approximately 30 day old seedlings are transplanted in the Philippine islands because of the atmospheric temperature is high. At that time the seedlings have 4 ~ 5 foliage leaves and grow as high as 18 cm in 20 days after sowing. Twenty day old seedlings are said to be adequate for transplanting. The seedlings for early maturing varieties are said to be ready in 17 ~ 18 days.

Since farmers in this province manage large fields, they sow only once in spite of a long transplanting period. They should seed weekly in consideration of transplanting labor, water, and the size of the field.

f. Pretreatment of Seeds

Seeds must be given the following pretreatment for selecting well-growing, healthy and fertile seeds.

Seeds given a germinalation test can be relied on.

Sorting by soaking in salt water

Add 2 kg of salt to 15l of water, and its specific gravity will be 1.05. Put the seeds into this salt water, then take out floating seeds, wash them by water and soak them in water. Sterilize seeds completely with Usplun solution of 1 : 1000 or to dissolve five tablets (5 g) of Riogen in 10l of water. Soak seeds for 24 hours, including sterilization time. Put sterilized and soaked seeds in jute bags up to 60 % of their capacity. Pour water over them in shade and cover them with wet cloth. They will be heated to about 40°C and hastening of germination will take place after 24 hours.

g. Fertilization of Nursery bed

Fertilization is important for raising healthy seedlings. Adequate fertilization will promise good seedlings. Thick and uniformly grown plants with medium leaf color and without damages by insects and diseases. Since nitrogen is especially effective, C-N ratio should be determined carefully. Since nitrogen top dressing is undesirable in tropical regions, the amount of N in basal application should be increased.

The three elements N, P_2O_5, K_2O are essential. Phosphate promotes

germination, potassium make the seedling strong and promotes photosynthesis.

Fertilizer quantities must be determined in consideration of soil conditions, P, H, and varieties. The criteria for average seedlings are given below.

N 30 kg, P_2O_5 30 kg, K_2O 30 kg per ha. There are 20 ~ 30% flexibility in those amount according to soil fertility. These fertilizers should be mixed well with soil after leveling.

h. Seeding and Irrigation

Uniform seeding is important. Seeding should be rather thin at the center of seed bed to facilitate the supply of fresh air and sun light.

If a bed shows a sign of cracking after germination, it should be submerged. Irrigation is recommended on five days before transplanting. Special attention must be paid to discharge in the case of heavy rain.

i. Plant Protection

Protection from insects and diseases is extremely important for the seedlings, stem borers, black tipped leafhopper, rice leafhoppers and case worms should be disinfested as soon as they are discovered. Diazinon and E. P. N. solution 1 : 1500 are effective.

j. Determination of Transplanting Time

Transplanting is one of the important operation of rice cultivation. When transplanting time is determined, a nursery bed is prepared. Sowing time should be adequate for transplanting. Tilling and leveling of paddy fields should be planned in consideration of transplanting time.

k. Plowing

Plowing of paddy fields is one of the essential operations. Fertilizers and soil must be mixed well by plowing, harrowing and leveling.

Puddling and leveling facilitate transplanting, uniformalize soil, level field surface and decrease water leakage. Levels with heavy water, and foot path should be plastered with mud.

Some Philippine farmers submerge their field with water to inhibit the growth of weeds. However, long term submerging promotes soil reduction and inhibits settling and initial growth of rice. To irrigate the water should be avoided for this reason. Soil reduction can be prevented by drying the soil through plowing one month in advance of transplanting. Farms covered densely with weeds should be plowed two months in advance in order to rot weeds. Methane gas generation can be prevented by this method. Excessive puddling increase the reductive property of soil, suppresses the growth of roots and inhibits tillering.

l. Pulling of Seedling

It is ideal to pull seedlings immediately before transplanting. If they must be pulled on the day before transplanting, they should be spread in shade and their roots should be immersed in water. Seedlings should be pulled by holding the bottom part to prevent breaking. Thinly sowed seedlings are difficult to pull. Soil should be softened by sufficient irrigation during the preceding two ~ three days and the roots should be washed well.

Overripe seedlings should be cut at the tip to prevent logging during moving and transplanting, by saving nutrients consumption through excessive transpiration or respiration and to prevent damages.

m. Fertilizers for Paddy Fields.

The amount of fertilizers to be used depend on soil composition and varieties. A standard (Palagad crop) for each variety is given below. A regular crop requires about 20% less (per ha.).

Fertilizer / Variety	N kg	P_2O_5 kg	K_2O kg	Raw straw ton
IRRI type	80	50	50	3
C type	70	50	50	3

The results of cultivation tests show that N should be given not only for basal application, but also for top dresings. Excessive ; use of nitrogen fertilizer for basal application will promote initial growth and give excessive nutrients. This can increase fertility too much and cause logging. Therefore, nitrogen fertilizer should be given at various stages ; basal application, tillering period 2 weeks after transplanting, reductive division stage, full heading stage for the maximum effects.

About 30% of nitrogen fertilizer should be used for basal application. Phosphate should be given as basal application. Potassium should be given twice, namely, basal application and ear premordia stage. Potassium top dressing (20 kg per ha) is effective for AKAGARE disease.

A good balance among nitrogen, phosphate and potassium is essential. Nitrogen deficiency will lower the effects of phosphate and potassium. For basal application, fertilizers should be mixed well with soil approximately one ~ two days before transplanting.

Nitrogen forms proteins, which are important for the growth of roots, stems and leaves. Phosphate promotes the growth of roots, as well as tillering, the fertility of grains and starch synthesis. Potassium promotes the moving of carbonhydrate and the synthesis of starch in plant body or increases resistance against insects and diseases.

About 2 ~ 3 tons straw are produced from one hectare. Farmers burn most of the straw at farms. Soil quality can be improved effectively by mixing straw with soil about one month before transplanting. Straw should be used in the form of compost in the case of ill-drained paddy fields because of a reduction problem.

n. Transplanting Method

Direct sowing method is used regionally in the Philippines because transplanting requires excessive labor. However, it requires much work for weeding after planting and decreases yield for many reasons. For example, directly sowing rice plant has little resistance against diseases because of poor air circulation and little exposure to sunshine.

Square planting with uniform inter-row and inter-column spacings increases yield and saves labor for weeding. Square planting is most desirable in consideration of the local geographical and meteorological conditions, workers' skill, rice management and growth.

Philippine people are skillful with fingers. Seven or eight planter per ha will be sufficient for transplanting in one day if conditions are good. They are probably one of the best transplanters in the world.

o. Planting Depth

About 20 day old seedlings are transplanted. They are approximately 18 cm tall. They should be planted deeply enough to prevent floating, otherwise, as shallowly as possible. The adequate depth is about 3 cm. Shallow planting make air circulation and tillering easy and promotes the uniform growth of rice plant. Deep planting allows the growth of two-stage root, which delays rooting and growth.

p. Transplanting Method and Density

The problem of planting density; the number of stubs per m^2 and the number of seedlings per stub are related not only to tillering transplanting time, soil fertility, fertilization and meteorological conditions, but also to the availability of seeding and labor.

Planting density may be low when conditions are good with heavy fertilization. The following table gives the standard planting density for healthy seedling under the above-stated conditions.

Regular Crop	Square Planting	18 cm x 18 cm
		20 cm x 20 cm
Palagad Crop	Square Planting	20 cm x 20 cm
		25 cm x 25 cm

Hold a bundle of seedling near the roots with the left hand, take out 3 ~ 4 plants with finger tips and insert them into the soil to the depth of 3 cm.

g. Replanting

Stubs often disappear after transplanting due to death in deep water or loss by rain. Since transplanting work is usually subcontracted, such losses tend to occur. Replanting should be done within one week after transplanting. Seedlings used for replanting should be kept ready in small bandles along ridges.

r. Weeding

Weeds not only inhibit the growth of rice plant by absorbing nutrients in soil, but also prevent air circulation and exposure to sunshine. Since they can be indirectly causes of insects and pests, weeding is one of the important works in rice plant culture.

Weeds, such as Fimbristylis miliacea VAHL, monochoria(Monochoria vagiualis PRESL), barnyard millet (Panicum crus-galli L. var. frumentaceum Hook. f.), yellow-cyperus (Cyperusiria L.) grow in pilot farm. They are killed by P. C. P. spraying, mechanical weeding and hand weeding.

Weeding not only eradicates weeds, but also promotes roots' functions, discharges poisonous hydrogen sulfide and methane gas from soil and minimizes nitrogen escape by feeding oxygen into soil.

Water should be kept as shallow as possible during weeding. The first weeding and the second weeding should be completed before the 14th day and the 35th day after transplanting, respectively. It is desirable to complete weeding before the beginning of head formation.

Roots are cut off by weeding. Although rooting is active during the tillering period, it becomes inactive when head formation has begun. For this reason, weeding should be completed by 25 days before heading.

Although sufficient labor reasource is available in the Philippines, the tendency of depending on weed killers has become rather popular because of the gradual shortage of labor forces in farm villages under the economic development and the progress of agricultural technology. We used P. C. P. sent from Japan in some polots. The following discoveries were made as a result of P. C. P. spraying.

(1) P. C. P. is most effective if sprayed five ~ six days after transplanting. It causes some injuries if sprayed three ~ four days after transplanting like in Japan. Special care must be taken for young plants.

(2) Large effects are obtained by spraying 30 kg per ha on 3 cm deep water and keeping water for four ~ five days.

(3) Do not spray P. C. P. while leaves are wet with dew.

s. Top Dressing

The life of rice plant is divided into the stage of vegetative growth and the stage

of generative growth. Nitrogen deficiency sharply decreases number of tillers and panicles. Nitrogen deficiency during ear premordia stage and reductive division stage decreases the number of grains per panicle and the weight of each panicle also. Ear manuring should be avoided while green leaves are wet with dew in the morning during the ear primordial stage. On the other hand, ear manuring is effective when leaves are yellow and hardened.

Top dressing at this stage sharply increases yield in the Philippines. About 20 kg of nitrogen per ha should be given two weeks before heading. The effects of nitrogen top dressing begin to appear in three days. It promotes the assimilation on leaf surface. Its effects reach the maximum level on the 10th day and decrease gradually.

When top dressing during the reductive division stage is not effective, ripening can be promoted by giving 10 kg of nitrogen per ha during full heading stage. Excessive nitrogen in basal application damages roots in the case of Indica varieties.

t. Water Management

Water management during the growth of rice plant is extremely important. Water is phisiologically essential for transpiration, absorption of nutrients from soil, maintenance of soil quality and culturing.

Submerging of water prevents soil concretion, facilitates weeding and inhibits the growth of weeds. Irrigation adjusts soil humidity, decomposes nutrients in soil and suppresses insects and pests.

The following water management is adequate for the growth of rice plant in the Philippines.

(A) Transplanting period

Water should be drained and kept as shallow as possible after transplanting. However, fertilizers and soil can be partly lost with water by discharging water immediately after transplanting.

(B) Rooting period

Transpiration must be minimized in fertile and well-drained paddy fields until new roots and new leaves come out. The water depth of 4 cm is adequate for about ten days after transplanting to prevent withering.

The water depth should be 3 cm when P. C. P., gamma or B. H. C. are used. Chronologically, the region affected by AKAGARE disease in the pilot farm should not be submerged for the first one week following transplanting.

(C) Tillering period

The best water depth after rooting is 3 cm. Water deficiency suppresses tillering, delays the growth of rice plant and promotes the growth of weeds. Oxygen should be fed to soil even during the tillering period for the healthy growth of roots.

The area affected by AKAGARE disease in the pilot farm will be in the

condition of the soil strongly reduced twenty days after transplanting. Such a farm should be drained after rooting. Although nitrogen fertilizer escapes in the form of gas and the growth of rice plant is inhibited to some extent, recovery and large yield can be facilitated by drying the soil leading to some cracking on ground, feeding oxygen to roots and discharging poisonous gas to keep roots in healthy condition.

(D) Intermediate Drying

The need for water becomes small in 35 ~ 40 days after transplanting from non-bearing tillering stage to ear primordial stage. Since rice requires more oxygen during this period, paddy fields should be drained for about ten days sufficiently for crack formation and healthy growth. However, excessive drying should be avoided. Drying is especially effective in the case of ill-drained paddy fields.

Intermediate drying has the following effects.

(1) Effective tillers can be strengthened by inhibiting non-bearing tillering.

(2) The growth of roots can be promoted by supplying oxygen to soil.

(3) Potassium absorption is promoted.

(4) The generation of hydrogen sulfide can be decreased.

(5) Soil concretion is promoted and prevents lodging.

(E) Ear Primordial Stage and Flowering Stage

The need for water is extremely large and the oxygen consumption by roots becomes the highest for twenty days preceding heading. A cycle of 3 ~ 5 day long submerging and 2 ~ 3 day long draining should be repeated. There is no need for irrigation during a rainy season.

(F) Ripening Stage

Extreme water deficiency stops the growth of endosperm and increases thin grains. Therefore, drying leading to cracking on fields should be avoided for the fifteen days following heading (Dry season). Drain paddy fields after the 15th day. Delayed draining can result in lodging and browning of straw can decrease weight.

u. Harvesting and Unhusking

Harvesting time effects not only on yield, but also on rice quality. The amount of greenish rice grains and waste rice are large in early-harvested palay. The amount of brown rice and cracked rice are large in late-harvested palay.

Palay is ready for harvesting when 80% of all the panicles, excluding late heads, have become yellow and head necks have some trace of green. Rice matures in 30 ~ 35 days after heading.

In the case of palagad crop, harvested palay should be dried in a few days. In

the case of regular crop, it should be threshed by manlabor or by Philippine thresher without being dried. After being threshed, it should be dried to at least 13% water content.

v. Plant Protection

The following insects, pests and diseases are found near the pilot farm. Their damages and applicable chemicals are summarized below.

Insect, pest, disease	Damage	Chemical
Green leaf hopper	It breeds mostly during nursery period and transplanting period, but breeds all the time. Imago and larva absorb the juice of rice plant. It carries virus diseases.	Wettable E. P. N. Folidol, Sumithion, Diazinon
Brown plant hopper	It breeds mostly in paddy fields. Imago and larva damage rice plant all the time. Heavy breeding causes lodging.	Sumithion, E. P. N. powder, wettable E. P. N.
Stem borer	Five types exist. They breed in nurseries and paddy fields all the time. Imago is frequently found on leaves.	Sumithion, Diazinon Diazinon powder and graines, wettable Parathion, endrin
Case worm	Larva cuts young leaves into 1 ~ 2 cm long pieces during tillering period and leaves become white.	E. P. N. B. H. C. and Sumithion powder wettable E. P. N.
Rice whole maggot	It breeds heavily during transplanting period ~ tillering period. It is a 2 or 3 mm long, fly and eats young leaves.	B. H. C. 6% gamma, Sumithion powder, wettable E. P. N.

Insect, pest, disease	Damage	Chemical
Leaf roller	Larva rolls the tip of a leaf and lives in it. It eats leaves. Such a part of a leave becomes white and withers. It breeds all the time, but especially during poor weather. Soft leaves are easily damaged.	Wettable E, P, N, Parathion
Rice bag	It breeds during heading stage ~ ripening stage. Both imago and larva suck the juice of young panicles.	Wettable E, P, N, Parathion
Cercospora leaf spot	It breeds in poorly fertilized and sterile paddy fields during heading period. It leaves short brown lines. It is frequently discovered in Pilot-farm.	Heavy phosphate and potassium fertilization, soil improvement, seed sterilization
Rice sheath blight	It breeds during ear primordial stage. It leaves cloud-like and oval marks on sheath. It turns the inside into gray.	Farm drying, organic arsenic, Pochioxine
Bacterial leaf blight	It breeds heavily at the middle of tillering stage. The tip of leaves become light yellow or white and withers.	Sunkel Celomate Seed sterilization, nursery improvement
Blast	It breeds in near-by farms during the growth of rice. Its breeding is promoted by excessive nitrogen and lack of sunshine. At some farms, it breeds in nurseries, but rice recovers in paddy fields.	Bla-S, kitazin, seed sterilization, resistance varieties, no use of fresh straw

Insect, pest, disease	Damage	Chemical
Rat	It gives heavy damage by eating stem.	Zinc phosphate, wrapping with Vinyl, Fratol
Sparrow	It eats palay during harvesting.	Group cultivation, vinyl tape, watch man
Zn deficiency	It occurs in ill-drained concave land. Small yellowish brown marks appear on lower leaves. The middle of a leaf's sheath becomes yellow. Leaves are short.	Spray 100 kg of zinc chloride per ha. Dissolve 1 kg of zinc chloride in 81 of water, immerse seedling for about five minutes before transplanting. In this case, 10 kg of zinc chloride is sufficient per ha.
AKAGARE disease	Small reddish brown marks appear on lower leaves and spread to upper leaves. Roots become black, weak and thin.	Drain, plow and dry surface soil. Top dressing with potassium, draining work

Note : Chemical spraying is prohibited during flowering peroid. (8 A. M. ~ 2 P. M.)

Powder: 30 kg ~ 40 kg per ha
Grain : 20 kg ~ 30 kg per ha
Wettable chemical : $\frac{1}{1000}$ solution, 1000l per ha (standard)

1 g = 1 cc, 1, 000 g = 1 kg

1000 cc = 1l

Records of Training and Field Instruction

Year	Date of training: Date	Date of training: Period	Training of cultivation techniques etc.: Farmer	Training of cultivation techniques etc.: Technician	Field instruction to farmer	Range of participant
1974	July 2ª ~ Aug. 10	13 days	40persons	persons		Farmers in pilot farm
	Sept. 16 ~ Sept. 20	5	25			All municipalities in Oriental Mindoro
	Sept. 25 ~ Oct. 1er	6	4 H Club 22	5		"
	Dec. 4 ~ Dec. 8	5	30	3		"
	Dec. 25 ~ Dec. 29	5	30			"
1975	Feb. 10 ~ Feb. 14	5	29	2		Batangas Province Queson Province Oriental Mindoro Province Occidental Mindoro Province
	Apr. 14 ~ Apr. 25	12	13	2	Jan. 20, 21 Instruction by visits to trainee farmers 3 persons	Sons and daughters of farmers near the Pilot-Farm
	Mar. 12 ~ Mar. 16	5	14	1	March 7, 21 Instruction by visits to trainee farmers 3 persons	Queson Province Batangas Province Rombron Province Oriental Mindoro Province
	Apr. 7 ~ Mar. 23	Every Friday (4 hours)	20			Farmers of Naujan in Oriental Mindoro
	Apr. 7 ~ Apr. 11	5		26		Oriental Mindoro
	June 16 ~ June 1ª	4		52		"
	June 23 ~ June 27	5		20		"
	Sept. 8 ~ Sept. 12	5	18		10th Lecture for Farmer's Association (Victoria) 100 attendants	Farmers in Pilot Farm
	Sept. 22 ~ Sept. 26	5	15		November Lecture for Farmer's Association Twice. (Naujan) 300 attendants	Farmers in Pilot Farm
	October ~ November	4 sessions (2 hours per session)	30			
1976	2. 27	3 hours	30		March Lecture for Farmer's Association 90 attendants	Farmers in Pilot Farm
Total	...		315persons	111persons	496persons	

Note Farmer : Leaders of farmers who have 2 - 10 ha (Mayer, Boardmember, Barrio Captain)
Technician : Leaders of Masagana 99 Movement
Field instruction to farmers: Visit to farms of trainee farmers, or attend to Farmer's Association's training as lecturer.

Training of Rice Cultivation (Some of the details are sometimes changed)

Item / Day	8 A. M.～Noon	1 P. M.～5 P. M.	7 P. M.～9 P. M.	Instructor
1st day	Opening ceremony, Development program of the province, Purpose of farmer education	Governmental loan and its system, Necessity of Masagana 99 Movement	Film on rice cultivation	Director Navarro of Training Center, Extention specialist: Mr Castello of Training Center, Engineer Corpuz of Training Center, Agronomist Solis of Training Center, Director of Development Bank; Calapan Branch.
2nd day	General rice cultivation techniques Growing process of rice Fertilization during growth Agriculture in Japan	Introduction of agricultural machineries, Preparation of field	On land reform in Republic of the Philippines	Specialist Goto of the Training Center, Specialist Miyaishi of the Training Center, Specialist Hirosaki of the Training Center, Engineer Corpuz of the Training Center, Chief Baral of Department of Land Reform
3rd day	How to raise the healthy seedling Techniques for nurseries Selection of varieties Selection of seeds Plant protection	Economy of rice production Preparation of paddy fields	On cooperative association by farmers	Extension specialists; Castillo of the Training Center, Extension Worker Martiness of the Training Center, Agronomist Solis of the Training Center, Engineer Corpuz of the Training Center, Specialist Hirosaki of the Training Center, Chief Cayanan of DLGCD.
4th day	Techniques of transplantation Weeding, water management, fertilization	Insects and pests of rice Rat	Film on Japan	Extension specialist; Mr Castillo of the Training Center, Agronomist Solis of the Training Center, Engineer Corpuz of the Training Center, Engineer Valdez of the Training Center, Planter; Dasil
5th day	Lecture and demonstration on compost Preparation of palay	Drying of palay, Storage, Solis	Closing ceremony Party	Technician; Balanco of N. G. A, Extension specialist; Castillo of the Training Center, Agronomist Solis of the Training Center, Specialist Hirosaki of the Training Center, Guests: Mayor of Naujan, Director of Oriental Mindoro provincial agriculturist, congressmen etc.

Training of Farmers and Technicians

A. Training Method

Although theory is important for agriculture, practice has the utmost importance. For this reason, efforts were made to introduce Japanese rice cultivation techniques not as special techniques, but as a part of Philippine rice cultivation to ensure general acceptance by ordinary farmers.

Demonstration is important for farmers. Fortunately, the demonstration of economical rice cultivation in the pilot farm proved to be powerful persuasive force. The travelling allowance and lodging expenses for trainees were paid by the training center.

B. The lecture on the Japanese agriculture and rice cultivation is briefly summarized below.

The development of the Japanese agriculture, whose rice yield per hectare is generally four times as large as that of the Philippines, is accounted not only by good varieties and weather conditions, but also by land reform, proper fertilization (use of compost), active adoption of new varieties, farmers' diligence, close relations among farmers, technicians and laboratories, plant protection, complete irrigation and drainage systems, agricultural warehouses (associations), farm roads etc. The rice yield was increased by 50% from the pre-war level.

The number of Japanese farm households is decreasing. However, farmers are working on ways to increase income. Although each farm household cultivates smaller land in Japan than in the Philippines, they adopt malti-system management : rice plant cultivation, upland field cultivation, fruit, stock-raising and vegetable.

Most farm households in the Philippines work on paddy fields and fruit like coconut or banana alone. Since member of families are large and they have wide wasteland and grass land that are available, they are advised to increase their income and improve their welfare by stock-raising, vegetable production, and household industry.

Agricultural cooperative associations will be necessary for this purpose. Individuals are expected to insist on their opinion and develop by competition with esteem on others in a democratic society. Since farmers are weak in competitions with marchant they should form organizations for insisting reasonable price of agriculture production for development of new markets and for the purpose of credit system.

Farmers should protect themselves and do not allow excessive profits for intermediate merchants. The spirit of independence is especially important for the future agricultural development in the Philippine.

In Japan, governmental grants for agricultural development are not applicable to individuals. The same will apply in the Philippines. The current farmer's associations should be strengthened and expanded in this respect also. The Phippines seems to need such an organization that is more advanced than Masagana 99 Movement.

Saving the money and educate the children which is important for agricultural reproduction in the future. The compulsory education in Japan is 9 years; 6 years of primary school, 3 years of junior high school. The rate of attendance is 99%. It is said that the large efforts in education account for the rapid post-war development of Japan. They say that the attendance rate is 80% at the beginning and 50% at the end of primary school education in the Philippines. Education shows the level of a country's prosperity. All the efforts are made to educate children. All the big buildings in the countryside of the Philippines are either schools or churches. We admire they are religious also. The rapid post-war development of the Japanese economy was driven by high level of education as well as highly productive agricultural management. In other words, farmers, who accounted for 60% of the population immediately after the war, are endeavor to save the money. As a result, most of the agricultural income become the prime force of the industrial development in Japan. It is good to enjoy gambling, drinking, signing and dancing, however it will also be good to save the money for the life in future.

Farmers and fishermen seem to account for 70% of the population. However, they will decrease to 50% in the near future because of the economic development. This will require the adoption of labor-saving techniques and land consolidation like in the pilot farm. Your interest in such projects will be highly important. Farmers in Japan, U. S. A. and E. E. C. countries are making efforts to develop labor-saving techniques and expansion of size of management area.

Per capital income announced by the World Bank.

	1972	1973
U. S. A.	4, 133 dollars	6, 200 dollars
Japan	1, 991 "	3, 010 "
Philippine	266 "	380 "
India	88 "	120 "

The future of the Philippine economy will be extremely bright since the illiteracy rate is only 20%. The educational standards in the Philippines are higher than that of other south east Asian countries and people are delightful, diligent and skillful. According to Professor and Dr. Garvrais, former U. S. Ambassador to India, said "Cultured population is rarely poor." The development of the Philippines depends on farmers engaged in the primary industry.

Instructions on Rice Cultivation

The following three factors are important for increasing rice production in this region.

(1) Selection of good seeds
Preparation of good seeds

(2) Improvement of agricultural circumstances :
Deep plowing, soil drying, levelling of field, irrigation and drainage, farm road.

(3) Scientific rice cultivation techniques

a. Nursery: healthy seedling, location, size of seed bed, seeding density, use of phosphate and potassium fertilizer in addition to nitrogen

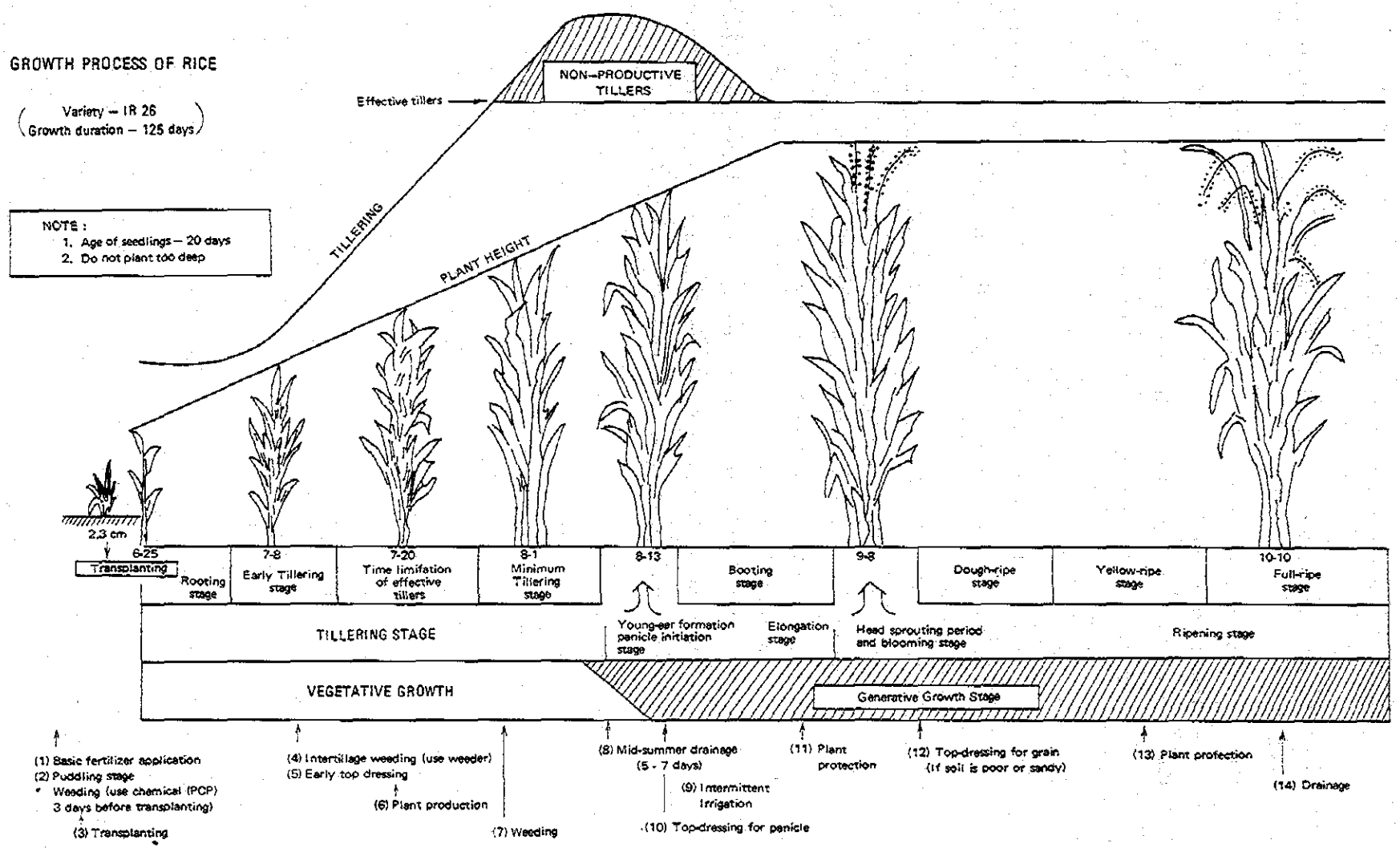
b. Transplanting: shallow planting, 4～5 pieces of seedling per stub, no overhead flooding before transplantation (irrigatable land) plowing one month before transplanting . . . for Methane gas, soil drying, tilling, prevention of soil reduction.

c. Management, weeding:
Fertilizer; Apply nitrogen at various stages. Water management; intermediate drying, intermittent irrigation. They were explained in the preceding pages. See the attached papers.

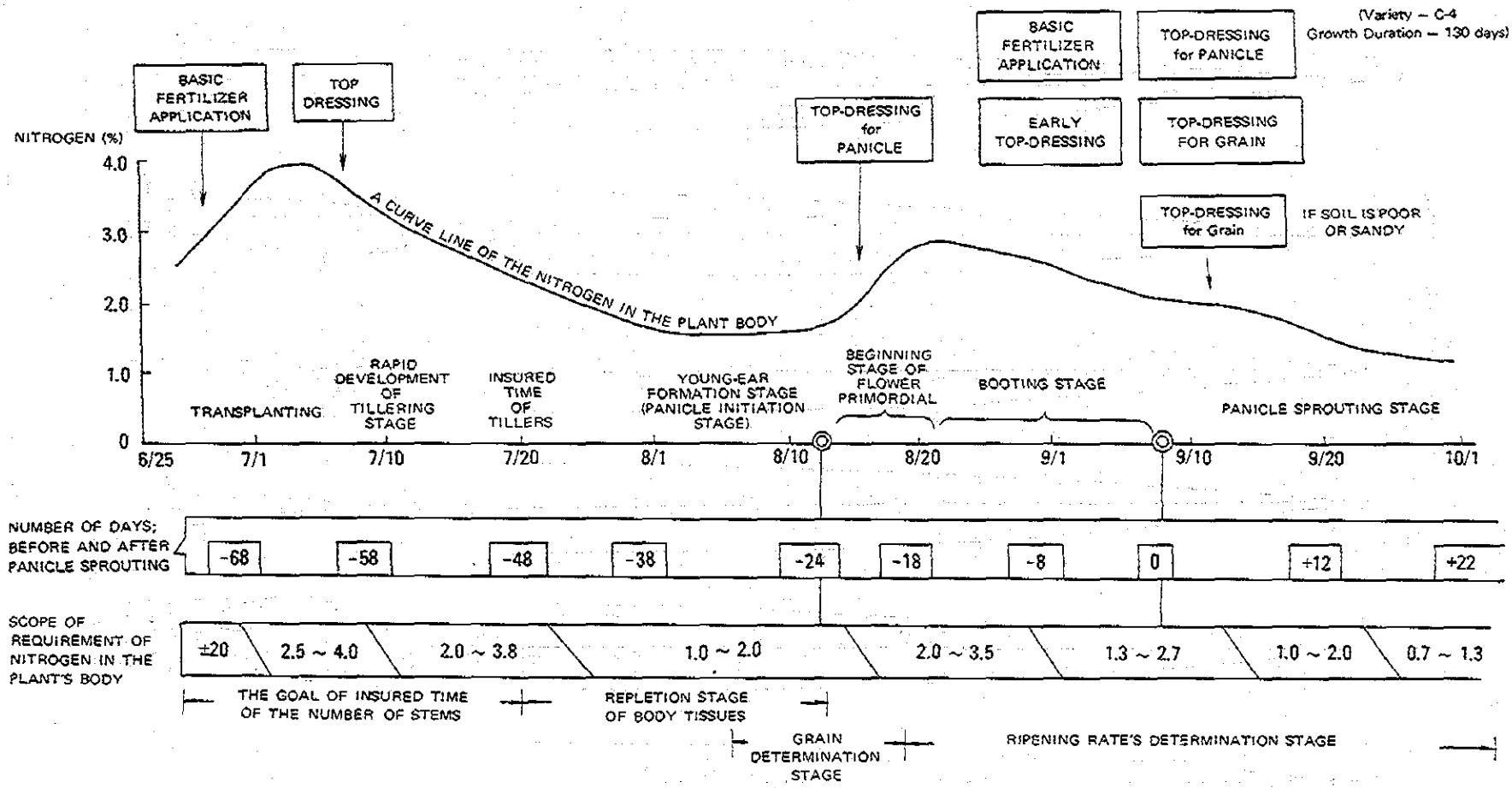
GROWTH PROCESS OF RICE

(Variety – IR 26
Growth duration – 125 days)

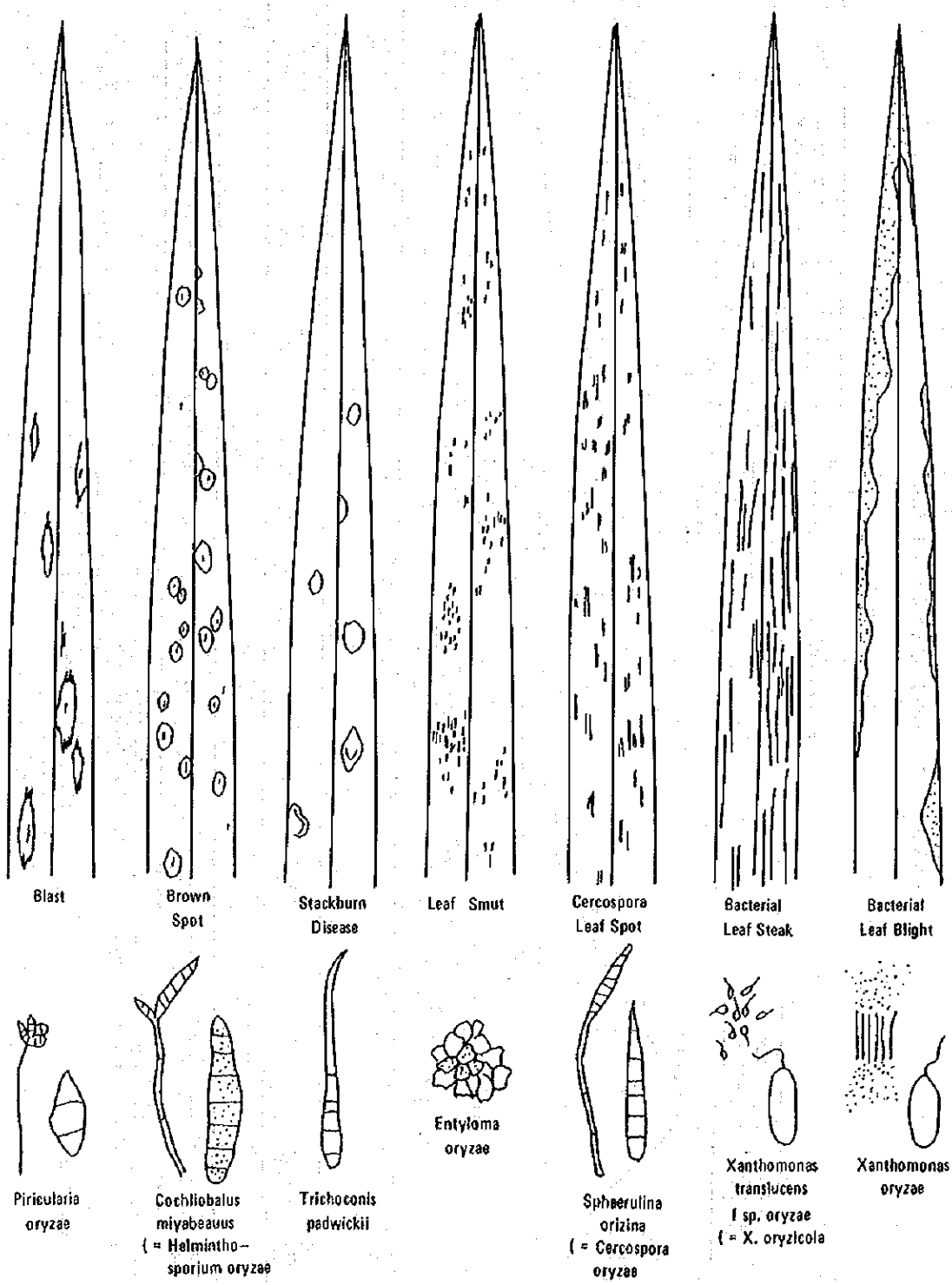
NOTE :
1. Age of seedlings – 20 days
2. Do not plant too deep



MANURING POINT AND PHYSIOLOGY OF RICE PLANT



Common Leaf Spot Diseases of Rice



Republic of the Philippines
National Food and Agriculture Council
REGIONAL DEMONSTRATION AND TRAINING CENTER
(RP-Japan Pilot Farm Project)
Barcenaga, Naujan, Oriental Mindoro

LECTURE

by

Mr. Yutaka Hirosaki
(Japanese Agronomist)

During my stay in the Philippines for almost six (6) months, I have observed that this country has a big agricultural area and abundant water supply but inspite of this, it has a production of only one to three tons per hectare. This shows that the farmers here are not utilizing these resources well. Japan, as compared to the Philippines, has almost the same area of agricultural land but it has a production of five to six tons per hectare which is much higher than the Philippines. Because of the fact that agricultural land in Japan is small, our government reclaimed areas for this purpose. Farmers are practicing the scientific methods of farming and they consider the following factors for high production:

1. Land reform
2. Application of organic matter like compost which is applied 4 to 5 tons per hectare.
3. Harmonious relationship between extension workers and farmers
4. Good method of pest control
5. Proper use of irrigation water
6. Land consolidation
   a) construction of farm roads for easier transportation
   b) efficient mechanization
   c) cheap management in land preparation and other field operation
   d) easier field management
   e) time saving
   f) accessible to roads, irrigation and drainage
   g) less man-labor for efficient use of machineries
7. Well organized farmers association

Due to these factors, the production by farmers increased and their living condition totally improved.

Japan has four (4) seasons, namely: winter, summer, spring, and autumn while in the

Philippines, only dry and wet season. With this kind of climate, the Philippines can produce more rice than Japan if farmers will only practice the scientific method of farming.

How to Improve Rice Cultivation

It is my pleasure to relate my experiences as an agricultural expert of Japan. Being in this field for twenty (20) years and a Japanese Consultant here for six(6) months, I would like to suggest some of the improved farming techniques based on the experiences and knowledge that I obtained from this country like the following:

Adopted Scientific Method -

1. Seedbed preparation

   Generally, the management of seedbed is neglected in the Philippines. By making a good seedbed we can prevent weeds, diseases, and pest.

2. Selection of seedbed area

   The land to be used in making the seedbed should have a good condition for quick germination of seeds.

3. Size and method of preparing the seedbed

   The size of the plot should be four (4) feet in width and a convenient length depending on the availability of land. In my opinion, wet seedbed is quite suitable in this country than the dry seedbed. An area of 400 sq. m. is required for 45 kgms. of seeds that is enough to be planted in one (1) hectare of land.

4. Seed requirement

   For one (1) hectare of land, the seed requirement is one cavan.

5. Age of seedlings

   Ordinarily, twenty five (25) to thirty (30) days old seedlings are quite suitable for transplanting.

Selection of Good Seeds -

1. Improved variety
2. Free from mixture
3. Grain should be bold and shiny
4. It should be free from seed borne and diseases
5. Should be free from stable stalk and dust
6. It should not be infected by insect pest
7. Should not less than 80% seed germination

Varieties like C-12, IR-26, and C-4 are highly recommended for rice cultivation after so many trials by this Pilot Farm.

Some reasons for having low yield in the Philippines are:

1. Shallow plowing -

   Ordinarily, we plow our field with an average of 2 to 3 inches deep,

whereas, the rice plant requires 4 to 5 inches deepness. Rice plant requires complete dispersion of soil particles.

2. Leveling

This is an important factor in producing good yield. It is difficult to level the land especially if the size is big, but if we divide it into plots then it will be easier for us to level. Proper planning should be observed so as not to waste time.

3. Use of organic matters -

Fertility of the soil can be maintained permanently by using organic matter. Constant use of commercial fertilizer makes the soil acidic because of the chemical reactions. Applying organic fertilizer is the best method of maintaining the porousity of the soil. It is the best factor in producing high yield and a good farm, so I suggest that rice stalk and other green leaves should not be burn, it should be made into compost.

4. Proper use of water -

Fertility of the soil cannot be maintained permanently by just using chemical fertilizer. Use of artificial fertilizer with the addition of organic manure, the texture of the soil is improved and beneficial microbial population is increased. In my observation, some areas in the Philippines are acidic and some contains much alkaline. Ammonium nitrate and phosphate is less and humus is also less. With this kind of soil, the application of organic matter is very essential.

Other Important Items to Remember -

Location of Seedbed -

Its location should be away from heaped paddy straw to avoid contamination from pathogen contained in the overflowed water through the paddy straw.

Land Preparation -

It should be remembered that due to very heavy puddling, the soil become compact and thereby penetration of oxygen in the soil is ckecked to a greater extent. This condition is harmful for plants' growth.

Transplanting -

Shallow transplanting is essential to have proper aeration in the root zone so that the root may develop properly and give comparatively more tillers.

Inter-Culture and Weeding -

It is most essential to weeding and inter-culture operation by hand or weeder to control the weeds and stimulates the growth of plants to supply sun rays and oxygen to the plants. Inter-culture also helps in escaping hydrogen sulphide gas from the soil and thereby it prevents root injury by the gas. It

is also effective in checking nitrogen loss by volatilization. Care should be taken not to stir the soil after the formation of young buds, one inch of water at the time of weeding will be adequate.

Additional Fertilizer -

As you know, it is the tillering and panicle forming period when the nitrogen shortage occurs greatly during the plant growth. It is the time when the growth of tillers runs short and the number of grain per panicle decreases when enough nitrogen is not available in the soil. So, in case the growth of the plant is not good and the color of the leaf seems to be yellowish, it is necessary to apply the additional dose of nitrogenous fertilizer preferably in the form of ammonium sulfate at the rate of 10 to 20 kg. per hectare. The effect of nitrogenous fertilizer is quite recognized after three (3) days of application and the remain is visible for two (2) weeks. For good maturity of grains, ammonium sulfate at the rate of 20 kgs. per hectare should be applied at milking stage.

Water Use and Management -

Control of water or draining the field after the effective tillering stage (45 days after transplanting) is very necessary so as to avoid the growth of uneffective tillers.

Water Management During the Uneffective Tillering Stage -

After the effective tillering period is finished and when the ineffective and invalid tillering period start to the initial stage of young panicle forming period, water is not so much required for the growth of rice plants, as the plants are then in need of oxygen, the field should be drained to dry the soil surface a little. This promotes the growth of the plants. This drying period should be prolonged up to the stage when a bit of cracking develops in the fields. By this little bit of cracking, the following advantages are claimed:

1. effective stalks are reinforced by controlling the invalid tiller process
2. oxygen is introduced into the soil to promote roots development
3. soil is somewhat hardened and thereby lodging is prevented
4. availability of potash is increased
5. hydrogen sulphide gas is escaped into the air

Steps in Making Compost

1. Materials -

Compostable garbage and other organic materials are needed.

(Ex. : rice straw, grasses, animal manure like chickens, horses, carabaos, etc.)

2. Preparation -

Select a site near the source of water and a well drained place if possible.

3. Procedure -

Once the compost site is selected, put down the composting materials into layers. Composting materials like straw should be soaked in water so as to have abundant supply of water while placing it in the said site. Press the layer of rice straw, green grasses, animal manure and add small quantity of chemical fertilizer like ammonium sulfate or urea. Repeat the same procedure until reach the height of two meters, then cover it with banana leaves or plastic vinyl. The reason for covering it is as follows:

a. to avoid escape of nitrogen and phosphorous

b. to minimize water evaporation or dryness

NOTE: After three (3) weeks, turn over the compost file. The materials on the side and on the top should be placed at the middle of the file. The compost is ready for harvest when the materials are thoroughly decomposed. This is for about two (2) months, when it is ready to be used in the rice field. If the compost will not be used at once, transfer it in a shaded area so that the nutrients will not be lost when it rains.

One ton of compost contains 0.5% of nitrogen, 0.25% of phosphorous, and 0.5% of potassium.

This is equivalent to 25 kgms. of ammonium sulfate, 16 kgms. of P_2O_5, and 10 kgms. of K_2O. Based on the current price of fertilizer, a ton of compost will give us a total value of about one hundred pesos.

Compost

Either an artificial intensive method or an anaerobic method can be used for making compost. The artificial intensive method is better in the Philippines.
The method is described below.

(1) Preparation of cover

Fertilizer component (potassium) is dissolved by rain in water, while nitrogen will become free by drying. Therefore, some cover must be used. Have banana leaves or empty fertilizer bags ready.

(2) Ground preparation

Make the compost on about 20 cm high mounds or on tablelands. In the case of mounds, make a ditch in every one (1) meter.

(3) Loading

In the case of grass, dry it for 4 ~ 5 hours, when it is fresh grass. Spray water 10% of it when dry grass. In the case of rice straw, spray with water as much as amount of straw. Water will come out through fingers when straw is tightly grasped.

(4) Stamping

Stamp down to the height of 2 m, near the edges strongly and at the center lightly When it becomes 50 cm high, pour water on materials and mix nitrogen sources, about 10 kg of ammonium sulphate per one (1) ton of raw materials or 80 kg of cattle dung, or 40 kg of cocks' droppings or 100 kg of fermented night soil. Stamp a few times and form a mountain shape. The amount of nitrogen sources should be small near the top and the bottom.

(5) Turning

Perform a turning operation after twenty (20) days when the temperature rises to 40°C. Pour water 20% ~ 30% of raw materials. When 45 ~ 50 days had passed it will become Medium-ripe compost and its good enough to apply for paddy fields.

The use of compost, instead of raw straw, is recommended for preventing methane gas generation.

If the weight of compost is assumed to be 1.5 times as large as that of raw materials after 50 days of accumulation, 7 ~ 8 tons will be sufficient per ha and no need to use of chemical fertilizer so much as usual. The test of compost application at the training center showed more 30% increase of yield than no-fertilizer plot.

One (1) ton of compost contains 5 kg of N, 2.5 kg of P_2O_5 and 5 kg of K_2O. It is equivalent to 25 kg of ammonium sulfate, 16 kg of super phosphate and 10 kg of potassium chloride. One ton of compost is equivalent to 100 ~ 150 pesos (1 peso = 40 yen).

Since the member of farm household is big in the Philippines, they are advised to make compost with straw and grass by using their labour force. Since grass is

better than straw to make the compost. I will recommend them to mow the grasses in order to make the compost when they get up early in the morning.

Visits to villages and attend to training class

We made 2 ~ 3 hour visits to trainee farmers in adjacent town and villages in January, March and May, 1975, with Bureau of Agriculture Extension (B. A. E.) Technicians and Philippine counterparts. The purposes were to see the rice cultivation having done by trainee farmers, to study the effects of training, learning by doing and to be effective for farmer training. We made discussions on water management, use of nitrogen, healthy seedling and compost preparation. We also talked about environmental improvements of Agricultural circumstance by comparing rice cultivation in Japan with that in the Philippines.

Especially, we insisted on the need for top dressing in reductive division stage and provided fertilizers for no charge. They proved to be effective and we obtained the proof of 20% increase in the yield.

We made a talk on my experience with the title of "How to Harvest 100 cavans" at the invitation by Mindoro Agricultural School Oct., 1975, Naujan Federation of Farmer's Association in San Paguita March, 1976.

The farmers who attend the training talk about the efficiency of training. We keenly felt that farmer's training has contributed not only to technological improvements, but also to the friendship between Japan and the Philippines.

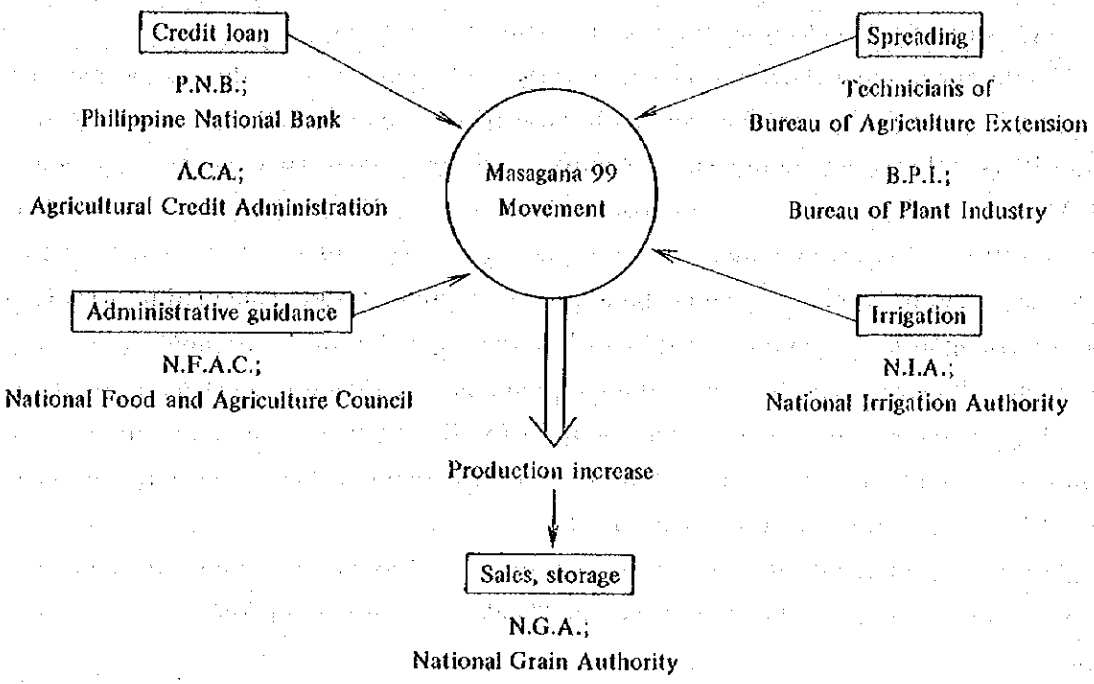
Reference

On "Masagana 99 Movement" in the Philippines

President Marcos has advocated the land reform, including the emancipation of tenant farmers, after the proclamation of the martial law to build a modern living of nation. He has enthusiastically promoted Masagana 99 Movement to solve the problem of food shortage.

Loans are given to irrigatable districts. Rice production is increased by distributing new varieties and teaching the techniques how to manage the farm. Crops are sold by the Government price. The community called "SELDA" are organized by farmers who participate in this movement. Each selda consists of 5 ~ 10 neighbors, friends and relatives. They adopt cultivate improved varieties and study a method of fertilization or chemical spraying plan with agricultural technicians. When they are given an approval, they obtain a loan of 1,300 pesos with interest rate 8% in a year per ha from a bank designated by the government as joint liability of a selda. With this fund, they work to increase rice production under technician's guidance.

This movement was started to improve the welfare of farmers with advance techniques, with funds of low interest instead of that of ordinary 15%. Considerable good results seem to have been obtained.



Philippine Staff of Rice Cultivation as of April, 1976

Counterpart (Rice cultivation, training)	Mr. Quirino M. Solis (39 years old) Graduate of Central Luzon Agricultural College, receiving training of Uchihara Training Center in Japan
Assistant (Recording, testing)	Miss. Elpidia Martinez (26 years old) Graduated Central Luzon Agricultural College
Assistant (Machine operation)	Mr. Crispin Bacay (27 years old) Finished a part of high school course, workingat the Center for 3 years
Assitant (Irrigation, draining)	Mr. Menardo Morales (29 years old) Finished a part of high school course, working at the Center for 3 years
Farm workers	14 workers

Postscript

I worked on the field in the Training Center for four cropping seasons during the past two years while studying the customary methods in the Philippines. As a result, the modern method of rice plant cultivation in Japan which I demonstrated in the pilot farm proved to be more adequate to this country than the conventional method in this district of the Philippines. I confirmed that yield exceeding 99 cavans of the Philippine government target can be obtained if farmers make the best efforts in fertilization and in water management.

It is our greatest pleasure that the Philippine authorities have highly evaluated our services. An action has been taken to extend the Training Center under a new organization. We have obtained deep understanding and frendship at the field.

Satisfactory rice cultivation requires improved and good varieties, good plowing techniques, agricultural machines and tools as well as good agricultural environment. There still remains many numerous problems in our pilot farm such as including special AKAGARE disease, methane gas, improvement of soil qualities, drainage work and so on. It will be difficult to solve all these problems at once. The immediate task will be to get the average yield of 80 cavans per hectare in one cropping season concerning directly with the better living of the farmers. "All business are depend upon the persons who are engaged in." It is my hope that technological cooperation should be continued for the sake of friendship between Japan and the Philippines, for the welfare of farmers and for improvement of rice cultivation. It is also my hope that training for technicians and specialists concerned to agriculture should be continued.

I am deeply grateful that I was able to remain healthy in the hot country and work every day for two years. Thanks to God and Thanks to Philippino people.

CURRENT ACTIVITIES OF RICE CULTIVATION BY FARMERS IN PILOT FARM AND SURVEY ON COST AND PROFIT IN RICE PRODUCTION IN PILOT FARM AREA

The present survey was conducted to obtain materials for studying annual changes of rice cultivation by farm households, and desirable directions for future rice cultivation techniques or an ideal form of rice cultivation management.

Only 15 ~ 20 ha out of the 100 ha land area had been used for rice cultivation before the development of this project. The remaining part of 100 ha area consisted of grassy swamps, sandy places and shrubbery land. Most of them could be described as uncultivated. Our primary concern was the rice cultivation techniques to be used by farmers on such newly opened irrigated field and the changes in yield as an index for indicating the effects of our instruction.

Our next concern is to make the ideal form of rice cultivation management. It is hard to make a general conclusion on this subject since profits depend on farmers conditions, that is to say, whether he is a land owner, owner operator, tenant farmer, or on their management scale including other crops and also on size of family as well as full-timer or part-timer. However, this survey was intended to find some management target for rice cultivation alone excepted other conditions of farmers as mentioned above.

The survey was limited to the farm households in the pilot farm Planting area had been gradually expanded as field reclamation was completed plot by plot. The survey had been covered seven crops in those fields which were opened during the initial period beginning with the regular crop in the latter half of 1972. However, the focus of those survey was directed to the two cropping seasons, namely, the regular crop during the latter half of 1974 when the reclamation of the entire pilot farm was completed and the palagad crop during the first half of 1975.

The regular crop during the latter half of 1975 was seriously affected by foot and mouth disease of carabos which broke out in May of the same year. Since more than one half of the farm was left unplanted, the item of the survey was limited to the yield alone.

The methods of survey were consisted of the field observation by each plot, interview with each farmer and estimation made by the Philippino staff or the Japanese specialists when the farmers could not give the answer.

The number of land owners was 23 at the begining. Some changes took place later since some were inherited by sons and daughters. However, it may be considered as 23, although considerable changes among farmers took place seasonally with regard to land owner, owner operator and tenant. Each plot was used as the survey unit to facilitate annual comparison and investigation. Strict annual comparison is difficult since one farmer does not necessarily cultivate the same plot in every cropping season. However, this factor was ignored as insignificant for grasping general tendency.

The planted area of the plots was handled as a survey unit and it was ranged from 0. 1 ha to 2. 5 ha during the following reason. When one farmer manages two adjacent plots they were counted as one for the sake of convenience. When one plot is managed by two farmers. it was counted as two. Therefore, the total number of plots exceeded 80. The number of farm households was about 40. Therefore, the average cultivation area per farm household was 2. 5 ha.

Cost or profit calculation has been done not by each farmer but by each plot. Taxes and other trifle expenses are not included in this profit calculation because of the farm households in this region, excluding households with large management scale, do not pay the taxes.

In principle, the local units were used in this survey. Some difficulty may arise in this respect for comparison with the data of foreign countries. For example, the Philippine currency "peso" (1 peso = about 40 yen) and a volume unit "cavan" (One cavan of palay is equivalent to about 44 $\sim$ 45 kg.)

The survey data on each crop in each plot are available. Since the discussion of these data will require an enormous amount of space, data were shown either by the block unit or by the total 100 ha unit. The land under study was divided into seven blocks, namely, A_1, A_2, B, ... F. These units will be used on the following discussion. However, the data of each farm are given if necessary and discussed in farm or plot unit.

The blocks were named as A_1---F approximately in the order of opening of the field. The size of each block is ranged from 13 hectares to 20 hectares. The characteristics of each block are summarized as below.

Block A_1 Rather ill-drained paddy fields comprising the 3 ha farm under direct administration management. This block was the first to be opened.

Block A_2 This block was the last to be opened. It comprises sandy soil.

Block B This block was the second to be opened. There is some high underground water containing iron in this block.

Block C This block comprises some fields which had been cultivated before opening. It belongs to dry land and it has the highest fertility in this pilot farm.

Block D It was a shrubbery land before opening the field. Fields are highly ill-drained probably due to the existence of a creek. The water shows large iron content.

Block E It was a dune district before opening the field. The soil contains small gravels and sands. It's fertility is poor.

Block F It had been grassy swamp before opening the field. It consists of typical ill-drained fields because of high ground water level.

Since, generally speaking, the ground level in the northern part of this pilot farm is higher than that of southern part in every block and in every plot, surface soil was moved from the north to the south to make the ground level uniform. Therefore, every plot has deeper surface soil in the southern part than in the northern part, consequently, better growth.

The survey was impeded by the lack of farmers' computing ability. For this reason, the basis of the survey depended considerably on enumerator's estimates.

Some average figures were used for cost and profit calculation. For example, farmers obtain 10 ~ 12 pesos daily as labor wage from rich land owners, but only 6 ~ 7 pesos from poor land owners. Since figures close to the greatest common measure, 8 pesos or 9 pesos were adopted in the calculation, the data shown in the tables differ from the actual state in a strict meaning.

The calculation of production cost may show the result of fictious calculation because there is mutual help of extended family system like the help among parents, brothers, and relatives in the labor of rice culture and also there remains the idea of barter-system in the agricultural economic society of this district. The survey was conducted in spite of these difficulties as an effort to give some criteria.

The explanation is given with tables as follows.

1. Table 1 ~ 6 shows the activities done by the farmers in each block. Five crops were able to compare in block A_1 and B because they were opened in an early stage of reclamation. Three crops only were compared for the whole land ($A_1 \sim F$) since it was not long before the expiration of the agreement between Japan and the Philippines that the reclamation of all the farms was completed.

   The table shows when the farmers sow seeds and harvest. It also gives the period and the number of days required for each operation (shown in parentheses of the tables). In block A_1 and B (about 18 ~ 19 ha), about 200 days are required from seeding to harvesting. The average seeding-harvesting period of the block $A_1 \sim F$ is seven or eight months. It is generally said that four months are required from seeding until harvesting. However, such a wide range as seven or eight month is found in the case of large planted area. Individual operations such as plowing and transplanting, require two or five weeks. The data of each plot seem to be close to this table although some yearly differences are observed. Even plowing alone frequently requires three weeks. Generally speaking, four ~ five days are required for plowing 1 ha of land by one carabao, but this table shows it actually took longer. The period of each operation should have been shortened from the point of economy of saving the water expense by introduction of short period cultivation techniques. However, it was done only partly not fully in the pilot farm.

Let study the state of fertilization. The survey result shows that only 10 ~ 20 kg (per ha) of nitrogen fertilizer is given instead of the general idea of 60 kg per ha. Sterile farms just opened require at least 70 ~ 80 kg of N fertilizer, but this was not realized because of the lack of farmers' fund.

The same tendency is found with regard to plant protection. Agricultural chemicals are used mostly for preventing damages by insects and hardly for diseases. Most farmers were indifferent to rats and birds although they gave serious damages. Some insect damages broke out so often through all the seasons that chemicals should have been sprayed weakly. However, it was difficult for the farmers to practice because of expensive.

Concerning the selection of varieties, at first we recommended high-yielding IR type varieties. However, the IR planted area was only 10 ~ 20 ha because the farmers has already known that it is hard for them to grow. We also recommended variety C type that was developed by the college of agriculture University of the Philippines. It requires rather small amount of fertilizers and has large resistance against insects and diseases. Planted area of C series varieties reached to 50 ~ 60 ha. It is said that C-series variety type has better teste than IR type.

It becomes clear after the experience of 2 ~ 3 crops that local varieties should also have been recommended during the initial period of this pilot farm in consideration of fertilizer or chemicals and soil fertility. Although local varieties have rather small yield, they are more easier to cultivate than breeded variety. This is especially true on sterile soil of newly opened fields even with irrigation facilities. The local varieties themselves should be studied more than ever. The BPI type varieties breeded by the Bureau of Plant Industry of the Department of Agriculture were also available. They were not recommended because of long growth period. They were not planted by any farmer in the pilot-farm.

2. Table 2 - 1 ~ Table 2 - 7 show how the yield of each plot changed year by year. The data of each plot or each block do not necessarily show a uniform increase, however, the average of the whole area shows gradually increased by seasons.

From January to June (Palagad crop) of 1974 was the first time to be planted all over 100 hectares project area. The average yield of palay was 1, 390 kg. The yield of the next crop dropped to 1, 170 kg because of the unusually frequent attacks of typhoons. Subsequently, it gradually rose to 1, 646 kg and 1, 790 kg in the following seasons. The yield of 1, 790 kg itself was the average of 33 ha since the remaining land in this cropping season was left idle because of carabao's disease as mentioned before.

Table 2-7 shows clearly how the yield changed. The actual amount of harvests were changed to that of per hectare and each plot is classified by yield within each block.

Masagana 99 Movement had been begun since 1973 in the Philippines. The target yield of Palay is 99 cavans per ha namely, 4,455 kg. The yield on the pilot farm is still far below from this target. We keenly felt the need for powerful introduction of cultivation techniques.

It should be noted that the planted area does not reach 100 ha or strictly speaking 97.67 ha in every season. This is because of some plots were left idle for some farmer's personal reasons and also because of the plot under the center's administrative management was excluded.

3. Table 3 - 1 ~ Table 3 - 2 shows the unit cost of rice plant culture materials used and that of labors needed, which are required for cost and profit calculation.

Table 3 - 1 is related to various materials, including seeds, fertilizers and agricultural chemicals. Both the government prices and the commercial prices were given separately. The government approved prices were adopted for various calculations in the following tables. Commercial prices were used when no government price exists.

For example, the Government gives coupon tickets to farmers participating in Masagana 99 Movement they can afford fertilizers for less than their commercial price.

The table shows that the costs of seeds, fertilizers and chemicals rose continuously year by year. They were doubled or tripled during the three years between 1973 and 1975. On the other hand, the price of palay rose only by 50%. The table shows clearly that these costs are decreasing farmers' profits.

Table 3 - 2 is related to the cost of human labor, animal power and mechanical power. It gives their base figures. The figures surrounded by thick frames in the table were used for the cost and profit calculation. The cost of human labor and that of animal power increased only by 50% during these three years. This seems to be attributable to population increase, namely, sufficient availability of labor forces. However, the cost of mechanical power was doubled or tripled like the cost of materials because of swelling fuel cost and wages of special machine operators. As for the rental of machines, the criteria prepared at the pilot farm were used as the basis, but general conditions outside the pilot farm were also considered to decide the rental. Rentals have also been rising yearly.

The conclusion that can be drawn from Table 3 - 1 and Table 3 - 2 is that the unit price of the palay has not been rising as quickly as the cost of production materials.

4. Table 4 - 7 shows the necessary expenses in each block. The figures were obtained on the basis of the amount of fertilizers, chemicals and seeds used at each plot and their unit price given in Table 3 - 1.

The figures of the regular crop season from July to December in 1975 alone

are given.

The total cost of fertilizers, chemicals and seeds was 332 pesos per ha. The cost of fertilizers accounted for more than one half (188 pesos), while the cost of chemicals is the smallest. The total cost of those materials ranged from 388 pesos to 196 pesos by block. The cost of fertilizers is the largest in every block. The cost of seeds is unexpectedly large in this table. Actually, some farmers used their own palay as seeds. However, they were assumed as purchased in the calculation since almost all of the farmers usually buy good seeds from others. The palay of regular crop harvested in December is usually of poor quality because of rain.

5. Table 5 - 22 shows the labor forces that were required for the crop of January ~ June, 1975. Since the labor for pulling of seedlings before transplanting and preparation work during harvesting are omitted, some more labors will be actually required, than the labor shown in this table. According to the table, 59.8 men, roughly, 60 men per hectare are required on the average. Harvesting, transplanting and weeding require more than 10 men. All these three operations account for more than one half of the total labors required. Plowing and tilling require less human labors because animal power and mechanical power combined with human labor. Carabao plowing was adopted by most of the farmers in the pilot farm. Mechanical power was rarely used. If it is assumed that animal power was used for plowing of all plots in 100 ha, the following conclusion can be drawn.

The table shows that plowing requires 7.6 man per ha on the average. Since a carabao was used for each man, it may be assumed that plowing required 7.6 carabaos per ha. In other words, one carabao covers 0.13 ha daily. This means that 7.6 days are required for one carabao to finish 1 ha of farm. This statement is the result of a mechanical calculation. Actually, it probably takes longer for a carabao to plow 1 ha of land. Carabao cannot work day after day. They must be given adequate rest. The larger a farm becomes, the less efficient carabao plowing will come.

Frequently, a farm household employs 5 ~ 6 carabaos at the same time and completes plowing 1 ha of a farm within a day. Occasionally, several relatives and friends exchange carabaos cooperatively to improve efficiency. This is called as BAYANIHAN. They also exchange human labors for transplanting and other operations. The period of each operation can be shortened by concentrating labor forces by this method although the total amount of human labors remains unchanged. This will be an important index for the improvement of rice cultivation management.

The ratio of employed labor forces and family labor forces will be shown later.

6. Table 6 - 21 gives the labor expenses required for rice plant cultivation. The labors namely, human labor, animal labor and mechanical power required in each plot were (Table 6 - 1 ~ Table 6 - 21) sum up to obtain the total in each block. Employed labors and domestic labors were put together and multiplied by the unit prices given in

Table 3 - 2.

The total labor cost per ha is 728 pesos. Plowing required 146 pesos, harvesting required 139 pesos, weeding required 100 pesos and transplanting required 100 pesos. These four operations required about 500 pesos, which account for slightly less than 70% of the whole. The total labor cost (728 pesos) is more than twice as large as the cost (332 pesos) of materials, including fertilizers, cheminals and seeds.

7. Table 7 - 6 gives the data on profits in each block. The data were obtained by subtracting the expenses of rice production from the rough income of palay. The profits in each block are given. Some assumptions were made for the calculation and they are described below.

Domestic labor forces were considered paid. All the farm households were assumed to have paid irrigation water expense, though some had not made a payment. Water expense is to be paid after harvesting in the form of palay. The payment is 3 cavans equivalent to 135 pesos per ha for palagad crop and 2 cavans equivalent to 90 pesos for regular crop.

Another assumption was made concerning harvested palay. The distribution of products depends on a farm household's status as owner operator or tenant farmer. Here, it was assumed that cultivating farm households take the total harvest. Generally, an owner operator gives 10 ~ 20% of all the harvest to helpers of harvesting in the form of palay and keeps the rest for himself. In the case of tenant farmers also they give 10 ~ 20% to helpers of harvesting and shares the rest with a land owner at the ratio of 1 (owner) : 2 (tenant). Therefore, owner operator actually obtain 85% or tenant get 60% of the total amount of harvested palay. This was ignored and it was assumed that a cultivating farmer keep 100% of the harvest.

The table shows that the necessary expenses are 1, 195 pesos as average of all the blocks. They consist of the cost of labor forces (61%), the cost of materials, such as fertilizers, chemicals and seeds (28%), and the cost of water (11%). The cost of fertilizer accounts for the largest part (15%) and followed by plowing (12%) and harvesting (12%).

When those expenses are subtracted from sales of palay, the pure profit per ha is 450 pesos on the average. It is equivalent to only 10 cavans of palay. The pure profits which are closer to the reality will be discussed later. Such pure profit means that of obtained from the calculation by subtracting actually paid expenses in cash from actually earned cash through selling the palay by owner-operator or tenant farmers.

8. Table 8 - 6 shows the expenditures close to the reality. In other words, only the actual cash payments made by a farm household are taken up as necessary expenses. Neither domestic labor, nor water cost is included. However, the total of harvested

palay was taken up as income, like Table 7 - 6.

This table also given data of each block. The average profit per ha of all the blocks is 938 pesos, which is twice as large as the profit (450 pesos) of Table 7 - 6. This is of course accounted by the fact that neither domestic labor cost, nor irrigation water cost was included in the expenditures.

9. Table 9 - 1 ~ Table 9 - 5 give the profit of each plot on the palagad crop or previous crop in January ~ June, 1975, and on the regular crop in July ~ December, 1974, in the most realistic form. The figures in these tables are not adequate for comparison in strict sense since all plots are not necessarily cultivated by the same farmers. However, it was assumed that it can be ignored for the grasping of general tendency.

These tables show at first the ratio of distribution of harvested palay among harvesters, landowner, tenant farmer and owner operator. Then rough income was calculated on the basis of palay which a tenant farmer or an owner operator actually obtained. Then, various expenses were subtracted from it to obtain profits. Two types of necessary expenses were used. As Table 7 - 6 and Table 8 - 6 show, family labor expense and irrigation water expense were included in expenses in one case and excluded in another case.

Although the income of a land owner is not calculated, it can be obtained by multiplying their share by the unit price of palay. Ordinarily, a farm household's actual income of palay subtracted by actually paid expense is considered as their profit. These results are compared below.

10. Table 10 - 1 and Table 10 - 2 give financial data on January ~ June crop in 1975 and July ~ December crop in 1974. The data in Table 7, 8 and 9 are summarized and rendered to four types of calculation.

In other words, two types of income were taken up. One of them is a tenant farmer's or an owner operator's share of palay, while the other is the total of harvested palay. Two types of expenditures were also used. One is the actually paid expenses, while the other is the total of the expenses, including family labor and irrigation water fee.

The top row of the tables gives the most realistic figures among the four.

The following conclusion can be drawn from the two crops. Incomes are below expenditures at a considerable number of farmers. Even in those plots with some surplus, the income is often insufficient in consideration of the consumption within a household, and other living expense during the six months preceding the next crop. In other words, only a limited number of highly ranked plots alone has the possibility of reproduction or expanded reproduction. The same tendency is observed even when all the harvested palay are counted as income.

11. Table 11 show the data on the block A_1 and B. Since these two blocks were opened at an early stage of this pilot farm changes over a relatively long period could be

observed.

This table compares the five crops of the block A_1 and B from palagad crop in January ~ June, 1973, to palagad crop in January ~ June, 1975 in terms of necessary labor forces and materials. The necessary expenses or production cost were calculated on the basis of these data.

Two types of necessary expenses were taken up for this table also. In other words, family labors were counted as expense in one case, while cash payments alone were counted as necessary expense in the other case.

The figures of the table given an impression that labor forces increase gradually, but this can be accounted by the following factors. Two figures within and outside parentheses are given as harvesting labor forces. The figures in parentheses indicate the actual number of workers. The figures outside the parentheses are obtained by converting the 10 ~ 20% of total harvested palay that should be given to the harvester as the share into the payment of "peso" in the way of multiplying it by the government unit price then dividing them by the daily wage per worker. If the amount of harvested palay is large, the figure outside the parentheses will be larger than that within the parentheses. If the unit price of palay rises more quickly than the unit price of labor, the labor required by calculation will become larger than labor required actually. The figure within parentheses indicates the labor required for harvesting alone, while the figure outside them includes preparing work after harvesting. In this respect, the latter may be close to the reality. It must be noted that the figure does not immediately give the actual number of workers.

No large difference among the crops is found with regard to fertilizers, chemicals and seeds.

They rise gradually in value due to the rise of their unit prices.

12. Table 12 - 6 is concerned with family labor for actual payments to employed labor and materials.

The data on the January ~ June crop in 1975 in each block are given. It indicates that family labor forces account for 30% of all the expenses on the average, ranging between 13% and 38% in each block.

It will be too hasty to draw conclusions immediately from these survey results, however, some generally observed tendencies are listed below.

(1) A considerably long period is spent for each type of operation in the rice plant cultivation. In order to improve economic efficiency, labor efficiency should be increased by cooperative operations or by the introduction of machines.

(2) Fertilization is still insufficient. If it cannot afford sufficiently, the use of self-made organic fertilizers should be considered or varieties with strong resistance even under poor conditions must be selected. In other words, the conventional method also should be studied again. Especially, when many plots

in this pilot farm which have been grassy swamps, shrubberies or sandy places are sterile. I thought it necessary to improve the agricultural environment step-by-step. It seems more advantageous to construct irrigation and draining facilities gradually in consideration of land characteristics or farmers' economic conditions. A sudden and quick introduction of modern methods must not be introduced in consideration those conditions in this district.

(3) Concerning plant protection, farmers seem to take measures for preventing damages by insects and pests alone. They seem to be indifferent to diseases. It is true that damages by diseases are less serious than those by insects and pests. However, farmers seem to depend too much on the disease resistance of varieties. This may be partly because of the fact that no farm chemical for plant disease is produced in the Philippines. Concerning insects and pests, their life history does not seem to be necessarily clear. Some insects or pests seem to break out all the time because of warm weather. We simply advised weekly spraying of chemicals. However, their expense raises a problem. Considerable damages by birds have also been observed, but no adequate measure has been discovered. Damages by sparrows are especially serious during the seedling period and during ripening period.

(4) A considerable number of years and months will be required for accomplishing the initial targets. Physiological diseases that will be caused by ill drainage and excessive iron content should be conquered at this pilot-farm. Various techniques should be spread among farmers gradually. First of all, leaders must do sufficient research to establish an adequate system of cultivation techniques for local farmers.

(5) The profit survey related to the production of palay was conducted to study the financial conditions of a farm. It revealed that most farm households have difficulty for reproduction. The calculations of the study are limited to 1 ha of rice cultivation in this case. So, it should not be concluded at once that they have financial difficulty. When farmers manage 2 or 3 hectars of rice cultivation and also cultivate coconut and banana or when they breed pig and sheep, especially when they are part time farmers. It is too hasty to conclude that not only reproduction, but also living should be difficult for a farmer managing 1 ha of rice fields. This is because social customs of rural area in the Philippines supplement their needs. It does not mean that no improvement is necessary. It does not seem to be useless to set some production criteria or production targets. An example is discussed below although it is nothing but a trial calculation.

(6) If one farm household is assumed to consist of a husband and a wife and five children, how much palay do they need yearly. Although it depends on their age

and sex, member of family will be assumed to consume 5 cavans (225 kg) of palay each yearly on the average, a family of seven members will require 35 cavans. If it is assumed to be two crops in a year, 17～18 cavans of palay will be consumed within a family after each crop. If food expense is assumed to account for 60% of living expense, about 30 cavans of palay will be required as total living expense in one cropping season. If it is assumed that 1,200 pesos expenses are required for each crop of rice production, 1,200 kg namely 27 cavans of palay will be required (1 kg = 1 peso). This means that 57 cavans are required for living expense and reproduction. About 10～20% of harvested palay must be given to harvesters in this farm. An owner operator obtains the remaining 90～80%, while a tenant farmer obtains 2/3 of the remaining 90～80%, namely, 60% of the total harvest. To obtain the share of 57 cavans, about 63 cavans of harvest is necessary for an owner operator and 95 cavans for a tenant farmer. These statements are based on simple calculations and the reality may be slightly different. In any event, at least a yield of 70～80 cavans will be necessary. The average yield of even the best crop in this pilot farm was 1,790 kg (39.8 cavans). It should be more than doubled in one cropping season.

(7) A yield of 70～80 cavans is not necessarily impossible in view of the technical standard. The amount of fertilizers, especially, nitrogen fertilizer, seems to have large effects on yield even if it also depends on soil fertility, water management and soil conditions. This has been proved by fertilization tests made by the administration in the pilot farm. Of course, the yield of rice depends on various factors, including the selection of varieties, seedling raising method, plant protection, water management and fertilization. However, the amount of fertilizers seems to be one of the most important factors in the pilot farm.

Table 1-6. Comparison of each Cropping Season on Farmer's Activities Done

Block			A_1 and B						A_1, A_2, B, C, D, E, F Total					
Item \ Cropping Season			Jan.–June 1973		July–Dec. 1973		Jan.–June 1974		July–Dec. 1974		Jan.–June 1975		Jan.–June 1974	
Area Planted			19.5		19.5		18.8		18.4		18.3		88.4	
Date of Farmer's Activities Done	Sowing		12. 9– 1. 5 (28)		6.22– 8. 1 (42)		12.26– 2.15 (52)		6.11– 8.28 (79)		12.10– 2. 1 (54)		12. 1– 3. 3 (93)	
	Plowing		12. 2– 2. 5 (66)		6. 2– 7.30 (60)		11.10– 2. 9 (92)		6.12– 8.12 (62)		11.25– 1.25 (63)		11.10– 3.19 (130)	
	Harrowing		1. 3– 2. 8 (37)		7. 3– 7.21 (19)		1. 7– 2.20 (45)		7. 1– 8.26 (57)		12.25– 2.18 (56)		1. 7– 4. 3 (87)	
	Puddling & Levelling		1. 6– 2. 8 (34)		7. 5– 8. 6 (33)		1. 7– 3.20 (73)		7. 1– 9.14 (76)		12.28– 2.19 (54)		1. 7– 4. 6 (90)	
	Transplanting		1. 8– 2. 9 (33)		7.19– 8. 7 (20)		1. 9– 3.23 (74)		7. 3– 9.15 (75)		12. 6– 3.12 (97)		1. 9– 4. 6 (88)	
	Harvesting		4.26– 6.20 (56)		10.29–11.30 (42)		4.23– 7.26 (95)		10.26– 1. 5 (72)		4.10– 6.21 (73)		4. 8– 8. 6 (121)	
	From Sowing to Harvesting		12. 2– 6.20 (201)		6. 2–11.30 (182)		11.10– 7.26 (260)		6.11– 1. 5 (209)		11.25– 6.21 (210)		11.10– 8. 6 (269)	
				per ha		per ha		per ha		per ha		per ha		per ha
Quantity of Fertilizer Applied	21–0–0	(kg)	1565	80.3	1495	76.7	1065	56.6	860	46.7	2600	142.0	1925	21.8
	16–20–0	(kg)			450	23.1	300	16.0	400	21.7	50	2.7	300	3.4
	14–14–14	(kg)	295	15.1	1300	66.7	990	52.7	800	43.5	290	15.8	3840	43.4
	46–0–0	(kg)	290	14.9	600	30.8	960	51.1	990	53.8			3680	41.6
	guano	(kg)									200	10.9		
	Total		2150	110.3	3245	166.4	3315	176.3	3050	165.8	3140	171.6	9745	101.2
Quantity of Chemical Sprayed	Diazinon	(ℓ)	4.775	0.24	8.85	0.45	16.05	0.85	7.75	0.42	3.1	0.17	37.45	0.42
	Folidol	(ℓ)	0.65	0.03	1.0	0.05	1.0	0.05	2.5	0.14	0.1	0.00	4.0	0.05
	Thiodan, Tayudan	(ℓ)	0.60	0.03	1.5	0.08			2.4	0.13	1	0.05	8.0	0.09
	EPN (Powder)	(kg)	56	2.87	30	1.54			84	4.6			461	5.21
	EPN (Liquid)	(ℓ)							0.5	0.03				
	Malathion	(ℓ)	0.60	0.03										
	Mipcin	(ℓ)	0.675	0.03										
	Parapest	(ℓ)	0.75	0.04	2.5	0.13	1.5	0.08					2.5	0.03
	Azodorin	(ℓ)			5.3	0.27					1.1	0.06		
	BHC (Powder)	(kg)			60	3.08			24	1.3				
	Furadan	(ℓ)			2.0	1.03								
	Meptox	(ℓ)			0.25	0.01								
	Endrin	(ℓ)					2.0	0.11	6	0.33	2.4	0.13	2.0	0.02
	Biofran (Bayfolan)	(ℓ)									3	0.16		
	Gustation	(ℓ)							0.5	0.03	2	0.11		
	Others	(ℓ)									3.01	0.16		
	Total		8.05ℓ 56kg		21.4ℓ 90kg		20.55ℓ		19.65ℓ 108kg		15.71ℓ		53.95ℓ 461kg	
Variety of Palay Area Planted	C_4	(ha)	8.2		19.5		16.4		16.4		14.7		58.15	
	C_{12}	(ha)									1.6		2.6	
	IR_5	(ha)							1.5					
	IR_8	(ha)	2.7						0.5				0.5	
	IR_{20}	(ha)	4.5				2.4				1.5		20.2	
	IR_{24}	(ha)	1.6										0.5	
	IR_{26}	(ha)												
	IR_{579}	(ha)											0.85	
	Local Variety	(ha)	2.5								0.5		3.6	

Block			A_1, A_2, B, C, D, E, F Total		
Item \ Cropping Season			July–Dec. 1974		Jan.–June 1975
Area Planted			62.85		75.15
Date of Farmer's Activities Done	Sowing		6.11– 9. 4 (85)		11.29– 2. 7 (71)
	Plowing		6.12– 8.25 (75)		11. 1– 4.17 (168)
	Harrowing		7. 1– 9. 1 (63)		12. 1– 3. 6 (96)
	Puddling & Levelling		7. 1– 9.14 (76)		12.20– 3. 8 (79)
	Transplanting		7. 3– 9.26 (86)		12. 6– 3.16 (101)
	Harvesting		10.26– 1. 7 (74)		4. 8– 7. 2 (86)
	From Sowing to Harvesting		6.11– 1. 7 (211)		11. 1– 7. 2 (244)
				per ha		per ha
Quantity of Fertilizer Applied	21–0–0	(kg)	1370	22.0	8775	116.8
	16–20–0	(kg)	500	8.0	50	0.7
	14–14–14	(kg)	3380	54.3	1745	23.2
	46–0–0	(kg)	3710	59.6	210	2.8
	guano	(kg)	160	2.6	400	5.3
	Total		9120	145.6	11180	148.8
Quantity of Chemical Sprayed	Diazinon	(ℓ)	25.9	0.42	14.3	0.19
	Folidol	(ℓ)	5.5	0.09	6.7	0.09
	Thiodan, Tayudan	(ℓ)	7.45	0.12	2.5	0.03
	EPN (Powder)	(kg)	84	1.35	30	0.4
	EPN (Liquid)	(ℓ)	15.0	0.24		
	Malathion	(ℓ)				
	Mipcin	(ℓ)				
	Parapest	(ℓ)				
	Azodorin	(ℓ)			1.1	0.01
	BHC (Powder)	(kg)	30	0.48		
	Furadan	(ℓ)				
	Meptox	(ℓ)				
	Endrin	(ℓ)	6.0	0.09	4.2	0.06
	Biofran (Bayfolan)	(ℓ)	2.5	0.04	3.9	0.05
	Gustation	(ℓ)	1.0	0.02	2	0.03
	Others	(ℓ)			42.96	0.57
	Total		63.35ℓ 114kg		77.66ℓ 30kg	
Variety of Palay Area Planted	C_4	(ha)	49.4		48.75	
	C_{12}	(ha)	0.25		5.6	
	IR_5	(ha)	5.1		3.5	
	IR_8	(ha)	5.5		1.0	
	IR_{20}	(ha)	1.3		1.9	
	IR_{24}	(ha)				
	IR_{26}	(ha)				
	IR_{579}	(ha)			0.4	
	Local Variety	(ha)	1.5		14.0	

Table 2-6. Comparison of palay harvested in R-P-Japan Pilot Farm by Plot and by each Cropping Season (1)

Block	No. of plot	July–Dec. 1972				Jan.–June 1973				July–Dec. 1973				Jan.–June 1974				July–Dec. 1974				Jan.–June 1975				July–Dec. 1975				Jan.–June 1976			
		ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
A_1	1	1.3	5	3.8	161	1.3	22	16.9	761	1.3	38	29.2	1314	1.3	60	46.2	2077	1.3	7	5.4	242	1.3	17	13.1	588	1.3	75	57.7	2597				
	2	1.3	17	13.1	590	1.3	34	26.2	1179	1.3	81	62.3	2804	1.3	81	62.3	2804	1.3	61	46.9	2112	1.3	45	34.6	1558	1.3	52	40	1800				
	3	1.3	3	2.3	103	1.3	33	25.4	1143	1.3	50	38.5	1333	1.3	60	46.2	2077	1.3	30	23.1	1038	1.3	43	33.1	1488	1.3	48	36.9	1661				
	4					1.5	29	19.3	869	1.5	39	26.0	1170	1.5	62	41.3	1860	1.5	40	26.7	1200	1.5	41	27.3	1230	1.7	46	27.1	1220				
A_2	5													0.8	15	18.8	844					0.8	38	47.5	2138								
	6													0.6	16	26.7	1200					0.8	31	38.8	1744								
	7													1.0	13	13	585					1.0	30	30	1350								
	8																																
B	9					1.3	85	65.4	2943	1.3	82	63.1	2840	1.2	103	85.8	3863	1.2	62	51.7	2325	1.1	87	79.1	3559								
	10					1.0	12	12	540	1.0	35	35	1575	0.8	26	35	1463	0.8	21	26.3	1182	0.8	38	47.5	2138								
	11					1.0	8	8	360	1.0	37	37	1665	1.0	36	36	1620	1.0	16	16	720	1.0	20	20	900								
	12					1.0	24	24	1080	1.0	51	51	2295	1.0	24	24	1080	1.0	18	18	810	1.0	34	34	1530								
	13					1.0	51	51	2295	1.0	50	50	2250	1.0	71	71	3195	1.0	31	31	1395	1.0	47	47	2115								
	14					1.0	8	8	360	1.0	42	42	1890	1.0	52	52	2340	1.0	48	48	2160	1.0	42	42	1890								
	15					1.0	27	27	1215	1.0	48	48	2070	1.0	48	48	2160	1.0	40	40	1800	1.0	48	48	2160								
	16					0.2	5	25	1125	0.2	7	35	1575	0.2	12	60	2700	0.2	21	105	4725	0.1	4	40	1800	0.1	7	70	3150				
	17					0.6	19	31.7	1428	0.6	18	30	1350	0.4	21	50	2363	0.4	8	20	900	0.6	21	35	1575	0.6	6	10.0	450				
	18					1.0	17	17	765	1.0	25	25	1125	0.8	34	50.3	1913	0.8	6	7.5	338	0.8	22	27.5	1238	0.8	13	16.3	734				
	19					1.0	28	28	1260	1.0	18	18	810	1.0	24	24	1080	1.0	27	27	1215	0.8	23	28.8	1294	0.8	6	7.5	338				
	20					1.0	3	3	135	1.0	21	21	945	1.0	14	14	630	1.0	29	29	1305	1.0	24	24	1080	1.0	31	31	1395				
	21					1.0	5	5	225	1.0	26	26	1170	1.0	36	36	1620	1.0	32	32	1440	1.0	36	36	1620	1.0	50	50	2250				
	22					1.0	21	21	945	1.0	45	45	2025	1.0	45	45	2025	1.0	31	31	1395	0.7	39	55.7	2507								
	23					1.0	31	31	1395	1.0	40	40	1800	1.0	48	48	2160	1.0	15	15	675	1.0	43	43	1935								
C	24									0.1	5	50	2250	0.1	4	40	1800	0.1	8	80	3600	0.1	8	80	3600	0.1	7	70	3150				
	25									0.3	15	50	2250	0.25	8	32	1440	0.25	19	76	3420	0.25	13	52	2340	0.25	16	64	2880				
	26									1.45	99	68.3	3074	1.3	83	63.8	2875	1.3	51	39.2	1765	1.0	78	78	3510	1.3	70	53.8	2421				
	27									1.03	45	43.7	1967	1.0	42	42	1890	1.0	39	39	1755	1.0	33	33	1485	1.0	67	67	3015				
	28									1.0	25	25	1125	1.0	41	41	1845	1.0	36	36	1620	1.0	42	42	1890	0.8	52	65	2925				
	29									1.0	38	38	1710	1.0	32	32	1440	1.0	34	34	1530	0.6	36	60	2700	0.8	23	28.8	1296				
	30									1.02	32	31.4	1413	1.0	47	47	2115	1.0	21	21	945	1.0	35	35	1575	1.0	64	64	2880				
	31									0.4	0	0	0	1.1	60	54.5	2456	1.1	25	22.7	1022	1.1	17	15.5	695								
	32									1.43	0	0	0	1.5	36	24	1080	1.2	40	33.3	1499	1.5	61	40.7	1830								
	33									1.3	37	28.5	1283	1.5	69	46	2070	1.5	28	18.7	842	1.5	50	33.3	1500								
	34									1.0	20	20	900	1.0	15	15	675	1.0	37	37	1665	1.0	43	43	1935	0.2	4	20	900				
	35									0.97	21	21.7	977	1.0	20	20	900	1.0	20	20	900	1.0	46	46	2070	1.0	18	18	810				
	36									1.88	46	24.5	1103	2.0	89	45	2025	2.0	35	17.5	788	2.0	105	52.5	2363	2.0	90	45	2025				
	37									1.38	40	36.2	1629	2.0	126	63	2835	2.0	31	15.5	698	2.0	121	60.5	2723	2.0	84	42	1890				
	38									1.81	84	46.4	2088	1.5	80	53.3	2400	1.5	30	20	900	1.5	62	41.3	1860	1.5	83	55.3	2489				
	39													1.3	67	51.5	2319	1.3	37	28.5	1283	1.3	27	20.8	935	0.4	19	47.5	2138				
	40													1.0	41	41	1845	1.0	12	12	540	1.0	21	21	945	1.0	26	26	1170				

– Continued – (2)

Block	No. of plot	July–Dec. 1972				Jan.–June 1973				July–Dec. 1973				Jan.–June 1974				July–Dec. 1974				Jan.–June 1975				July–Dec. 1975				Jan.–June 1976			
		ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
C	41													1.0	38	38	1710	1.0	32	32	1440	1.0	42	42	1890								
	42													1.5	42	28	1260	1.5	26	17.3	779	1.5	44	29.3	1320	1.4	80	57.1	2570				
	43													2.0	96	48	2160	2.0	25	12.5	563	2.0	82	41	1845	1.0	56	56	2520				
	44													1.5	37	24.7	1110	1.5	26	17.3	779	1.3	47	36.2	1627	1.0	37	37	1665				
	45													2.5	6	1.5	108					2.5	43	17.2	774								
	46													1.0	0	0	0	1.0	14	14	630	1.0	14	14	630								
D	47													1.2	0	0	0	1.2	23	19.2	864	1.0	11	11	495	1.2	6	5	225				
	48													0.9	0	0	0					0.9	9	10	450								
	49													1.1	2	1.8	82	1.1	18	16.4	738	1.1	11	10	450								
	50													0.85	4	4.4	212	0.85	6	7.1	320												
	51													1.2	59	49.2	2212	1.2	12	10	450	1.2	27	22.5	1013								
	52													1.2	16	13.3	600	1.2	13	10.8	486	0.5	33	66	2970	1.0	14	14	360				
	53													0.8	4	5	225	0.3	7	23.3	1049	0.8	12	15	675	0.8	21	26.3	1184				
	54													1.0	14	14	630	1.0	18	18	810	1.0	37	37	1665	1.0	36	36	1620				
	55													0.85	36	42.3	1906	0.85	16	18.8	846	0.5	38	76	3420								
	56													0.85	6	7.1	318	0.2	4	20	900	0.7	42	60	2700								
	57													1.2	0	0	0					0.7	52	74.3	3343								
	58													1.0	25	25	1125					0.5	23	46	2070								
	59													0.85	8	9.4	424	0.85	12	14.1	635	0.7	28	40	1800								
	60													0.85	11	12.9	582	0.5	8	16	720	0.7	16	22.9	935								
	61													0.7	4	5.7	257					0.7	22	31.4	1414								
	62													0.85	14	16.5	741	0.65	12	18.5	833	0.7	15	21.4	964								
	63													0.75	11	14.7	660	0.6	11	18.3	824	0.8	18	22.5	1013								
	64													1.0	8	8	360	0.7	14	20	900	1.0	13	13	585								
	65													1.0	6	6	270					1.0	78	78	3510								
E	66													1.0	11	11	495																
	67													0.6	8	13.3	600					0.6	28	46.7	2100	0.6	48	80	3600				
	68													0.6	35	58.3	2625					0.6	24	40	1800	0.6	52	86.7	3902				
	69													0.7	14	20	900																
	70													0.8	21	26.3	1181																
	71													0.9	24	27.4	1200																
	72													1.0	17	17	765																
	73													1.0	54	54	2430																
	74													1.0	65	65	2925					1.2	24	20	900								
	75													1.0	65	65	2925																
	76																																
	77													1.0	13	13	585																
	78													1.0	17	17	765																
	79													1.0	14	14	630					1.0	21	21	945								
	80													1.0	19	19	855					1.0	36	36	1620								

– Continued – (3)

		July–Dec. 1972				Jan.–June 1973				July–Dec. 1973				Jan.–June 1974				July–Dec. 1974				Jan.–June 1975				July–Dec. 1975				Jan.–June 1976			
		ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha	ha	cav.	cav/ha	kg/ha
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
F	81													1.0	19	19	855	1.0	38	38	1710	1.0	82	82	3690								
	82													2.0	33	17	743	2.0	8	4	180	2.0	78	39	3510								
	83													2.0	42	21	945	2.0	77	38.5	1733	2.0	85	43	1913								
	84													2.4	49	20.4	919	2.0	81	40.5	1823	2.2	43	20	880								
Total		3.9	25	6.4	288	19.5	462	23.7	1087	35.57	1260	35.4	1593	88.4	2728	30.9	1390	62.85	1547	24.6	1107	75.15	2749	36.6	1646	32.85	1307	39.8	1790				
A_1		3.9	25	6.4	288	5.4	118	21.9	986	5.4	208	38.5	1733	5.4	263	48.7	2192	5.4	138	25.6	1152	5.4	146	27.0	1215	5.6	221	39.5	1776				
A_2														2.4	44	18.3	824					2.6	99	38.1	1715								
B						14.1	344	24.4	1098	14.1	545	38.7	1742	13.4	594	44.3	1994	13.0	405	31.2	1404	12.9	528	40.9	1841	4.3	113	26.3	1183				
C										16.07	507	31.6	1422	20.55	898	43.7	1967	20.25	535	26.4	1188	19.85	840	42.3	1904	13.35	623	46.7	2100				
D														14.95	262	17.5	788	11.55	163	14.1	635	13.0	321	24.7	1115	5.6	193	34.5	1551				
E														20.3	461	22.7	1022	5.65	102	18.0	810	12.2	470	38.5	1733	4.0	157	39.3	1766				
F														11.4	206	18.1	815	7.0	204	29.1	1310	9.2	345	37.5	1688								
Total		3.9	25	6.4	288	19.5	462	23.7	1087	35.57	1260	35.4	1593	88.4	2728	30.9	1390	62.85	1547	24.6	1107	75.15	2749	36.6	1646	32.85	1307	39.8	1790				

Table 2-7. Frequency Table of Yield in each Block per Cropping Season

Unit: No. of plot

Block	Cropping Season	Cavan												Average Cav.
		0	10	20	30	40	50	60	70	80	90	100		
A_1	July – Dec. 1972		2	1									3	6.4
	Jan. – June 1973			2	2								4	21.9
	July – Dec. 1973				2	1			1				4	38.5
	Jan. – June 1974						3		1				4	48.7
	July – Dec. 1974		1		2		1						4	25.6
	Jan. – June 1975			1	1	2							4	27.0
	July – Dec. 1975				1	1	1	1					4	39.5
A_2	Jan. – June 1974			2	1								3	18.3
	July – Dec. 1974													
	Jan. – June 1975					2	1						3	38.1
	July – Dec. 1975													
B	Jan. – June 1973		4	2	5	2		1	1				15	24.4
	July – Dec. 1973			1	3	4	4	2	1				15	38.7
	Jan. – June 1974			1	2	3	3	3	1	1	1		15	44.3
	July – Dec. 1974		1	3	4	3	2	1				1	15	31.2
	Jan. – June 1975				4	4	6			1			15	40.9
	July – Dec. 1975		1	2		1		1		1			6	26.3
C	July – Dec. 1973		2		5	3	2	2	1				15	31.6
	Jan. – June 1974			1	2	3	7	3	2				18	43.7
	July – Dec. 1974			4	5	7				1	1		18	26.4
	Jan. – June 1975			1	2	3	6	2	2	1	1		18	42.3
	July – Dec. 1975			1	3		3	2	4	1			14	46.7
D	Jan. – June 1974		6	1	2		2						11	17.5
	July – Dec. 1974		1	8									9	14.1
	Jan. – June 1975			5	2	1	1		1				10	24.7
	July – Dec. 1975		1	1		1		2					5	34.5
E	Jan. – June 1974		7	7	4		1	2	2				23	22.7
	July – Dec. 1974			6	3								9	18.0
	Jan. – June 1975			2	4	2	4		1	3			16	38.5
	July – Dec. 1975				1	1					2		4	39.3
F	Jan. – June 1974			6	2								8	18.1
	July – Dec. 1974		1			2	1						4	29.1
	Jan. – June 1975				2	2	1				1		6	37.5
	July – Dec. 1975													
Total	July – Dec. 1972		2	1									3	6.4
	Jan. – June 1973		4	4	7	2		1	1				19	23.7
	July – Dec. 1973		2	1	10	8	6	4	3				34	35.4
	Jan. – June 1974		13	18	13	6	16	8	6	1	1		82	30.9
	July – Dec. 1974		4	21	14	12	4	1		1	1	1	59	24.6
	Jan. – June 1975			9	15	16	19	2	4	5	2		72	36.6
	July – Dec. 1975		2	4	5	4	4	6	4	2	2		33	39.8

Table 3-1. Price of Palay, Fertilizer and Chemical in each Cropping Season

Unit: P

			Government Price						Commercial Price					
			Jan.–June 1973	July–Dec. 1973	Jan.–June 1974	July–Dec. 1974	Jan.–June 1975	July–Dec. 1975	Jan.–June 1973	July–Dec. 1973	Jan.–June 1974	July–Dec. 1974	Jan.–June 1975	July–Dec. 1975
Palay	For Seed	Cav.	36	60	45	67	78	80						
	For Food	(45 kg)	32	35	38	45	45	45						
Fertilizer	46–0–0	kg	0.59	0.59	1.4	1.46	2.24	1.68			1.4	2.64	2.70	2.81
	14–14–14	kg	0.60	0.58	1.2	1.28	1.39	1.23			1.2	2.50	2.50	2.11
	21–0–0	kg	0.36	0.42	0.7	0.78	1.06	0.93			2.2	2.20	2.00	1.70
	16–20–0	kg		0.59		1.20	1.06	1.32			1.2	2.40	2.30	2.25
	Guano	kg				0.60						0.60	0.60	
Chemical	Diazinon	ℓ							20	20	31	31	32	
	Endrin	ℓ									36	29	29	
	EPN (Liquid)	ℓ									15	27	38	
	EPN (Powder)	kg							0.2	0.95	2.20	2.20	2.20	
	Tayudan (Thiodan)	ℓ							24	25	36	41	45	
	BHC (Powder)	kg								1.17	1.17	3.30	4.10	
	Folidol	ℓ							25	25	36	40	43	
	Biofrau	ℓ										51		
	Parapest	ℓ							16	24	35	41	45	
	Malathion	ℓ							18			26	29	
	Mipcin	ℓ							27			25	26	
	Azodorin	ℓ								21		46	58	
	Furadan (Powder)	kg								0.69		2.80	5.60	
	Meptox	ℓ								22		41	46	
	Gusathion	ℓ										48	54	
	Feraloen	ℓ											51	
	Benlate	ℓ											112	
	Perthane	ℓ											53	
	2–4D ester	ℓ											27	
	Lethox	ℓ											53	
	Sevidol	kg											5	
	Endox	ℓ											45	
	Lindox	ℓ											45	
	Bayfolan	ℓ											16	

Table 3–2. Wage and Rental fee of Machinery in Pilot Farm per each Cropping Season

Unit: ₱

Cropping Season			Jan.–June 1973	July–Dec. 1973	Jan.–June 1974	July–Dec. 1974	Jan.–June 1975	July–Dec. 1975
Wage of Man Labor per day			6	6	6	8	9	10
When hired Carabao	Man Labor with Carabao	per day (8 hrs)	12	12	12	16	18	20
		Plowing (5 days/ha)	60	60	60	80	90	100
		Harrowing (2 days/ha)	24	24	24	32	36	40
When used 4-Wheel Tractor	Tractor with Fuel oil and Wage of Operator	per day (8 hrs)			① 58	② 97	③ 139	④ 162
		Plowing (6 hrs/ha)	25	⑤ 40	⑥ 44	⑦ 72	⑧ 104	⑨ 121
		Harrowing (4 hrs/ha)	17	⑩ 28	⑪ 30	⑫ 48	⑬ 56	⑭ 64
When used Hand Tractor	Tractor with Fuel oil and Wage of Operator	per day (8 hrs)				⑮ 55	⑯ 81	⑰ 94
		Plowing (20 hrs/ha)				⑱ 156	⑲ 219	⑳ 253
		Harrowing (15 hrs/ha)				㉑ 103	㉒ 137	㉓ 161
Fee of Rotary Weeder ₱/day (8 hrs)							0.56	0.56

			Rental fee of Tractor	Fuel oil consumed	Wage of operator	Total
4-Wheel Tractor	per day	①	₱ 4.5 x 8 hrs = 36	₱0.6 x 20ℓ = 12	₱1.25 x 8 hrs = 10	₱ 58
		②	7.2 x 8 = 57.6	0.6 x 5ℓ x 8 hrs = 24	1.875 x 8 = 15	97
		③	11 x 8 = 88	0.9 x 5 x 8 = 36	1.875 x 8 = 15	139
		④	12.7 x 8 = 101.6	1.1 x 5 x 8 = 44	2.0 x 8 = 16	162
	Plowing	⑤	4.5 x 6 = 27	8	5	40
		⑥	4.5 x 6 = 27	₱0.45 x 20ℓ = 9	1.25 x 6 hrs = 7.5	44
		⑦	7.2 x 6 = 43.2	0.6 x 5ℓ x 6 hrs = 18	1.875 x 6 = 11.25	72
		⑧	11 x 6 = 66	0.9 x 5 x 6 = 27	1.875 x 6 = 11.25	104
		⑨	12.7 x 6 = 76.2	1.1 x 5 x 6 = 33	2.0 x 6 = 12	121
	Harrowing	⑩	4.5 x 4 = 18	6	4	28
		⑪	4.5 x 4 = 18	₱0.45 x 15ℓ = 6.75	1.25 x 4 hrs = 5	30
		⑫	7.2 x 4 = 28.8	0.6 x 5 x 4 = 12	1.875 x 4 = 7.5	48
		⑬	7.5 x 4 = 30	0.9 x 5 x 4 = 18	1.875 x 4 = 7.5	56
		⑭	8.5 x 4 = 34	1.1 x 5 x 4 = 22	2.0 x 4 = 8	64
Hand Tractor	per day	⑮	3.5 x 8 = 28	0.6 x 2.5ℓ x 8 hrs = 12	1.875 x 8 = 15	55
		⑯	6 x 8 = 48	0.9 x 2.5 x 8 = 18	1.875 x 8 = 15	81
		⑰	7 x 8 = 56	1.1 x 2.5 x 8 = 22	2.0 x 8 = 16	94
	Plowing	⑱	4.5 x 20 = 90	0.6 x 2.5ℓ x 20 hrs = 30	1.875 x 20 = 37.5	156
		⑲	6.8 x 20 = 136	0.9 x 2.5 x 20 = 45	1.875 x 20 = 37.5	219
		⑳	7.9 x 20 = 158	1.1 x 2.5 x 20 = 55	2.0 x 20 = 40	253
	Harrowing	㉑	3.5 x 15 = 52.5	0.6 x 2.5 x 15 = 22.5	1.875 x 15 = 28.125	103
		㉒	5 x 15 = 75	0.9 x 2.5 x 15 = 33.75	1.875 x 15 = 28.125	137
		㉓	6 x 15 = 90	1.1 x 2.5 x 15 = 41.25	2.0 x 15 = 30	161

Note 1: Base of the cost of palay production is ₱97/day 2 in the case of using four wheel tractor, and ₱55/day in the case of hand-tractor during July to Dec. 1974.

2: Wage is ₱8/manday, and ₱16/manday with carabao respectively.

3: ₱58/day was adopted in the calculation of cost of palay during Jan. to June 1974.

4: ₱40/day was adopted in the calculation of cost of palay production for plowing and ₱28/day for harrowing during July to Dec. 1973.

5: Actual expenses were adopted in the calculation of cost of palay production. The expenses value in the table show those of per hectare.

6: Other expense values except concerned with those of note from 1 to 5 are shown for reference only.

7: Down part of this table shows the basement of upper part of this table.

8. ₱139/day 3 was adopted in the calculation of cost of palay when the farmers use four-wheel tractor and ₱81/day when they use hand-tractor, during Jan. to July 1975.

Table 4—7. Expenditure of Fertilizer, Chemical and Seed per ha

Jan. -- June, 1975

Unit: ₱

Block	Area planted	Fertilizer		Chemical		Seed		Total	
		Amount	per ha	Amount	per ha	Amount	per ha	Amount	per ha
	ha								
A_1	5.4	809	150	224	41	515	95	1,548	287
A_2	2.6	174	67	63	24	273	105	510	196
B	12.9	2,859	222	412	32	1,294	100	4,565	354
C	19.85	3,988	201	1,290	65	1,981	100	7,259	366
D	13.0	1,656	127	435	33	1,393	107	3,484	268
E	12.2	2,086	171	499	41	1,448	119	4,033	331
F	9.2	2,120	230	517	56	937	102	3,574	388
Total	75.15	13,692	182	3,440	46	7,841	104	24,973	332

Table 5–22. Man Labor required by Farmers For Production of Palay Jan.–June, 1975

Unit: Manday

Block	A_1	A_2	B	C	D	E	F	Total	A_1	A_2	B	C	D	E	F	Total	
Area planted (ha)	5.4	2.6	12.9	19.85	13.0	12.2	9.2	75.15	per hectare							per ha	%
Preparation for Seedbed and Sowing	19	8	64.2	78	53	58.5	49.9	330.6	3.5	3.1	5.0	3.9	4.1	4.8	5.4	4.4	7
Plowing	37	8	89	176	116	107	37	570	6.9	3.1	6.9	8.9	8.9	8.8	4.0	7.6	12
Harrowing	12	7	29.5	61	31	48	41	229.5	2.2	2.7	2.3	3.1	2.4	3.9	4.5	3.1	5
Puddling and Levelling	13	11	37	52	36	54	32	235	2.4	4.2	2.9	2.6	2.8	4.4	3.5	3.1	5
Transplanting	72	42	151	208	149	128	110	860	13.3	16.2	11.7	10.5	11.5	10.5	12.0	11.4	19
Weeding	47	18	200	261	77	246	40	889	8.7	6.9	15.5	13.1	5.9	20.2	4.3	11.8	20
Fertilizing	6	2	21.6	30.2	15	16.5	16.5	107.8	1.1	0.8	1.7	1.5	1.2	1.4	1.8	1.4	2
Spraying	8	4	18.6	30.3	13	17.5	12	103.4	1.5	1.5	1.4	1.5	1.0	1.4	1.3	1.4	2
Harvesting	91	50	192	312	175	216	130	1,166	16.9	19.2	14.9	15.7	13.5	17.7	14.1	15.5	26
Total	305	150	802.9	1208.5	665	891.5	468.4	4,491.3	56.5	57.7	62.2	60.9	51.2	73.1	50.9	59.8	100

Table 6–21. Showing the Expenses for Production of Palay Jan.–June, 1975

Unit: ₱

Block	A_1	A_2	B	C	D	E	F	Total	A_1	A_2	B	C	D	E	F	Total	
Area planted (ha)	5.4	2.6	12.9	19.85	13.0	12.2	9.2	75.15	per hectare							per ha	%
Preparation for Seed bed and Sowing	270	117	834.3	985.5	657	769.5	618.1	4,251.4	50	45	64.7	49.6	50.5	63.1	67.2	56.7	8
Plowing	666	270	1,635	3,168	2,088	1,926	1,271	11,024	123.3	103.8	126.7	159.6	160.6	157.9	138.2	146.7	20
Harrowing	594	126	789	1,461	1,042	846	1,605	6,463	110	48.5	61.2	73.6	80.2	69.3	174.5	86	12
Puddling and Levelling	360	198	666	936	648	972	576	4,356	66.7	76.2	51.6	47.2	49.8	79.7	62.6	58	8
Transplanting	648	378	1,359	1,872	1,341	1,152	990	7,740	120	145.4	105.3	94.3	103.2	94.4	107.6	103	14
Weeding	439.8	162	1,822.2	2,364	696	2,232	360	8,076	81.4	62.3	141.3	119.1	53.5	183	39.1	107.5	15
Fertilizing	54	18	194.4	271.8	135	148.5	148.5	970.2	10	6.9	15.1	13.7	10.4	12.2	16.1	12.9	2
Spraying	104	52	241.8	393.9	169	227.5	156	1,344.2	19.3	20	18.7	19.8	13	18.6	17	17.9	2
Harvesting	819	450	1,728	2,808	1,575	1,944	1,170	10,494	151.7	173.1	134	141.5	121.2	159.3	127.2	139.6	19
Total	3,954.8	1,771	9,269.7	14,260.2	8,351	10,217.5	6,894.6	54,718.8	732.4	681.2	718.6	718.4	642.4	837.5	749.4	728.1	100

Table 7–6. Expenses of Labor, Material, Irrigation in Producing Palay and Profit Jan.–June 1975

Expenses including Farmer's own Labor

Unit: ₱

Block			A_1	A_2	B	C	D	E	F	Total	A_1	A_2	B	C	D	E	F	Total	
Area Planted (ha)			5.4	2.6	12.9	19.85	13.0	12.2	9.2	75.15	per ha							per ha	%
Expense	Labor	Preparation for Seedbed and Sowing	270	117	834.3	985.5	657	769.5	618.1	4,251.4	50	45	64.7	49.6	50.5	63.1	67.2	56.7	4
		Plowing	666	270	1,635	3,168	2,088	1,926	1,271	11,024	123.3	103.8	126.7	159.6	160.6	157.9	138.2	146.7	12
		Harrowing	594	126	789	1,461	1,042	846	1,605	6,463	110	48.5	61.2	73.6	80.2	69.3	174.5	86	7
		Puddling and Levelling	360	198	666	936	648	972	576	4,356	66.7	76.2	51.6	47.2	74.8	79.7	62.6	58	5
		Transplanting	648	378	1,359	1,872	1,341	1,152	990	7,740	120	145.4	105.3	94.3	88.6	94.4	107.6	103	9
		Weeding	439.8	162	1,822.2	2,364	696	2,232	360	8,076	81.4	62.3	141.3	119.1	171.7	183	39.1	107.5	9
		Fertilizing	54	18	194.4	271.8	135	148.5	148.5	970.2	10	6.9	15.1	13.7	11.4	12.2	16.1	12.9	1
		Spraying	104	52	241.8	393.9	169	227.5	156	1,344.2	19.3	20	18.7	19.8	17.5	18.6	17.0	17.9	1
		Harvesting	819	450	1,728	2,808	1,575	1,944	1,170	10,494	151.7	173.1	134	141.5	149.5	159.3	127.2	139.6	12
		① Total	3,954.8	1,771	9,269.7	14,260.2	8,351	10,217.5	6,894.6	54,718.8	732.4	681.2	718.6	718.4	786	837.5	749.4	728.1	61
	Material	Seed	515	273	1,294	1,981	1,393	1,448	973	7,841	95.4	105	100.3	99.8	111.4	118.7	105.8	104.3	9
		Fertilizer	809	174	2,859	3,988	1,656	2,086	2,120	13,692	149.8	66.9	221.6	200.9	160.5	171	230.4	182.2	15
		Chemical	224	63	412	1,290	435	499	517	3,440	41.5	24.2	31.9	65	38.4	40.9	56.2	45.8	4
		② Total	1,548	510	4,565	7,259	3,484	4,033	3,574	24,973	286.7	196.2	353.9	365.7	310.2	330.6	388.5	332.3	28
	③ Irrigation ₱135/ha		729	351	1,741.5	2,679.75	1,755	1,647	1,242	10,145.25	135	135	135	135	135	135	135	135	11
	④ = ① + ② + ③ Grand Total		6,231.8	2,632	15,576.2	24,198.95	13,590	15,897.5	11,710.5	89,837.05	1,154	1,012.3	1,207.5	1,219.1	1,045.4	1,303.1	1,272.9	1,195.4	100
Production of palay	⑤ ₱@₱45		6,570	4,455	23,760	37,800	14,445	21,150	15,525	123,705	1,216.7	1,713.5	1,841.9	1,904.3	1,111.2	1,733.6	1,687.5	1,646.1	
	Cavans		146	99	528	840	321	470	345	2,749	27	38.1	40.9	42.3	24.7	38.5	37.5	36.6	
⑥ = ⑤ - ④ Profit			338.2	1,823	8,183.8	13,601.25	855	5,252.5	3,814.5	33,867.95	626.3	701.2	634.4	685.2	65.8	430.5	414.6	450.7	

Table 8–6. Expenses of Labor, Material and Irrigation in Producing Palay and Profit Jan.–June 1975
(Expenses; Cash paid only)

Unit: ₱

Block			A_1	A_2	B	C	D	E	F	Total	A_1	A_2	B	C	D	E	F	Total	
Area Planted (ha)			5.4	2.6	12.9	19.85	13	12.2	9.2	75.15	per ha							per ha	%
Expense	Labor	Preparation for Seedbed and Sowing	40.5	85.5	252.9	261.9	117	229.5	285.1	1,272.4	7.5	32.9	19.6	13.2	9	18.8	31	16.9	2
		Plowing		270	558	954	360	558	1,019	3,719		103.8	43.3	48.1	27.7	45.7	110.8	49.5	7
		Harrowing	486	90	261	669	556	180	1,137	3,379	90	34.6	20.2	33.7	42.8	14.8	123.6	45	6
		Puddling and Levelling		126	234	234	198	126	396	1,314		48.5	18.1	118	15.2	10.3	43	17.5	2
		Transplanting	549	324	1,008	1,431	882	891	810	5,895	101.7	124.6	78.1	72.1	67.8	73.0	88	78.4	11
		Weeding	90	99	767.4	486	234	435.6	144	2,256	16.7	38.1	59.5	24.5	18	35.7	15.7	30	4
		Fertilizing		9	90	90	45	36	85.5	355.5		3.5	7	4.5	3.5	3	9.3	4.7	0.
		Spraying		26	118.3	117	26	52	78	417.3		10	9.2	5.9	2	4.3	8.5	5.6	0
		Harvesting	738	405	1,584	2,502	1,404	1,728	1,044	9,405	136.7	155.8	122.8	126	108	141.6	113.5	125.1	18
		① Total	2,065.5	1,434.5	4,873.6	6,744.9	3,822	4,236.1	4,998.6	28,175.2	382.5	551.7	377.8	339.8	294	347.2	543.3	374.9	53
	Material	Seed	515	273	1,294	1,981	1,393	1,448	937	7,841	95.4	105	100.3	99.8	107.2	118.7	101.8	104.3	15
		Fertilizer	809	174	2,859	3,988	1,656	2,086	2,120	13,692	149.8	66.9	221.6	144	127.4	171.0	230.4	182.2	26
		Chemical	224	63	412	1,290	435	499	517	3,440	41.5	24.2	31.9	65	33.5	40.9	56.2	45.8	6
		② Total	1,548	510	4,565	7,259	3,484	4,033	3,574	24,973	286.7	196.2	353.9	365.7	268	330.6	388.5	332.3	47
	③ Irrigation ₱135/ha																		
	④ = ① + ② + ③ Grand Total		3,613.5	1,944.5	9,438.6	14,003.9	7,306	8,269.1	8,572.6	53,148.2	669.2	747.9	731.7	705.5	562	677.8	931.8	707.2	100
Production of palay	⑤ @ = ₱45		6,570	4,455	23,760	37,800	14,445	21,150	15,525	123,705	1,216.7	1,713.5	1,841.9	1,904.3	1,111.2	1,733.6	1,687.5	1,646.1	
	Cavan		146	99	528	840	321	470	345	2,749	27	38.1	40.9	42.3	24.7	38.5	37.5	36.6	
⑥ = ⑤ - ④ Profit			2,956.5	2,510.5	14,321.4	23,796.1	7,139	12,880.9	6,952.4	7,0556.8	547.5	965.6	1,110.2	1,198.8	549.2	1,055.8	755.7	938.9	

Table 9—1. Profit gained by Tenant or Owner-Operator. Two Cropping Seasons (1)

Unit: Cavan, ₱

Block				A_1					A_2					B														
Plot				1	2	3	4	Total	5	6	7	8	Total	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Area planted (ha)			⑭	1.3	1.3	1.3	1.5	5.4	0.8	0.8	1.0	-	2.6	1.1	0.8	1.0	1.0	1.0	1.0	1.0	0.1	0.6	0.8	0.8	1.0	1.0	0.7	1.0	12.9
Jan. – June 1975	All quantities of palay (cav.)		①	17	45	43	41	146	38	31	30		99	87	38	20	34	47	42	48	4	21	22	23	24	36	39	43	528
	Share (cavan)	Harvester	②	3	9	7	8	27	7	5	5		17	18	6	3	6	8	7	8		4	4	4	4	6	6	8	92
		Land Owner	③	5	12	12	11	40			8		8			6		13				6	6	6	7		11		55
		Tenant including seed	④	9	24	24	22	79			17		17			11		26				11	12	13	13		22		100
		Tenant excluding seed	⑤																										
		Owner-operator	⑥						31	26			59	69	32	-	28	-	35	40	4	-	-	-	-	30	-	36	273
	Rough income of Tenant or of owner-operator		⑦	405	1,080	1,080	990	3,555	1,395	1,170	765		3,330	3,105	1,440	495	1,260	1,170	1,575	1,800	180	495	540	585	585	1,350	990	1,575	17,145
	Expense ₱	All Expenses including Farmer's own Labor	⑧	1,287.1	1,206	1,322.2	1,597.5	5,412.8	632	635	905		2,172	1,321.5	863	985.5	1,091.4	942.7	1,090	1,140	202.6	528.7	751.5	883.1	1,304.5	1,170.5	757	816.2	13,848.2
		Cash only paid by Farmer	⑨	625.5	479	806	965	2,875.5	497	500	532.5		1,529.5	1,063.5	681.5	513	882.9	378	923.5	880.5	174.7	200	248	313	572	519	294	211	7,354.6
	Net Income ₱	⑦–⑧–⑩ In case of all expenses including Farmers own Labor	⑩	-882.1	-126	-242.2	-607.5	-1,857.8	763	535	-140		1,158	1,783.5	577	-490.5	168.6	227.3	485	660	-22.6	-33.7	-211.5	-298.1	-719.5	179.5	233	758.8	3,296.8
		⑦–⑨ In case of Cash only paid by Farmer	⑪	-220.5	601	274	25	659.5	898	670	232.5		1,800.5	2,041.5	758.5	-18	377.1	792	651.5	919.5	5.3	295	292	272	13	831	696	1,364	9,290.4
	per ha ₱	⑫=⑩/⑭ per ha	⑫	-679	-97	-186	-405	-344	954	669	-140		445	1,621	721	-491	169	227	485	660	-226	-56	-264	-373	-720	180	333	759	256
		⑬=⑪/⑭ per ha	⑬	-170	462	211	17	122	1,123	838	233		693	1,856	948	-18	377	792	652	920	53	492	365	340	13	831	994	1,364	720
Area planted (ha)			⑭	1.3	1.3	1.3	1.5	5.4						1.2	0.8	1.0	0.6	1.0	1.0	1.0	0.2	0.4	0.8	1.0	1.0	1.0	1.0	1.0	13.0
July – Dec. 1974	All quantities of Palay (cav.)		①	7	61	30	40	138						62	21	16	18	31	48	40	21	8	6	27	29	32	31	15	405
	Share (cavan)	Harvester	②	1	12	6	8	27						10	4	2	4	6	8	7	4	2		4	6	6	6	3	72
		Land owner	③	2	37	6	8	53								4		6				2	2	6	8	9	5	4	46
		Tenant including seed	④	4	12	18	24	58								10		19				4	4	17	15	17	20	8	114
		Tenant excluding seed	⑤																										
		Owner-operator	⑥											52	17	-	14	-	40	33	17	-	-	-	-	-	-	-	173
	Rough income of Tenant or of owner-operator		⑦	180	540	810	1,080	2,610						2,340	765	450	630	855	1,800	1,485	765	180	180	765	675	765	900	360	12,915
	Expense ₱	All Expenses including Farmer's own Labor	⑧	1,001	1,048	1,105	1,369.5	4,523.5						954	890	848	689	800	939	862	235.4	394.6	647	848	894	1,028	1,167	684	11,880
		Cash only paid by Farmer	⑨	414	517	512	698.5	2,141.5						706	702	334	413	274	649	516	177	180	214	388	372	590	734	240	6,487
	Net Income ₱	⑦–⑧–⑩ In case of all expenses including Farmer's own Labor	⑩	-821	-508	-295	-289.5	-1,913.5						1,386	-125	-398	-59	55	861	623	529.6	-214.6	-467	-83	-219	-263	-267	-324	1,035
		⑦–⑨ In case of Cash only paid by Farmer	⑪	-234	23	298	381.5	468.5						1,634	63	116	217	581	1,151	969	588	0	-34	377	303	175	166	120	6,428
	per ha ₱	⑫=⑩/⑭ per ha	⑫	-632	-391	-227	-193	-354						1,155	-156	-398	-98	55	861	623	2,648	-537	-584	-83	-219	-263	-267	-324	80
		⑬=⑪/⑭ per ha	⑬	-180	18	229	254	87						1,361	79	116	362	581	1,151	969	2,940	0	-43	377	303	175	166	120	494

Table 9-2. Profit (Net Income) gained by Tenant or Owner-Operator. Two Cropping Seasons (2)

Unit: Cavan, ₱

				Block	C																		
				No of plot	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	Total
Area Planted (ha)				⑭	0.1	0.25	1.0	1.0	1.0	0.6	1.0	1.1	1.5	1.5	1.0	1.0	2.0	2.0	1.5	1.3	1.0	1.0	19.85
Jan. – June 1975	All quantities of palay (cav.)			①	8	13	78	33	42	36	35	17	61	50	43	46	105	121	62	27	21	42	840
	Share (cavan)	Harvester		②		2	13	5	8	6	6		10	10	7	7	18	20	10	5	3	7	137
		Land Owner		③		4				10				13	12	10					6	12	67
		Tenant	including seed	④		7				20				27	24	29					12	23	142
			excluding seed	⑤																			
		Owner-operator		⑥	8		65	28	34		29	17	51				87	101	52	22			494
	Rough income of Tenant or of owner-operator			⑦	360	315	2,925	1,260	1,530	900	1,305	765	2,295	1,215	1,080	1,305	3,915	4,545	2,340	990	540	1,035	28,620
	Expense ₱	All Expenses including Farmer's own Labor		⑧	122.9	298.05	1,892.5	1,123.5	1,009.5	1,180.5	1,063.7	1,116	1,371.5	1,199.5	1,222	1,174.5	2,094	1,828.8	1,436.5	1,202	1,002.5	1,053	21,390.95
		Cash only paid by Farmer		⑨	105.4	115	1,721.5	957	820.5	646	303	361	405	368	1,010.5	483	970	677	519	959	490	591	11,501.9
	Net Income ₱	⑩=⑦-⑧ In case of all expenses including Farmer's own Labor		⑩	237.1	16.95	1,032.5	136.5	520.5	-280.5	241.3	-351	923.5	15.5	-142	130.5	1,821	2,716.2	903.5	-212	-462.5	-18	7,229.05
		⑪=⑦-⑨ In case of cash only paid by Farmer		⑪	254.6	200	1,203.5	303	709.5	254	1,002	404	1,890	847	69.5	822	2,945	3,868	1,821	31	50	444	17,118.1
	Net Income per ha ₱	⑫=⑩/⑭ per ha		⑫	2,371	68	1,033	137	521	-468	241	-319	616	10	-142	131	911	1,358	602	-163	-463	-18	364
		⑬=⑪/⑭ per ha		⑬	2,546	800	1,204	303	710	423	1,002	367	1,260	565	70	822	1,473	1,934	1,214	24	50	444	862
Area planted (ha)				⑭	0.1	0.25	1.3	1.0	1.0	1.0	1.0	1.1	1.2	1.5	1.0	1.0	2.0	2.0	1.5	1.3	1.0	1.0	20.25
July – Dec. 1974	All quantities of palay (cav.)			①	8	19	51	39	36	34	21	25	40	28	37	20	35	31	30	37	12	32	535
	Share (cavan)	Harvester		②		4	10	6	6	7	4	5	8	6	7	4	5	6	6	7	2	6	99
		Land Owner		③		5				9			11	7	10	5	10	8	8		3	9	85
		Tenant	including seed	④		10				18			21	15	20	11	20	17	16		7	17	172
			excluding seed	⑤																			
		Owner-operator		⑥	8		41	33	30		17	20								30			179
	Rough income of Tenant or of owner-operator			⑦	360	450	1,345	1,485	1,350	810	765	900	945	675	900	495	900	765	720	1,350	315	765	15,795
	Expense ₱	All Expences including Farmer's own Labor		⑧	140.2	225.9	1,178	894	857	995	1,105	1,058	939	1,073	812	925	1,665	1,825	1,221	974	830	1,051	17,768.1
		Cash only paid by Farmer		⑨	28	100	767	592	587	484	547	511	251	426	232	346	733	815	474	709	340	471	8,413
	Net Income ₱	⑩=⑦-⑧ In case of all expenses including Farmer's own Labor		⑩	219.8	224.1	667	591	493	-185	-340	-158	6	-398	88	-430	-765	-1,060	-501	376	-515	-286	-1,973.1
		⑪=⑦-⑨ In case of Cash only paid by Farmer		⑪	332	350	1,078	893	763	326	218	389	694	249	668	149	167	-50	246	641	-25	294	7,382
	Net Income per ha ₱	⑫=⑩/⑭ per ha		⑫	2,198	896	513	591	493	-185	-340	-144	5	-265	88	-430	-383	-530	-334	289	-515	-286	-97
		⑬=⑪/⑭ per ha		⑬	3,320	1,400	829	893	763	326	218	354	578	166	668	149	84	-25	164	493	-25	294	365

Table 9–3. Profit (Net Income) gained by Tenant or Owner-Operator, Two Cropping Seasons (3)

Unit: Cavan, ₱

				Block	D											
				No of plot	42	43	44	45	46	47	48	49	50	51	52	Total
				Area planted (ha) ⑭	1.5	2.0	1.3	2.5	1.0	1.0	0.9	1.1	–	1.2	0.5	13.0
Jan. – June 1975				All quantities of palay (cavan) ①	44	82	47	43	14	11	9	11		27	33	321
	Share (cavan)		Harvester ②		8	14	8	7	2	2	1	2		5	6	55
			Land owner ③			23	13									36
			Tenant	including seed ④		45	26									71
				excluding seed ⑤												
			Owner-operator ⑥		36			36	12	9	8	9		22	27	159
			Rough income of Tenant or of owner-operator ⑦		1,620	2,025	1,170	1,620	540	405	360	405		990	1,215	10,350
	Expense	₱	All Expenses including Farmer's own Labor ⑧		1,641.7	2,029	1,060.5	2,923.5	901	590	655.5	802		760.5	651.3	12,015
			Cash only paid by Farmer ⑨		651	946	251	2,532	434	203	156	316		253	160	5,902
	Net income	₱	⑩=⑦-⑧ In case of all expenses including Farmers own Labor ⑩		-21.7	-4	109.5	-1,303.5	-361	-185	-295.5	-397		229.5	563.7	-1,665
			⑪=⑦-⑨ In case of Cash only paid by Farmer ⑪		969	1,079	919	-912	106	202	204	89		737	1,055	4,448
		per ha	⑫=⑩/⑭ per ha ⑫		-14	-2	84	-521	-361	-185	-328	-361		191	1,127	-128
		₱	⑬=⑪/⑭ per ha ⑬		646	540	707	-365	106	202	227	81		614	2,110	342
				Area planted (ha) ⑭	1.5	2.0	1.5		1.0	1.2		1.1	0.85	1.2	1.2	11.55
July – Dec. 1974				All quantities of palay (cavan) ①	26	25	26		14	23		18	6	12	13	163
	Share (cavan)		Harvester ②		5	5	5		3	5		4	1	3	3	34
			Land owner ③		7	7	7		4				2	3	3	33
			Tenant	including seed ④	14	13	14		7				3	6	7	64
				excluding seed ⑤												
			Owner-operator ⑥							18		14				32
			Rough income of Tenant or of owner-operator ⑦		630	585	630		315	810		630	135	270	315	4,320
	Expense	₱	All Expenses including Farmer's own Labor ⑧		1,144.5	1,598	1,206		760	941		1,062	873	1,134	1,003	9,721.5
			Cash only paid by Farmer ⑨		587.5	610	479		232	347		443	362.5	414	371	3,846
	Net income	₱	⑩=⑦-⑧ In case of all expenses including Farmer's own Labor ⑩		-514.5	-1,013	-576		-445	-131		-432	-738	-864	-688	-5,401.5
			⑪=⑦-⑨ In case of Cash only paid by Farmer ⑪		42.5	-25	151		83	463		187	-227.5	-144	-56	474
		per ha	⑫=⑩/⑭ pet ha ⑫		-343	-507	-384		-445	-109		-393	-868	-720	-573	-468
		₱	⑬=⑪/⑭ per ha ⑬		28	-13	101		83	386		170	-268	-120	-47	41

Table 9—4. Profit (Net Income) gained by Tenant or Owner-Operator. Two Cropping Seasons (4)

Unit: Cavan. ₱

	Block			E																						
	No. of plot			53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	Total
	Area planted (ha)		⑭	0.8	1.0	0.5	0.7	0.7	0.5	0.7	0.7	0.7	0.7	0.8	1.0	1.0	–	0.6	0.6	–	–	–	–	–	1.2	–	12.2
Jan. – June 1975	All quantities of palay (cavan)		①	12	37	38	42	52	23	28	16	22	15	18	13	78		28	24						2.4		470
	Share (cavan)	Harvester	②	2	6	7	8	10	4	5	2	4	4	3	2	15		6	5						5		88
		Land-owner	③		10				6	8	5	6	4	5	4										6		54
		Tenant including seed	④		21				13	15	9	12	7	10	7										13		107
		Tenant excluding seed	⑤																								
		Owner-operator	⑥	10		31	34	42								63		22	19								221
	Rough income of Tenant or of Owner-operator		⑦	450	945	1,395	1,530	1,890	585	675	405	540	315	450	315	2,835		990	855						585		14,760
	Expense ₱	All Expenses including Farmer's own Labor	⑧	982	1,167.7	1,029.4	955.5	1,112.1	550.2	783.5	849.1	663.5	660.5	882.5	868.5	1,438		506	582						928		13,953.5
		Cash only paid by Farmer	⑨	285	518	697.6	639	396	111	244	252	142	229	289	311	1,257.5		393.5	469.5						307		6,541.1
	Net income ₱	⑩=⑦–⑧ In case of all expenses including Farmer's own Labor	⑩	–532	–222.7	365.6	574.5	777.9	34.8	–108.5	–444.1	–123.5	–345.5	–432.5	–553.5	1,402		484	273						–343		806.5
		⑪=⑦–⑨ In case of Cash only paid by Farmer	⑪	165	427	697.4	891	1,494	474	431	153	398	86	161	4	1,577.5		596.5	385.5						278		8,218.9
	per ha ₱	⑫=⑩/⑭ per ha	⑫	–665	–223	731	821	1,111	70	–155	–634	–176	–494	–541	–554	1,402		807	455						–286		66
		⑬=⑪/⑭ per ha	⑬	206	427	1,395	1,273	2,134	948	616	219	569	123	201	4	1,578		994	643						232		674
	Area planted (ha)		⑭	0.3	1.0	0.85	0.2			0.85	0.5		0.65	0.6	0.7												5.65
July – Dec. 1974	All quantities of Palay (cavan)		①	7	18	16	4			12	8		12	11	14												102
	Share (cavan)	Harvester	②	1	4	2	1			2	2		2	2	2												18
		Land-owner	③	2	5					3	2		3	3	4												22
		Tenant including seed	④	4	9					7	4		7	6	8												45
		Tenant excluding seed	⑤																								
		Owner-operator	⑥			14	3																				17
	Rough income of Tenant or of Owner-operator		⑦	180	405	630	135			315	180		315	270	360												2,790
	Expense ₱	All Expenses including Farmer's own Labor	⑧	397.6	656	747.5	526.8			621.5	380.4		625.7	641.2	637												5,233.7
		Cash only paid by Farmer	⑨	119	322	308	270			209	151		246	226	238												2,089
	Net income ₱	⑩=⑦–⑧ In case of all expenses including Farmer's own Labor	⑩	–217.6	–251	–117.5	–391.8			–306.5	–200.4		–310.7	–371.2	–277												–2,443.7
		⑪=⑦–⑨ In case of cash only paid by Farmer	⑪	61	83	322	–135			106	29		69	44	122												701
	per ha ₱	⑫=⑩/⑭ per ha	⑫	–725	–251	–138	–1,959			–361	–401		–478	–619	–396												–433
		⑬=⑪/⑭ per ha	⑬	203	83	379	–675			125	58		106	73	174												124

Table 9–5. Profit (Net income) gained by Tenant or Owner-operator. Two Cropping Seasons (5)

Unit: Cavan, ₱

	Block	F										A1	A2	B	C	D	E	F	Total
	No. of plot	76	77	78	79	80	81	82	83	84	Total								
Jan. – June 1975	Area planted (ha) ⑭	–	–	–	1.0	1.0	1.0	2.0	2.0	2.2	9.2	5.4	2.6	12.9	19.85	13	12.2	9.2	75.15
	All quantities of palay (cavan) ①				21	36	82	78	85	43	345	146	99	528	840	321	470	345	2,749
	Share (cavan) Harvester ②				3	6	15	13	14	7	58	27	17	92	137	55	88	58	474
	Share (cavan) Land Owner ③							22	24		46	40	8	55	67	36	54	46	306
	Share (cavan) Tenant including seed ④							43	47		90	79	17	108	142	71	107	90	587
	Share (cavan) Tenant excluding seed ⑤																		
	Share (cavan) Owner-operator ⑥				18	30	67			36	151		57	273	494	159	221	151	1,382
	Rough income by Tenant or Owner-operator ⑦				810	1,350	3,015	1,935	2,115	1,620	10,845	3,555	3,330	17,145	28,620	10,350	14,760	10,845	88,605
	Expense ₱ All Expenses including Farmer's own Labor ⑧				956.8	1,486.3	1,271.5	2,112	1,751	2,963	10,540.6	5,412.8	2,172	13,848.2	21,390.95	12,015	13,953.5	10,540.6	79,333.05
	Expense ₱ Cash only paid by Farmer ⑨				785.8	1,324.3	1,100.5	984	767	2,567	7,528.6	2,875.5	1,529.5	7,854.6	11,501.9	5,902	6,541.1	7,528.6	43,233.2
	Net income ₱ ⑩=⑦–⑧ In case of all expenses including Farmer's own Labor ⑩				–146.8	–136.3	1,743.5	–177	364	–1,343	304.4	–1,857.8	1,158	3,296.8	7,229.05	–1,665	806.5	304.4	9,271.95
	Net income ₱ ⑪=⑦–⑨ In case of cash only paid by Farmer ⑪				24.2	25.7	1,914.5	951	1,348	–947	3,316.4	679.5	1,800.5	9,290.4	17,118.1	4,448	8,218.9	3,316.4	45,371.8
	Net income per ha ₱ ⑫=⑩/⑭ per ha ⑫				–147	–136	1,744	–89	182	–610	33	– 348	445	256	364	–128	66	33	124
	Net income per ha ₱ ⑬=⑪/⑭ per ha ⑬				24	26	1,915	476	674	–430	360	122	693	120	862	342	674	360	604
July – Dec. 1974	Area planted (ha) 14						1.0	2.0	2.0	2.0	7.0	5.4		13.0	20.25	11.55	5.65	7	62.85
	All quantities of palay (cavan) ①						38	8	77	81	204	138		405	535	163	102	204	1,547
	Share (cavan) Harvester ②						6	1	13	14	34	27		72	99	34	18	34	284
	Share (cavan) Land owner ③						11				11	53		46	85	33	22	11	250
	Share (cavan) Tenant including seed ④						21				21	58		114	172	64	45	21	474
	Share (cavan) Tenant excluding seed ⑤																		
	Share (cavan) Owner-operator ⑥							7	64	67	138			173	179	32	17	138	539
	Rough income by Tenant or Owner-operator ⑦						945	315	2,880	3,015	7,155	2,610		12,915	15,795	4,320	2,790	7,155	45,585
	Expense ₱ All Expenses including Farmer's own Labor ⑧						1,177.6	1,804	1,736	2,025.5	6,743.1	4,523.5		11,880	17,768.1	9,721.5	5,233.7	6,743.1	55,869.9
	Expense ₱ Cash only paid by Farmer ⑨						939.6	1,360	1,254	1,548.5	5,102.1	2,141.5		6,487	8,413	3,846	2,089	5,102.1	28,078.6
	Net income ₱ ⑩=⑦–⑧ In case of all expenses including Farmer's own Labor ⑩						–232.6	–1,489	1,144	989.5	411.9	–1,913.5		1,035	–1,973.1	–5,401.5	–2,443.7	411.9	–10,284.9
	Net income ₱ ⑪=⑦–⑨ In case of cash only paid by Farmer ⑪						5.4	–1,045	1,626	1,466.5	2,052.9	468.5		6,428	7,382	474	701	2,052.9	17,506.4
	Net income per ha ₱ ⑫=⑩/⑭ per ha ⑫						–233	–745	572	495	59	–354		80	–97	–468	–431	59	–164
	Net income per ha ₱ ⑬=⑪/⑭ per ha ⑬						5.4	–523	813	733	293	87		494	365	41	124	293	279

Table 10—1. Showing the Number of Farmer's plot gained Profit or Netincome in Producing Palay Jan.—June 1975

Profit or Net income gained		Block	₱ -700	-500	-300	-100	0	100	300	500	700	1000	1500	2000	Total No. of plot	Average ₱
When Farmers are actually Tenants or owner-operators	In Case of Cash only paid by Farmer ① (per ha)	A_1				1		1	1	1					4	122
		A_2							1		1	1			3	693
		B					1	2		4	1	5	1	1	15	720
		C						3		4	1	3	5	1	1	18	862
		D			1			1	3		3	1			1	10	342
		E						1	5	1	3	2	2	1	1	16	674
		F			1			2		1	1			1		6	360
		Total			2	1	1	10	10	11	9	12	9	4	3	72	604
	In Case of Farmer's own Labor is assumed to be paid ② (per ha)	A_1		1	1	1	1									4	-344
		A_2				1					1	1				3	445
		B	1		2	2	1		3	2	1	2		1		15	256
		C			3	2	1	2	3		3	1	2		1	18	364
		D		1	3	1	2	1	1				1			10	-128
		E		4	1	4		1		1		3	2			16	66
		F		1		2	1		1					1		6	33
		Total	1	7	10	13	6	4	8	3	5	7	5	2	1	72	124
When Farmers are assumed to be owner-operators	In Case of Cash only paid by Farmer ③ (per ha)	A_1					1			1		1	1			4	548
		A_2									1		2			3	969
		B				1				2	1	4	3	3	1	15	1110
		C							2	2		2	6	4	2	18	1199
		D			1			1	3		1	1	2		1	10	549
		E							2	2	2	1	4	3	2	16	1056
		F			1			1	1				2		1	6	756
		Total			2	1	1	2	8	7	5	9	20	10	7	72	939
	In Case of Farmer's own Labor is assumed to be paid ④ (per ha)	A_1		1				1		2						4	63
		A_2							1			1	1			3	701
		B			2	1		1	2	1	1	4	2		1	15	634
		C			1	1	1		1	2	4	3	3	1	1	18	685
		D		1	3	2		1				2		1		10	66
		E	1		2	2		1	1	1	1	2	3	2		16	430
		F		1		1		1			1	1			1	6	415
		Total	1	3	8	7	1	5	5	6	7	13	9	4	3	72	451
Circled Numbers are Correspond to that of upper parts		① Total			2	1	1	10	10	11	9	12	9	4	3	72	604
		② Total	1	7	10	13	6	4	8	3	5	7	5	2	1	72	124
		③ Total			2	1	1	2	8	7	5	9	20	10	7	72	939
		④ Total	1	3	8	7	1	5	5	6	7	13	9	4	3	72	451

Table 10–2. Showing the Number of Farmer's plot gained Profit or Net Income in Producing Palay July–Dec. 1974

Profit or Net Income gained		Block	₱ -700	-500	-300	-100	0	100	300	500	700	1000	1500	₱ 2000	Total No. of plot	Average ₱
When Farmers are actually Tenants or owner-operators	In Case of Cash only paid by Farmer ① (per ha)	A_1				1		1	2						4	87
		A_2														
		B					1	2	4	3	1	1	2	1	15	494
		C					2	1	5	3	2	3	1	1	18	365
		D				2	2	2	2	1					9	41
		E		1				3	4	1					9	124
		F		1				1				2			4	293
		Total		2		3	5	10	17	8	3	6	3	2	59	279
	In Case of Farmer's own Labor is assumed to be paid ② (per ha)	A_1		1	1	2									4	-354
		A_2														
		B		2	2	4	2	1			1	1	1	1	15	80
		C		2	4	4		2	1	1	2	1		1	18	-97
		D	2	2	4	1									9	-468
		E	2	1	4	2									9	-433
		F	1			1				1	1				4	59
		Total	5	8	15	14	2	3	1	2	4	2	1	2	59	-164
When Farmers are assumed to be owner-operators	In Case of Cash only paid by Farmer ③ (per ha)	A_1				1					2			1	4	660
		A_2														
		B					1		2	3	1	3	3	1	15	808
		C							3	5	1	3	4		18	680
		D				1	1	1	2	4					9	211
		E	1						3	5					9	311
		F		1							1	1	1		4	477
		Total	1	1		2	2	1	10	17	5	7	8	2	59	561
	In Case of Farmer's own Labor is assumed to be paid ④ (per ha)	A_1		1				1	1				1		4	191
		A_2														
		B		1	1	2	2		3	2		1	2	1	15	358
		C			2	3	2	1	1	2	3	2		1	18	188
		D	1	1	3	2	2								9	-320
		E	2		1	5		1							9	-292
		F	1							1	1	1			4	221
		Total	4	3	7	12	6	3	5	5	4	4	3	1	2	59	90
Circled Numbers are Correspond to that of upper parts		① Total		2		3	5	10	17	8	3	6	3		2	59	279
		② Total	5	8	15	14	2	3	1	2	4	2	1		2	59	-164
		③ Total	1	1		2	2	1	10	17	5	7	8	2	3	59	561
		④ Total	4	3	7	12	6	3	5	5	4	4	3	1	2	59	90

Table 11. Comparison among Five Cropping Seasons on Labor, Materials and other Expenses Farmers needed in Block A_1 and B, RP–Japan Pilot Farm

Item \ Cropping season	Labor, Material, and Irrigation					Expenses Labor, Material and Irrigation									
						In the case of all expenses including Farmer's own Labor					In the case of Cash only paid by Farmers				
	Jan.–June 1973	July–Dec. 1973	Jan.–June 1974	July–Dec. 1974	Jan.–June 1975	Jan.–June 1973	July–Dec. 1973	Jan.–June 1974	July–Dec. 1974	Jan.–June 1975	Jan.–June 1973	July–Dec. 1973	Jan.–June 1974	July–Dec. 1974	Jan.–June 1975
	Manday	Manday	Manday	Manday	Manday	₱	₱	₱	₱	₱	₱	₱	₱	₱	₱
Preparation for Seed bed and sowing	68	101	65	76.3	83.2	601	766	1,770	866.9	1,104.3	113.8	145	135	260.5	293.4
Plowing	111	75	141	114	126	1,804	1,309	2,060	1,863	2,301	671	356	228	471	558
Harrowing		19	35.5	44.5	41.5		417	840	1,102	1,383		239	528	830	747
Puddling & Levelling		46	47.5	41	50		604	570	656	1,026		247	162	224	234
Transplanting	227	302	248	237	223	1,250	1,158	1,488	1,896	2,007	1,124	1,158	1,508	1,965	1,557
Weeding	91	126	251	191	247	548	756	1,506	1,528	2,262	–	66	162	432	857.4
Fertilizing	10	45	32	33.7	27.6	64	270	192	269.6	248.4	–	30	54	88	90
Spraying	20	69	24	32	26.6	125	414	156	256	345.8	–	96	42	72	118.3
Harvesting	538	(292) 799	(279) 1,007	(212) 1,597.5	(283) 2,370	3,231	(1,752) 4,795	(1,674) 6,042	(2,352) 12,780	(2,547) 21,330	–	–	–	–	–
Total	1,065	(1,074) 1,581	(1,060) 1,788	(981.5) 2,367	(1,107.9) 3,194.9	7,623	(10,489) 13,532	(10,256) 14,624	(10,789.5) 21,217.5	(13,224.5) (32,007.5)	1,908.8	2,337	2,819	4,342.5	4,455.1
Seed	cav. 41.0	cav. 27.3	cav. 21.6	cav. 20.5	cav. 23.2	1,476	1,638	972	1,368	1,809	1,476	1,638	972	1,368	1,809
Fertilizer	kg 2,150	kg 3,245	kg 3,315	kg 3,050	kg 3,140	1,167.3	2,345.4	3,933	3,987	3,668	1,167.3	2,345.4	3,933	3,987	3,668
Chemical	ℓ kg 8.05 56	ℓ kg 21.4 90	ℓ 20.55	ℓ kg 19.65 108	ℓ 15.71	143	467.7	659	955	636	143	467.7	659	955	636
Total	---	---	---	---	---	2,786.3	4,451.1	5,564	6,310	6,113	2,786.3	4,451.1	5,564	6,310	6,113
Irrigation	ha 19.5	ha 19.5	ha 18.8	ha 18.4	ha 18.3	1,465	1,365	2,143	1,656	2,470.5	–	–	–	–	–
Grand Total	---	---	---	---	---	11,874.3	(16,305.1) 19,348.1	(17,963) 22,331	(18,755.5) 29,183.5	(21,808) 40,591	4,695.1	6,788.1	8,383	10,652.5	10,568.1

Numbers in parenthes are actual number farmers needed. Numbers outside parenthes are that of recalculated from palay paid by farmers.

Table 12–6. Operational Expenses on the Field of Pilot Farm Jan.–June 1975
(Expenses including Farmer's own Labor)

Unit: ₱

Block	Area planted (ha)	Seed bed preparation and sowing ①			Land Operation and Transplanting: Plowing ②			Harrowing ③			Puddling Levelling ④			Trans-planting ⑤			Total ⑥=②+③+④+⑤			Weeding ⑦			Fertilizing ⑧			Spraying ⑨			Harvesting ⑩			Total ①+⑥+⑦+⑧+⑨+⑩			Seed ₱78/cav. ⑫	Fertilizer ⑬	Chemical ⑭	Irrigation ₱135/ha ⑮	Grand Total ⑯=⑪+⑫+⑬+⑭+⑮			%		
		own	hired	Total	own	hired	Total	own	hired	Total	own	hired	Total	own	hired	Total	own	hired	Total	own	hired	Total	own	hired	Total	own	hired	Total	own	hired	Total	own	hired	Total	paid	paid	paid	paid	Actual			own	hired	Total
A_1	5.4	229.5		229.5	666		666	108	486	594	198	162	360	99	549	648	1,071	1,197	2,268	349.8	90	439.8	54		54	104		104	81	738	819	1,889.3	2,065.5	3,954.8	515	809	224	729	1,889.3	4,342.5	6,231.8	30	70	100
		40.5		40.5				486		486	162		162	549		549	1,197		1,197	90		90																					
		270		270	666		666	594		594	360		360	648		648	2,268		2,268	439.8		439.8	54		54	104		104	819		819	3,954.8											
A_2	2.6	31.5		31.5				36		36	72		72	54		54	162		162	63		63	9		9	26		26	45		45	336.5		336.5	273	174	65	351	336.5	2,295.5	2,632	13	87	100
		85.5		85.5	270		270	90		90	126		126	324		324	810		810	99		99	9		9	26		26	405		405	1,434.5		1,434.5										
		117		117	270		270	126		126	198		198	378		378	972		972	162		162	18		18	52		52	450		450	1,771											
B	12.9	581.4		581.4	1,077		1,077	528		528	432		432	351		351	2,388		2,388	1,054.8		1,054.8	104.4		104.4	123.5		123.5	144		144	4,396.1		4,396.1	1,294	2,859	412	1,741.5	4,396.1	11,180.1	15,576.2	28	72	100
		252.9		252.9	558		558	261		261	234		234	1,008		1,008	2,061		2,061	767.4		767.4	90		90	118.3		118.3	1,584		1,584	4,873.6											
		834.3		834.3	1,635		1,635	789		789	666		666	1,359		1,359	4,449		4,449	1,822.2		1,822.2	194.4		194.4	241.8		241.8	1,728		1,728	9,269.7											
C	19.85	723.6		723.6	2,214		2,214	792		792	702		702	441		441	4,149		4,149	1,878		1,878	281.8		281.8	276.9		276.9	306		306	7,515.3		7,515.3	1,981	3,988	1,290	2,679.75	7,515.5	16,683.45	24,198.75	31	69	100
		261.9		261.9	954		954	669		669	234		234	1,431		1,431	3,288		3,288	486		486	90		90	117		117	2,502		2,502	6,744.9											
		985.5		985.5	3,168		3,168	1,461		1,461	936		936	1,872		1,872	7,437		7,437	2,364		2,364	271.8		271.8	393.9		393.9	2,808		2,808	14,260.2											
D	13.0	540		540	1,728		1,728	486		486	450		450	459		459	3,123		3,123	462		462	90		90	143		143	171		171	4,529		4,529	1,393	1,656	435	1,755	4,529	9,061	13,590	33	67	100
		117		117	360		360	556		556	198		198	882		882	1,996		1,996	234		234	45		45	26		26	1,404		1,404	3,822											
		657		657	2,088		2,088	1,042		1,042	648		648	1,341		1,341	5,119		5,119	696		696	135		135	169		169	1,575		1,575	8,351											
E	12.2	540		540	1,368		1,368	666		666	846		846	261		261	3,141		3,141	1,796.4		1,796.4	112.5		112.5	175.5		175.5	216		216	5,981.4		5,981.4	1,448	2,086	499	1,647	5,981.4	9,916.1	15,897.5	38	62	100
		229.5		229.5	558		558	180		180	126		126	891		891	1,755		1,755	435.6		435.6	36		36	52		52	1,728		1,728	4,236.1											
		769.5		769.5	1,926		1,926	846		846	972		972	1,152		1,152	4,896		4,896	2,232		2,232	148.5		148.5	227.5		227.5	1,944		1,944	10,217.5											
F	9.2	333		333	252		252	468		468	180		180	180		180	1,080		1,080	216		216	63		63	78		78	126		126	1,896		1,896	937	2,120	517	1,242	1,896	9,814.5	11,710.5	16	84	100
		285.1		285.1	1,019		1,019	1,137		1,137	396		396	810		810	3,362		3,362	144		144	85.5		85.5	78		78	1,044		1,044	4,998.6											
		618.1		618.1	1,271		1,271	1,605		1,605	576		576	990		990	4,442		4,442	360		360	148.5		148.5	156		156	1,170		1,170	6,894.6											
Total	75.15	2,979		2,979	7,305		7,305	3,084		3,084	2,880		2,880	1,845		1,845	15,114		15,114	5,820		5,820	614.7		614.7	926.9		926.9	1,089		1,089	26,543.6		26,543.6	7,841	13,692	3,440	10,145.25	26,543.6	63,293.55	89,837.15	30	70	100
		1,272.4		1,272.4	3,719		3,719	3,379		3,379	1,476		1,476	5,895		5,895	14,469		14,469	2,256		2,256	355.5		355.5	417.3		417.3	9,405		9,405	28,175.2											
		4,251.4		4,251.4	11,024		11,024	6,468		6,468	4,356		4,356	7,740		7,740	29,583		29,583	8,076		8,076	970.2		970.2	1,344.2		1,344.2	10,494		10,494	54,718.8											

B. Part of Machinery

Haruo Miyaishi

Foreword

Based on an agreement (5 years) between the Republic of the Philippines and Japan, this project was launched in June 1969 to create a model district in Naujan, the central rice belt in Oriental Mindoro Province, and in Alan Alan in Leyte Province, to increase rice yield in the Philippines.

Although 4 Japanese specialists, with Mr. Ryuichi Nakagawa as the leader, were dispatched to the Philippines in August of the same year, there was a rotation of specialists during the period of the agreement and I continued the work of my predecessor, Mr. Shuntaro Suruga, from December 1971.

This agreement encompassed a 5 year project in which the various structural facilities, civil engineering works, and the preparation of 100 hectares of new paddy field would be completed during the first 2 years and technical guidance activities would be conducted for the inhabitants within and outside the pilot farm during the remaining 3 years. The final objective was being to disseminate farming technique in 1,000 hectares area around the project district. This project however was greatly delayed from the initially decided schedule.

This was not due to any business failures but was simply proof of the difficulty of preparing farm land where there were many swampy areas as well as sandy hills in this project site. However, it is also true that there were some obstructive causes in impeding the progress of this project that we feel must be frankly appraised and recorded for the benefit of future projects of this kind.

Leaving the explanation of these obstructive elements for later detailed reports, this project was advanced under various difficult conditions with the ideal team work formed by the Japanese and Philippine counterparts centered on the leader Mr. Nakagawa.

Special notes on this accomplishment are the perfect leveling of the entire 100 hectares area, the well arranged irrigation and drainage canals, and the criss crossing farm roads to permit easy access to any paddy fields with machines or carabaos. Also, the project carried out the exchanges and consolidation of the field that were formerly divided into several sections or were irregular in shape were consolidated into rectangular paddy fields. As a result, management of the fields became more convenient and efficient than ever in farming operations that were possible from various economical points.

Of the 100 ha pilot farm, mere 20 ha was previously under cultivation and the remaining 80 ha was uncultivated fields. In other words, rice could now be harvested from where previously even a handful of rough rice could not be produced. Palay harvested from the field that were operated directly by administration shows an annual upward trend to reach

as much as one hundred (100) cavans per hectare. Production standards of the farmers are still low with an initial target of 80 cavans. It is presently an average of 50 cavans per ha. However, several farms have exceeded the standard level and it is believed that it will be possible to attain the target within a few years.

Also, as an outgrowth of the completion of this land consolidation, the price of land increased sharply from the previous 3, 000 pesos per hectare to the current 10, 000 to 12, 000 pesos per hectare.

Further, as this report only treats the narrow field of machinery, please review the general report (1975) put out by Mr. Nakagawa together with the reports by the extension and agronomy specialists.

Looking back to my 4 four and a half years duty in Oriental Mindoro, my only regret was that I was not able to accomplish all that I had anticipated in initial time because time flew by so quickly.

I wish to take this opportunity to express my deepest appreciation to all those connected with this project and especially to the officials of the supervisory agency of this project NFAC Director Mr. Domingo Panganibn, Chief Special Projects Mr. Jorge Cruz, BAE Commissioner Mr. Francisco Saguiguit, present Commissioner Mr. Francisco Renturar, the Japan International Cooperation Agency, Japanese Embassy in Manila, Manila office of JICA, and the staff of the concerned agencies for their warm support and guidance.

I also wish to thank my most excellent counterpart Mr. Teofilo S. Corpuz for many years of partnership.

June, 1976

I. Project Progress Report

1. Conditions of machine utilization

The total amount for the machinery supplied by the Japanese Government for this pilot project will reach approximately 120 million yen. Of this, first, second, and supplementary supply of equipment amounted to approximately 75 million yen that were consisted of basic equipment such as heavy construction equipment, vehicles, farm machinery, research and test equipment, office equipment, fertilizer, farm chemicals, and other items called main machine. All those materials were necessary to curry out the work of this project. The additional machines supplied in the third stage were consisted of those requested from the project site such as swamp bulldozer, ditcher, rock crusher for use in humid regions and these amounted to an supply of 10 million yen. In addition, approximately 3 million yen in maintenance equipment and tools, 2 million yen in some research and test equipments. A quantity of office supplies and the majority of expendable machine parts were supplied. Also included is approximately 2 million yen for transportation of equipment and for miscellaneous expenses.

Although the usage results of the machinery supplied is as shown in Table 1, their usage will differ in relation to the period they were supplied, the type of work in which they were employed, the period in which they were put in operation, and their length of usage. The principal features in the usage of the machines may be explained by roughly classifying them into the following three stages.

(1) Ground preparation work during the initial stage of reclamation to a paddy field;

Rough tillage by means of heavy equipment such as bulldozers, shoveldozers, dump trucks, and with 4-wheeled trucks.

(2) Ground preparation work during the latter period of paddy field reclamation and tillage of the first to the third planting plots;

Heavy machineries were fully used for field operations and pumps for drainage. Also, power tillers with trailer will be employed for hauling supplies. Primary tillage will be continued with 4-wheeled tractors. Machinery was used for tillage of direct-controlled fields in the pilot farm and also loaned to the regular farmers. It is believed that the usage of 4-wheeled tractors, power tillers and other machines will become frequent. Increased usage will be made of large sized irrigation pumps, power generators, and drier hullers.

(3) Tillage of all plots after completion of land consolidation within pilot farm and cooperation in levelling and paddy field reclamation in areas outside the project zone;

As usage of heavy machinery will now be limited to making small repairs

within the project area, cooperation will be given to the farmers in areas outside the project zone in compliance with their requests. The degree in usage of general farm machinery will increase.

Although I have summarized the progress in utilization of machinery as mentioned above, please also refer to the reference attached to the actual conditions of usage of the principal machines which are listed below in the order of their work application.

Table 2. Machines Used Frequently in Land Consolidation
Table 3. Results of Rental Machines
Table 4. Rental Rates
Table 5. Progress in the Utilization of Heavy Machinery and Vehicles
Table 6. Progress in the Utilization of Principal Farm Machinery
Table 7. Progress in the Monthly Utilization of principal Machines.

I believe that you will be able to have a general idea about the work progress in this project by reviewing the above tables. In Table 7 especially, it can clearly be seen that the zenith of this project, or the work peak, was during the period from February of 1973 to March of 1974. Although there is a dip during November and December of 1973, this was due to the necessity of replacing the pins and bushings in the shoe links of the bullodozers caused by heavy wearing. With the cooperation of the Governor of the province of Oriental Mindoro, we were able to rent 2 bulldozers and one (1) grader from the Provincial Equipment Pool to continue operations during this period.

Full usage was also made of the machines as a 2-shift system was set up for the operators during this period. I will touch on the subject of bulldozer troubles in a later paragraph on maintenance.

Table 1. Utility results of Machinery (As of March 1976)

Name of Machine	Q'ty	Operating time/distance					Total
		Period of five years agreement			Period of extension		
		Jan. June 1970～1972	July June 1972～1973	July June 1973～1974	July June 1974～1975	July March 1975～1976	
Bulldozer D50P	1	-	1,749hr	1,082hr	799hr	323hr	3,953hr
" D50A	1	758hr	698	982	-	-	2,436 "
Dozer shovel D30S	1	1,156	1,359	1,221	186	-	3,921 "
Crane truck	1	250 (1,315km)	186 (533)	48 (439)	2 (1)	2.5 (45)	488.5 " (2,332km)
Cargo truck	1	13,435km	10,817km	6,213km	1,157.5km	376km	32,000.5
Dump truck	2	35,371	47,095	35,010	9,807.5	11,700	138,983.5 "
Station wagon	1	48,620	33,846	26,215	23,051	12,894	144,626.0 "
Jeep	1	10,000	28,113	16,322	12,612	6,437	73,484.0
Concrete mixer	1	-	692hr	437hr	34hr	-	1,163hr
Irrigation pump ϕ16"	1	50hr	284	1,135	1,165	815	3,449 "
ϕ 2"	2	400	117	155	175	-	947 "
ϕ 3"	2	450	16	5	-	5	476 "
Generator 35KVA	1	28	464	807	84	169	1,552 "
" 3KVA	2	550hr	1,318	761	1,661	1,107	5,397hr
" 1KVA	2	560	751	518	642.5	148	2,619.5 "
Tractor L-350	1	94	961	881	871.5	402	3,209.5 "
" L-27	1	376	302	234	-	97.5	1,009.5 "
Power tiller KMB-200	2	-	104	239	299.5	662.5	1,305 "
" KR-850	5	340	398	1,329	398.5	358.5	2,824 "
" KL-1100	3	457	323	1,005	508	473.5	2,766.5 "
Power sprayer	2	292	124	243	56	85	800 "
Power duster	5	75	21	13	35	27	171 "
Automatic thresher	3	-	43	60	52	49.5	204.5 "
Combine	2	110	159	39	-	111	419 "
Dryer flat type	2	-	124	257	258	127	766 "
Dryer circulation type	3	-	45	212	115	-	372 "
Rice mill	1	-	98	173	65	126	462 "
Mini bus	1					2,962km	2,962km

Table 2. Machineries frequency used in Land consolidation

Name of machine	Month / Year	Operating time (hr)												Total (hr)
		July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	
Bulldozer D50P	1972 ~ 1973	-	21.5	175.5	164	189	172	165	183	175	168	165.5	170.5	1,749
	1973 ~ 1974	135	121	145	143	-	-	175	198	165	-	-	-	1,082
Bulldozer D50A	'72 ~ '73	82.5	32.5	36	76	-	-	74	84	75	61	95	82	698
	'73 ~ '74	141	143	122	80	-	13	60	255	168	-	-	-	982
Dozer shovel D30S	'72 ~ '73	89.5	100	162	151	129	76.5	-	99.5	133.5	125.5	127.5	164	1,358
	'73 ~ '74	146.5	158	141	105	88.5	-	-	61.5	172	121.5	117	110	1,221
Tractor L-350	'72 ~ '73	119	120	101	77	62	52	81	32	4	108	127	78	961
	'73 ~ '74	107	66.5	65	65	114.5	154	47.5	148	113.5	-	-	-	881

Table 3. Results of Rented Machineries (As of March 1976)

Name of Machine	Total operation time	Users			
		Farmer's inside the project	Farmer's outside the project	Gov't agencies	Others
Bulldozer D50P	328.0hr	-	312.5	13.5	2.0
" D50A	15.5"	-	6.5	9.0	-
Dozer shovel D30S	81.5"	-	-	-	81.5
Dump truck	237.5"	25.5	26.5	2.0	184.5
Cargo truck	160.5"	-	31.5	6.0	123.0
Crane truck	4.0"	-	2.5	-	1.5
Pump ϕ2"	36.0"	-	17.0	-	19.0
" ϕ3"	68.0"	-	22.0	-	46.0
Tractor L-350	660.5"	577.5	83.0	-	-
" L-27	110.5"	110.5	-	-	-
Power tiller	1,482.0"	1,324.0	58.0	-	-
Disc harrow	33.0	33.0	-	-	-
Rear grader	16.0	16.0	-	-	-
Chain block	128.0	-	-	-	128.0

TABLE 4 RATE OF RENTALS

The following list of the equipment and machinery shall be rented at the corresponding rate per hour, and the cost of fuel, oil, repair, spare parts and operation shall be shouldered by the use.

A. Construction Equipment	Rental Fee
1. Angle Dozer–Komatsu D50A–15	₱ 40.00/hr.
2. Bulldozer	43.30/hr.
3. Back hoe Komatsu	10.00/hr.
4. Dozer–Shovel–Komatsu D305–12	30.00/hr.
5. Hydraulic truck crane	30.00/hr.
6. 6 ton cargo truck	10.00/hr.
7. 2 ton dump truck	10.00/hr.
8. Treble chain block	2.00/hr.
9. Air compressor	2.00/hr.
10. Concrete mixer	6.00/hr.
11. Belt conveyor	2.00/hr.
B. Agricultural Machinery and Equipment	
1. Husker	₱ 1.00/hr.
2. Pedal thresher	0.20/hr.
3. Automatic thresher	1.60/hr.
4. Power mist blower and duster	1.50/hr.
5. Hand duster	0.30/hr.
6. Reversible single plow	1.00/hr.
7. Disc plow	2.70/hr.
8. Bottom plow	2.60/hr.
9. Trailer	1.20/hr.
10. Disc harrow	5.50/hr.
11. Tooth harrow	1.50/hr.
12. Power tiller 7hp.	3.40/hr.
13. Power tiller 8hp. (Kr 350 x Kr 65)	2.00/hr.
14. Power tiller 9hp.	4.70/hr.
15. Power tiller with rotary (Kubota) RMB 200 x ER 90	3.20/hr.
16. Tractor with rotary	6.20/hr.
17. Tractor L350	7.20/hr.
Rotavator	5.50/hr.
18. Tractor L27	6.20/hr.
Rotavator	5.10/hr.
19. Binder	4.00/hr.
20. Hand sprayer	0.50/hr.
21. Power sprayer I HS–23 KUBOTA	7.20/hr.
22. Power sprayer II CSP X MARUYAMA	5.20/hr.
23. Power sprayer III MS 400–E MARUYAMA	2.80/hr.
24. Sprayer with rotary	2.00/hr.
25. Kreis cutter	1.00/hr.
26. Hand weeder	0.07/hr.
27. Power weeder	2.50/hr.
28. Rice whitening machine	2.50/hr.
29. Scraper	0.13/hr.
30. Combine	6.00/hr.

Continued

31. Ditcher	12.90/hr.
32. Rice planter	2.70/hr.
33. Winnower	1.30/hr.
34. Pump ϕ 70 mm	2.60/hr.
35. Ebara centrifugal pump M–150 SFE 2"	2.00/hr.
36. Pump ϕ 50 mm	1.60/hr.
37. Ebara centrifugal pump M–50 SFE 3"	3.00/hr.
38. Ebara centrifugal pump M–140 SRL 16"	100.00/hr./crop
39. Generator 35 Kw	5.60/hr.
40. Generator 3 Kw	1.90/hr.
41. Generator 1 Kw	1.30/hr.
42. Cargo jack	0.15/hr.
43. Electric welder	1.20/hr.
44. Battery charger	0.40/hr.
45. Diesel generator ASK 110	2.00/hr.
46. Diesel generator ASK 120	2.00/hr.

C. Drying Fee

a) Horizontal and vertical type of dryer

1st 3 hours	₱ 6.00/hr.
2nd 2 hours	5.00/hr.
for the following hours	4.00/hr.

b) Semi–vertical type of dryer

1st 3 hours	₱ 5.00/hr.
2nd 2 hours	4.00/hr.
for the following hours	3.00/hr.

D. Milling Fee

₱3.00/cavan (56 Kg.–White rice or prevailing price in the locality.

E. Irrigation fee per hectare

Palagad season	3 cavans (45 Kgs/cavan of palay)
Regular season	2 cavans

* For all pump sizes, operator and fuel consumption shall be shouldered by the user.

Table 5 Progress of utility of heavy equipment

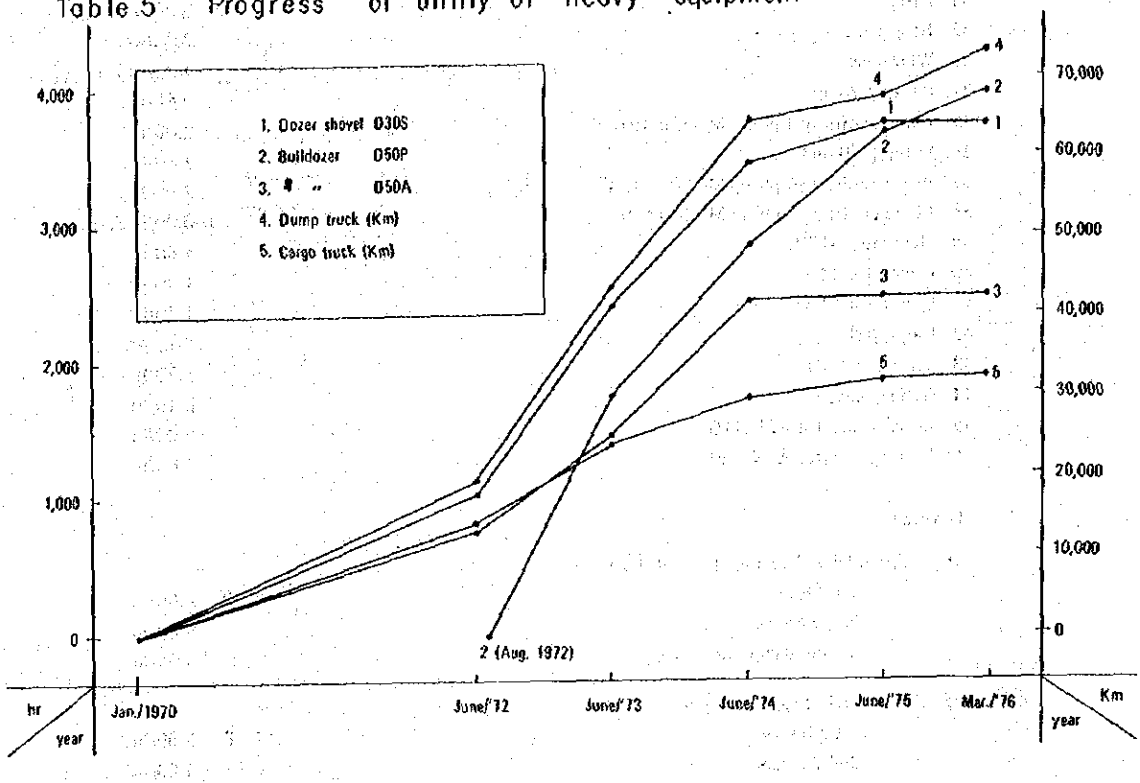


Table 6 Progress of utility of form machinery

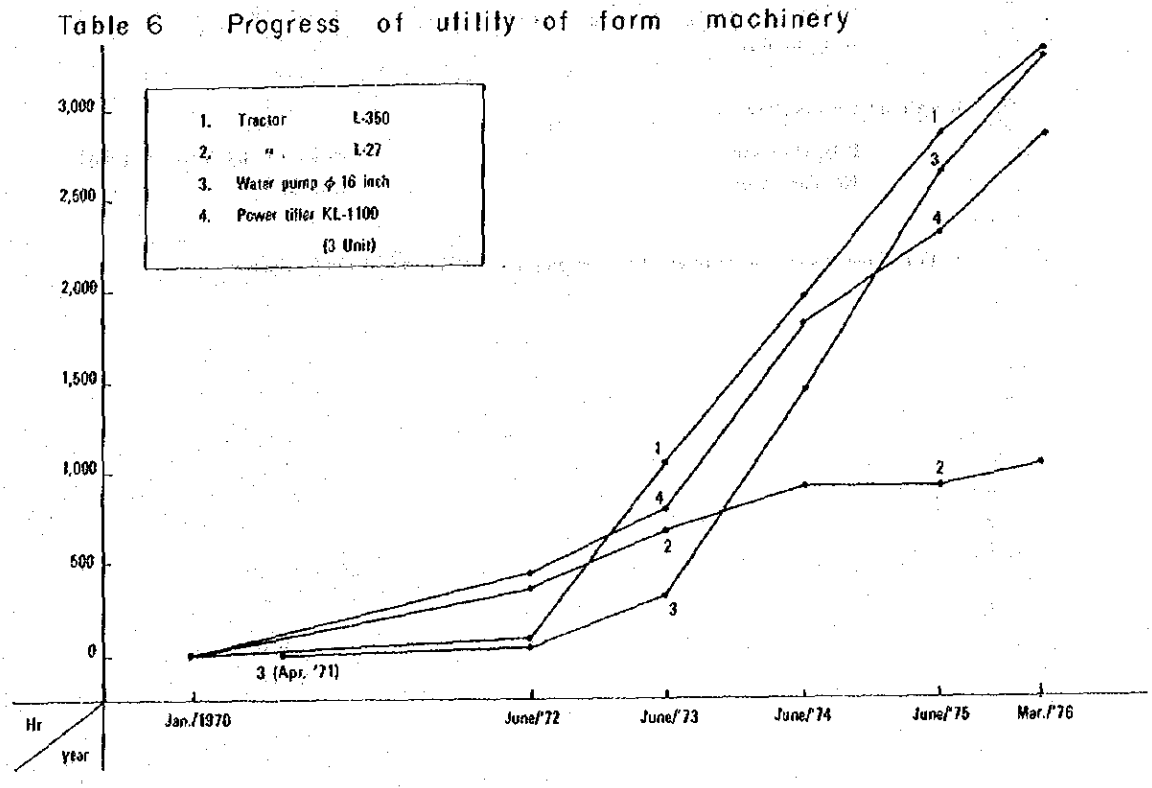
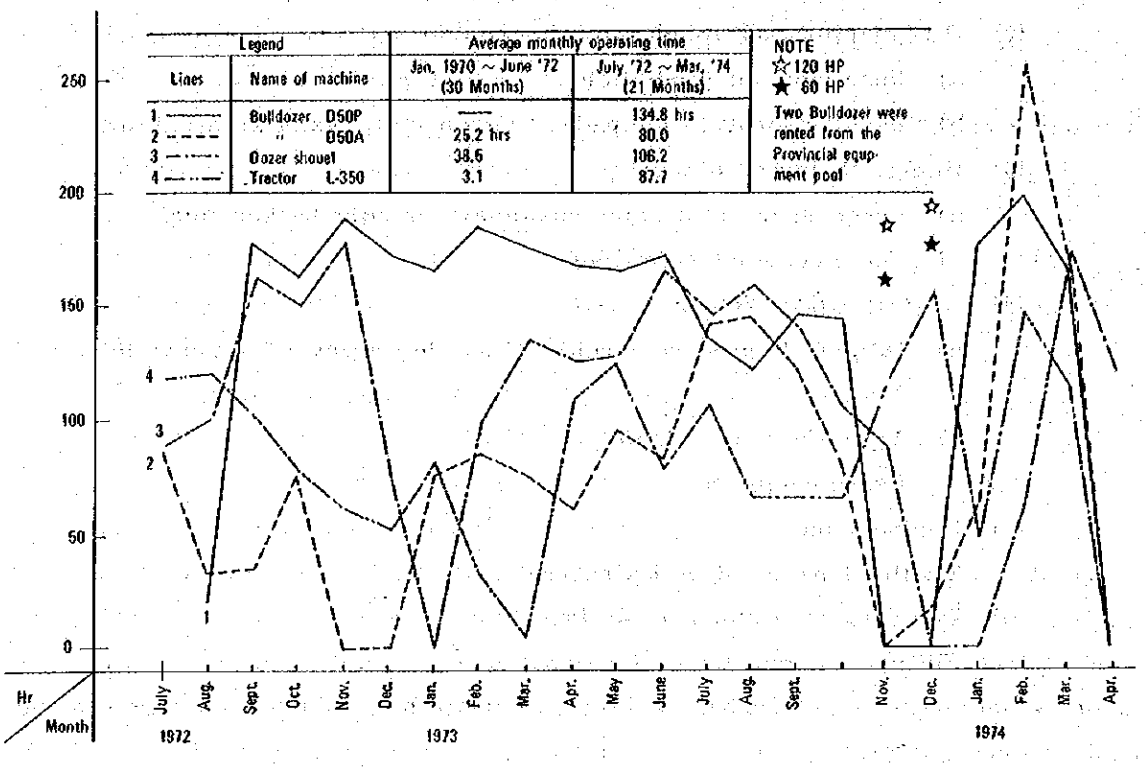


Table 7 Progress of monthly utility of principal machinery



2. Actual Usage and Problems of thePrincipal Machines Supplied

Due to the variety in the types of machines supplied, it is difficult to evaluate the usage of each machine. I have classified the farm construction machinery and farming machinery into 11 categories and have judged their effective usage each. Table 8 shows the effectiveness of utility of the principal machines. Even the items that are low ranked utility in Table 8 are sometimes ranked high in the necessity. That is to say degree of utility is quite different from that of necessity. This also depends on the contents of work or purpose of usage such as those for the purpose of special jobs, for display or training and for research and test. Further, those machines with extremely low usage are sometimes highly necessary. For Example, rice planting machine is not necessary in the Philippines because of low wage, however, it is valuable from the point of display.

I will make the list of those items with problems in usage and the types of problems involved.

a) Items with practically no usage value in relation to conditions at the site.

(1) Power Weeder

Reason

a) Unsuitable for dense cultivation

b) Seedlings will be damaged during rotation

c) Cheaper and neater work by manpower

(2) Disc Harrow and Broadcaster

a) Unsuitable for paddy fields

b) Usage difficult as the paddy fields are always in wet condition.

(3) Husker (Independent unit)

a) Unnecessary as it is not customary to store husked rice.

b) Too large for test husking

(4) Acetylene Gas Welder

a) Difficult to procure carbide (Possible, however, in the vicinity of Manila)

b) Type of unit unsuitable

Usage complicated

(5) Engine Stand

Trolley type would be desirable

(6) Portable Carpenter's Tools (Electric)

Entirely too small

b) More variety and number of units were desirable in the way of machines and accessories.

(1) Bulldozer Track Parts

From the nature of the work involved, the tracks of the bulldozer (caterpillar) is subjected to heavy wear. More spares are therefore necessary than in ordinary case. Although it would depend on the nature of the work involved and to the conditions at the site, it would be desirable to have standard accessories 1 set of shoe assemblies or more than 1 set of pins, bushings, and 1 set of rollers. I will go into this problem in more detail in other paragraph on machine maintenance.

(2) Hydraulic Press

Tools necessary for replacing the above pins and bushings (50 ton capacity)

Special Tools (Example)

Komatsu No. 09732-00001

Komatsu No. 09715-00001

(3) Dump Truck

Approximately 5 required. 4 to 5 for each Dozer Shovel

(4) 4-Wheeled Tractors

One 60 PS and three 35 PS class units were desirable. Tractors under 30 PS are inadequate in horsepower and capacity and cannot display their functions

as 4-wheeled tractors. Increased variety of attachments are desirable. (Refer Item 65, Table 19)

(5) Power Tiller

15 Units required. 5 of these units should be light in weight (also called home tillers - with gasoline engines) for use in wet paddy fields.

(6) Blades for Rotary Tillers

Since wear is heavy. it will be desirable to have 3 sets for each machine as standard accessories. Periodic replenishment will also be necessary.

(7) Hand Farm Tools

Total quantity should be increased as wear is heavy. An extra 10% supply of handles for mattocks and hoes will be required as breakage rate is high.

(8) Rice Planting Rope

Spares are required as this is expendable.

(Example) 20 Rolls each of ropes with V marks (red) in intervals of 15 and 20 cm each.

c) About the Types and Models of Machines

Although a number of automatic self-recording type machines were supplied. when precision machines are supplied to developing countries particularly to outlying areas where farms are located, once trouble develops repair and adjustments those will not be an easy task. As management and control of machinery is not possible by the Japanese specialists alone due to the vast numbers involved, this is allocated to many Philippine staffs according to the kind of machinery. As a result, trouble frequently develops due to operational errors and inadequate controls. In these cases, I believe that there is no alternative but to retain spare parts for those that are prone to give trouble, or to use equipment that is suited to the conditions at the site that can be switched over automatically from manual to visual measurement.

An example in addition to the foregoing was the problem of deterioration of the light sensitive chemicals on the papers used in the copy machine (wet type), which prevents the storage of spare supplies over an extended period. Inconveniences were therefore experienced in being required to have supplies shipped in on a frequent basis. If we were not restricted to Japanese products those are on the market in the Philippines, replenishment of supplies can be conveniently carried out in the Philippines. conveniently carried out in the Philippines.

Machines that will require study are listed as follows.

(1) Dryer of Circulation Type

Malfunctions and troubles are frequent in the electromagnetic valves so spares are desirable.

(2) Weather Observation Instrument (Battery Type Automatic Recording System)

When operating normally, this is extremely convenient but once trouble develops

adjustments are difficult and recording will be interrupted or recording errors will result. It will therefore be desirable to change over to a complete manually operated visual type observation equipment or at least keep spare parts for the main equipment,

(3) Wireless Equipment

Although there is no denying that it would be convenient to have this equipment, this is not a high priority item when evaluated from the standpoint of the frequency of usage. Repairs will also not be simple.

(4) Copy Machines

The dry type is desirable. If possible, models that are sold and used in the Philippines will be preferable.

(5) Manual Calculators

Trouble develops frequently (operational errors) and repairs are difficult. It is believed that portable electronic calculators will be used in future.

Table 8. Usage Results of the Principal Machines and Equipment Supplied by the Japanese Government

I. Agricultural Construction Machinery

Machine Name	Model	HP (Capacity)	Quantity	Utility				
				High	Normal	Low	Very Low	
Komatsu Bulldozer for Wet Land	D50P -15	90	1	○				Effective for levelling and road construction in land consolidation. Most effective in finishing the levelling of paddy fields in submerging condition.
Komatsu's Bulldozer	D50A -15	90	1	○				Used for levelling and road construction
Komatsu Dozer Shovel	D30S -12	55	1	○				For loading dirt and gravel and filling under drainages.
Back Hoe Attachment for Above.	DHF-030-2	3.15m	1	○				Digging irrigation and drainage canals, filling under drainages.
Isuzu Crane Truck	TXD -50	7 tons	1	○				Used for many purposes such as carrying crate, loading and unloading heavy equipment, machine installation, machine repairs, etc.
Toyota Cargo Truck	DA115 -L	6 tons	1	○				Hauling machinery, dirt, unhusked rice, etc.
Toyota Dump Truck	RU12 -LD	2 tons	2	○				Hauling earth and gravel, hauling machinery, and hauling unhusked rice.
Kubota Ditcher	K-700	6.5	1		○			For digging irrigation and drainage ditches and also for constructing foot paths and levees.
Koyo Concrete Mixer	KYC-KND-6A	6	1	○				For civil engineering construction work. Also for manufacturing blocks and cement slabs (for irrigation ditches)
Belt Conveyor			2	○				For construction work especially in the installation of large-sized pumps and in the construction of drainage ditches
Chain Block		3 tons 1 ton	2	○				In addition to construction work, this was extremely useful when repairing machines and especially when installing the large size pumps

II. Measuring Devices

Machine Name	Model	HP (Capacity)	Quantity	Utility				Remarks
				High	Normal	Low	Very Low	
Tokyo Kogaku Transit	AB	25 x	1	◦				Used in the first half of the project work
Tokyo Kogaku Level	T-2 25K	25 x	1	◦				
Muto Kogyo Drafter	MGF -110		1	◦				
Takeda Drafting, Drafting Machine	KENT -E		1	◦				
Ikeda Drafting Board and Desk			2	◦				
Ikeda Drafting Set			1	◦				
Ikeda Regulation Set - 6 Types			6	◦				
Ikeda Slide Rule			4	◦				
Ikeda Tape Measure (Cloth, Steel)			10	◦				
Sugiura Sangyo Plane-Table Surveyor			1	◦				

III. Farm Machines

Machine Name	Model	HP (Capacity)	Quantity	Usage				Remarks
				High	Normal	Low	Very Low	
Kubota 4-Wheel Tractor	L-350	35	1	○				For first rough levelling plowing, rotary tilling, puddling, etc. for land consolidation.
"	L-27	27	1	○				
Kubota Power Tiller	KMB -200	9	2	○				Used for tilling and puddling work
"	KR-850	7	5	○				Tilling, puddling, and hauling equipment by means of a trailer attachment.
Iseki Power Tiller	KL-1100	9	3	○				Used for tilling and puddling work
Kyoritsu Hand Duster	SETE -11		10		○			Light and convenient to use in spreading agricultural chemicals over a small area
Hatta Hand Duster	New Golden		5		○			Convenient to use as granulated chemicals can be sprayed.
Maruyama Hand Sprayer	8 TIPE		10		○			For rice nurseries, vegetables or small-scale farming
Maruyama Power Sprayer	CSP-1	4	1		○			For control of 3 ha of Demonstration fields and 5 - 10 ha of fields controlled directly by Administration
Maruyama Power Sprayer	MS-400E	4	1		○			For spraying test fields and also used for washing vehicles.
Kubota Power Sprayer	HS-23	8	1		○			For spraying on the Demonstration field and paddy field controlled directly by Administration
Kubota Power Mist Duster	ADM -30	3	10	○				For spraying on Demonstration fields and paddy field controlled directly by Administration especially during the dry period
Iseki Rice Transplanter	PC-20	2.5	1				○	Faults exist in its efficiency and in raising its effect on the rice seedlings
"	PF-200	2.5	1		○			Dapog seedlings may be used. Principally for show purposes

Continued

Machine Name	Model	HP (Capacity)	Quantity	Utility				Remarks
				High	Normal	Low	Very Low	
Kubota Binder	HC-50	3	1			°		As the shattering characteristics of panicle is high, the utility becomes low.
Iseki Combine	HD-50	7	2	°				Extremely effective in dry season
Kubota Fully Automatic Thresher	JT-N480	3	3	°				Utility is high although there were some drawbacks in threshing during the wet season.
Fukazawa Foot Thresher			4		°			For test purposes and small areas. Farmers have no interest
Sashinami Hand Operated Weeder			30	°				Of the 15 and 20 cm types. the 15 cm width was preferable.
Fuji Power Weeder	RPC-13	3.5	20				°	Damages the seedlings when rotating. As wider spacing is necessary, this is not suited for increased production.
Toyota (Make) Wheelbarrow			20	°				Useful for hauling supplies of construction works and farming
Kubota Cutter	C15-1	4	1	°				Used to cut rice straw and spread them back over the paddy field
Maruyama Power Grass Mower	BCA-17	1.5	5	°				Used for cutting grass along the foot paths and irrigation or drainage ditches
Ebara (Yanmer) Pump	NT-75	7.5	4	°				Used for water drainage during the construction work in the first half of the project.

Continued

Machine Name	Model	HP (Capacity)	Quantity	Utility				Remarks
				High	Normal	Low	Very Low	
Small Farm Tools								
1) Hoe	Flat Type		10		○			Used extensively in construction work and cultivation
	Multi-pronged Type		10		○			
	Chinese Type		10		○			
2) Pick	Double Edged		10		○			
3) Shovel	Square Type		25		○			
	Pointed Type		25		○			
4) Sickle	For harvesting rice		20	○				Ideal for mowing rice and grass
	For cutting grass		50	○				
5) Simple Foot-path	Undulating.	1,000m	1	○				Necessary for control of test plots, Utility is high.
	Flat	1,000m	1	○				
6) Anti-sparrow netting	Mesh 20 mm	20 x 25m	20	○				

Continued

Machine Name	Model	HP (Capacity)	Quantity	Utility				Remarks
				High	Normal	Low	Very Low	
Farm Machine Attachments								
1 4-Wheel Tractor								
(1) Disc Plow		26 X 2	1	°				Used for primary plowing in land consolidation. Spares required.
(2) Bottom Plow		14 X 2	2	°				Effective for plowing the field where remains harvested stubs and straw, also effective to dry the soil.
(3) Disc Harrow			2				°	Low usage value in paddy fields
(4) Tooth Harrow			2			°		Used for levelling in sandy soils. Low usage value
(5) Broadcaster			1				°	Unsuitable for rice crops. Not possible in wet condition as in this region of 2 crops per year.
(6) Steel Wheels for Paddy Field Use			2 Sets	°				As strakes are always mounted when using in paddy fields, wear is heavy.
(7) Rotary Blades				°				Wear was heavy due to long hours of usage and spares were lacking.
2 Power Tiller								
(1) Steel Wheels and Cage Wheels								Same as in (6) and (7) of 4-Wheel Tractor above.
(2) Rotary Blades								

IV. Fixed Machines

Machine Name	Model	HP (Capacity)	Quantity	Utility				Remarks
				High	Normal	Low	Very Low	
Kubota Generator	3LKE	52	1	○				Power supply within the project area. Especially for use in the operation of rice mills, driers, welders, etc.
"	ASK -130	6.5	2	○				Power supply within the project area for use in small size electrical machines.
"	ASK -110	3	2	○				Same as above
Ebara(Yanmer) Irrigation Pump	3LDL -F 400 -SZR	53	1	○				For distribution of water in the project area. Along with the large-sized generator, forms the two major fixed facilities.
Satake Rice Mill	TYPE -1	11 KW 5.5 KW	1 Unit		○			Efficient in recovery percentage of white rice and it is drawed more attention by NGA. Operation was kept low to avoid oppressing the neighboring businesses.
Yamamoto Ventilating Type Drier	VDS-8	2 KW	3	○				A bit inconvenient as this is not an automatic circulating type. A drawback is the electromagnetic valve that often gives trouble.
Yamamoto Circulating Type Drier	NCD -12	2 KW	3	○				Highly efficient with uniform drying. The native operators are not suited for operating the electromagnetic valves.
Iseki Flat Type Drier	KEH -48K	1 KW	3	○				Flat type received heavy usage as the palay brought in by the farmers were poorly separated. Suited to this country even if the palay must be tumbled periodically.
Kubota Husker	MN-40		1				○	For display. Usage low in this country as it is not customary to store husked rice.
Ikeda Platform Scale		250 kg 100 kg	1 3	○				Used for weighing unhusked and polished rice.

V. Machine Tools and Maintenance Tools

Machine Name	Model	HP (Capacity)	Quantity	Utility				Remarks
				High	Normal	Low	Very Low	
DAIDEN Electric Welder	B	3.2 KW 200 V	1	○				Used extensively for machine repairs. Used for manufacturing rear graders, steel wheels and other items by procuring iron supplies.
Shinwa Acetylene Gas Welder	S6	1200L/hr	1				○	Difficult to procure carbide. Operation too complicated and operating instructions supplied inadequate.
Namiki Bench Drill	NBD -340	300 W 13ϕmm	1		○			Used for repairing machines and for various machine tool's work
Toshiba Bench Grinder	BGB -205	400 W 200 V	2	○				Used for various bench work
Iwata Air Compressor	SU- -15B	3 PS 10 kg/cm^2	1	○				For filling tires of the various vehicles. Cleaning parts during machine overhaul.
Fuji Air Compressor	PU -3	2.2 KW 5.5 x 7 kg/cm^2	1	○				In addition to the above, a paint sprayer may also be connected to this unit. Also used in conjunction with the drum pump to pour fuel.
Nihon Pump Drum Pump	DP -200	Pipe dia. 3.5m/m	2	○				For fueling bullsozers and other heavy equipment. Is connected to and used in conjunction with the above compressor.
B.T.C Oil Pump		Pipe dia. 2.5m/m	3	○				Used for refueling of power tillers and other small-sized machines
Iyasaka Engine Cleaner	GC -P3		1	○				Used for washing engines during dismantling and assembly.
Iyasaka Engine Stand			1		○			Used when dismantling the engine for repairs.
Iyasaka Parts Cleaner	PS-3	Tank 100L 15L/min	1	○				Used for washing machine parts and is indispensable for maintenance
Iyasaka Battery Charger	Lancher	6 ~ 12V 200W	1	○				Used for charging the batteries in the various vehicles and machines
Iyasaka Spark Plug Cleaner	Vixen SPC -VX	100V Air pressure 7 ~ 10 kg/cm^2	1	○				Used for testing and cleaning spark plugs

Continued

Machine Name	Model	HP (Capacity)	Quantity	Utility				Remarks
				High	Normal	Low	Very Low	
Iyasaka Nozzle Tester	DN -50	10 ~ 400 kg/cm^2	1	○				For checking and adjusting the nozzles of various diesel engines.
Iyasaka Toe-In Gauge	2-C	1300 ~ 2300mm	1		○			Used to correct toe-in of the various vehicles
Iyasaka Ampere Tester		0 ~ 40V -6 ~ 60A	1		○			Used for checking the amperage of the various electrical apparatus
Hirasawa Electric Ampere Test Meter		15 ~ 300A 150 ~ 600A	1		○			Used principally to check the voltages in generators and power distribution equipment
Iyasaka Rotation Meter		0 ~ 10, 000 rpm	2	○				To measure correct rotation of milling machines, pumps husking machines, etc. for proper maintenance.
Iyasaka Garage Jack	HG-3	3 tons	1	○				Used for maintenance and repairs of various machines
Kubota Garage Jack	SG-100	10 tons	1	○				Same as above
Anzen Garage Jack	500 -T	5 tons	1	○				Same as above
Osaka Chain Chain Block		1 ton	1		○			Used for maintenance of the machines and for construction. May also be used for shifting and hauling
"		3 tons	1		○			Same as above
Iyasaka Trolley Chain Block		2 tons	2	○				Used for maintenance of various machines and trolley is movable.
Iyasaka Hydraulic Press	HP -15	15 tons	1	○				Used for replacing the pins and bushings in the bulldozers and caterpillers, and for removing the pins and bearings in various machines.
Iyasaka Valve Lifter		225 ~ 250m/m	1	○				Used for replacing the valves in diesel engines.
Iyasaka Bearing Puller	HD		1	○				Used for removing the bearings in the various machines.
Iyasaka Tool Set			15	○				Used for maintenance of machines and for training. with steel case.
"			1	○				Deluxe special tools for the use of the specialists

Continued

Machine Name	Model	HP (Capacity)	Quantity	Utility				Remarks
				High	Normal	Low	Very Low	
Kubota Magician HC			1	○				Special tools mainly for the use of small and medium engines.
Kubota Magician T			1	○				Special tools for 4-wheel tractor use.
Iyasaka Torque Wrench	1300F 2100F 2800F		3	○				Well used as indispensable for tightening nuts and bolts in the machines.
Hitachi Electric Drill	Portable	φ0.5m 10m/m	1		○			Ideal for light work
Hitachi Grinder	"		1		○			Same as above
Hitachi Electric Carpenter's Tools	"		1				○	Practically no usage value as entirely too small.
Others								Although there were a great number of other tools, they are limitless. If necessary, please refer to the List in RP-Japan Pilot farm. (Examples) Piston Ring Tool, Wire Stopper, Vice Gripper Wrench, Snap Ring Pliers, Vice, Screw-driver Set, Various Types of Hammers, Various Types of Chisels, Various Types of Wrench Sets, etc. amounting to over 80 items. All of these were extensively used and indispensable.

VI. Vehicles for Traffic or Liaison

Vehicle Name	Model	HP (Capacity)	Number of Units	Utility				Remarks
				High	Normal	Low	Very Low	
Toyota Station Wagon	FJ-55 LV	7 Passengers	1	○				For Liaison between the Project Area and Calapan. For commutation of staff members and for visitor use.
Toyota Jeep	FJ-40 LV	"	1	○				For Project director's use. Also for liaison within the project area and for inspection and guidance rounds
Suzuki Motorcycle	U-70	70 cc	4	○				For counterpart's use. Also used for liaison within the project area.
Honda Motorcycle	CD -125	125 cc	1	○				For extention activities. Making tours of farms in and outside the project area.
Toyota Mini-Bus	Coaster Diesel	26 Passengers	1	○				For trainee use. Also for special occasions and for pickup and delivery of visitors

VII. Research and Test Equipment

Item	Model	Capacity	Quantity	Utility				Remarks
				High	Normal	Low	Very Low	
Olympus Microscope	ECB1 -11	10～20 X2000	1		◦			For research and discovery of blight fungus
"	X2	6X～160X	1		◦			For research of plant pests
"	SZ-2	5X～160X	1		◦			Same as above
Ikeda Weather Observation Device	Self-recording		1 set	◦				Screen, thermometer and hygrometer, heliograph, wind direction indicator and anemometer, rain gauge, water level gauge, etc.
Ikeda Water Verifier			1		◦			Check of irrigation water, rain water, well water, etc.
Yamato Kagaku Desiccator	DZ -54	Max 300°C	1		◦			For drying various test samples and containers
Hitachi Refrigerator		200	1	◦				For storage of seeds, chemicals, samples, etc.
Toa Denpa PH Meter	PH -5A		1	◦				Used for testing soil and water quality
Yanagida Type Soil Verifier			1	◦				Used to check soil quality. Also used for training and extension activities
Yamato Kagaku Germination tester			1	◦				Used to test seed germination.
Yamato Kagaku Hygrometer			1			◦		A drawback was the fragility of the glass tube
Naga Manufacturing Co. Direct Reading Scale	C2 -500	500 g Min. 0. 1g	1		◦			Used to weigh palay, husks, and other light items
Yamato Kagaku Platform scale		1～10kg Min. 0. 5～5g	2		◦			Used to check yield
Ikeda Precision Stalk Scale		200 g Min. 0. 05g	1	◦				Same as above
Ikeda Head Scale		10 g Min. 0. 02g	1	◦				Same as above
Ikeda Grain Scale		150 g	1	◦				Same as above
Ikeda Minute Grain Gauge		0～10m/m Min. 0. 05m/m	1			◦		Same as above
Ikeda Cone Panetrometer		Min. 0. 1 mg	1	◦				Same as above

Continued

	Model	Capacity	Quantity	Utility				Remarks
				High	Normal	Low	Very Low	
Ikeda Sampling Thresher	TSL Type	Motor 200V	1	◦				Used to chek yield volume
Ikeda Sampling Huller	HMF	〃	1	◦				Same as above
Ikeda Sampling Rice Mill		〃	1	◦				Used to check the recovering rate of milling
Ikeda Sampling Winnow	B-3B	200V	1	◦				Used to check rate of yield
Okamoto Riken Water Distiller	B-5	5 /hr	1	◦				Required for the verifiers. Also used for vehicle batteries
Others								There are also a number of other accessories and small devices with above normal usage and considered necessary items. Refer to the machine list that had already reported in 1975. (Examples) Boring Stick, Alcohol Lamp, Test Equipment Set, Plastic Containers, Wagner Pot, Porcelain Pot, Magnefying Lens, Single Head Huller, Insect Collection Box, Sepcimen Bottle etc.

VIII. Audio Visual Machines

Item	Model	Capacity (Specifications)	Quantity	Utility				Remarks
				High	Normal	Low	Very Low	
Elmo 16mm Projector	16 -SR	200V 500W	1	○				Used to introduce agriculture and culture in Japan to the farmers in and outside the project area, and to the trainees and visitors. The films were borrowed from the Japanese Embassy in Manila
Elmo Slide Projector	AS-1000T	200V 500W	1	○				Employed as a guide to rice crop technique to the staff, trainees, farmers, etc.
Cannon 8mm Cinescope Camera	318M	F. 1.8 10~30 m/m zoom	1	○				For film recording of project activities
Cannon 8mm Projector	S-400	F. 1.3 200V zoom	1	○				To show the above for P.R. and educational purposes
Sony Tape Recorder	TC-800B	AC-DC 200V	1		○			Used for recording conference and assembly proceedings, Visitor's voices (opinions) also recorded.
Omiya Photographic Paper and Fixing Solution		Substantial Quantity		○				Used for developing and copying, Recording Photographs
Others								In addition to the above, there were a number of other accessories. (Example) Various lens for the projectors and cinecamera, 8mm and 16mm films slides for the slide projectors, document box, various reference data and pictorials

IX. Communications and Official Report Machines

Item	Model	Capacity	Quantity	Utility				Remarks
				High	Normal	Low	Very Low	
Oki Electric Co. Wireless Radio Set	TR -3001	100W PEP	1 Set		○			Used for communications between NFAC (Manila) and BAE (Calapan)
Toa Broadcasting Equipment	TOA -PA	200V	1 Set		○			System type (amplifier, speaker, microphone, record player) used in conferences and assemblies.
Toa Portable Megaphone	ER -307	DC6V	4	○				Used for explanation and guidance in assemblies, training sessions, and for visitors, etc.
Sony Transceiver		2 km	8	○				Used for communicating during work and indispensable for measuring operations.
Copier Photo-copy Machine	Elite 1200	200V	1	○				Used for preparing and copying various data and records.
Uchida Mimeograph Machine	E -700	200V	1	○				Same as above. Convenient for bulk printing
Yamada Mimeograph Set			1	○				Same as above. Used for preparing reports
Others								Substantial supply of mimeograph ink and paper. Although local stencil paper is of good quality, the quality of ink is poor.

X. Office Equipment and Supplies

Item	Model	Specifications	Quantity	Utility				Remarks
				High	Normal	Low	Very Low	
Adler Typewriter	Gabriel-25		1	◦				For office typing
Standard Typewriter	Standard	Electric, 200V	1	◦				Same as above. 45 cm Carriage is desirable.
Ricoh Desk Type Electronic Calculator	Ricohmack 1200	200V, 12 Digits	1	◦				For office work and Calculation test results. Highly useful
Regulation Set			1	◦				Convenient for data preparation
Complete Set of Stationery			1	◦				General Office Supplies. 15 sets of each type.
Stationery			Substantial Quantity	◦				Tracing paper, tracing section paper, Kent paper, kraft paper, section paper, copy paper, cardboard, carbon paper, etc. Local products are poor in quality.
Binders				◦				Extensively used for consolidating data material.
Others								(Examples) Cutters, envelopes, tags, albums, field pens, sign pens, and many others.

XI. Lockers and Other Equipment

Item	Model	Specifications	Quantity	Utility				Remarks
				High	Normal	Low	Very Low	
Ikeda Steel Locker	For Clothing	2-Person Use	5	°				For holding clothing and valuables
Ikeda Cabinet	382N	Side Table, 4-Tier with Casters	4	°				To store important data and items
Iwamoto Steel Cabinet	S-S3	Glass Doors, 2 Tiers	2	°				To store valuable Items
Uchida Tool Locker	KT-75B	With 10 Shop Desks	1	°				To hold expensive tools
Uchida Parts Cabinet	KT-816		4	°				To hold instruments and fragile parts (filters etc.)
Uchida Storage Safe	S-380A		2	°				To store items that deteriorate easily. (photographic paper, developing fluids)
Uchida Open File	Maruzen	950 x 1890	1	°				For consolidating various machine manuals and data for filing.
Fertilizers and Agricultural Chemicals			Substantial Quantity	°				Sell at cost to the direct-controlled farms and to other farmers within the project area. Refer to machine supply list. The current inventory is approximately 1/3 of the amount supplied.
Others			Substantial Quantity					Deleted. Refer to machine supply list

3. Philippine Staff of the Machinery Division

As the number of staff members in the machinery division varies in relation to the progress of the project, I shall give a brief description of this transition.

At the time when current personnel were appointed in December of 1971, the Philippine counterpart in charge of machines was still not officially assigned and the counterpart of irrigation was acting as the person in charge and jointly overseeing the machinery division. The technical level of the operators and mechanics at this time was considerably low and the most urgent task at hand was technical training and establishment of a control and maintenance system for the machines. Also, the usage of the machines was on a "spur of the moment" basis with no planning whatsoever. Consequently, machines were taken out an used at will with no clearly defined responsibilities and the record of time used was inaccurate.

A staff meeting was therefore held to improve the situation and the following was approved and decided.

(1) To assign a machinery division counterpart at the earliest date.

(2) To have the supervisor of farm construction and cultivation to submit a weekly report showing their daily machine requirements for the following week, repair and maintenance of machines would then be conducted in relation to this usage plan to prevent disruption of this plan.

(3) Heavy construction machinery, including farm machinery, and their mechanics and operators would be placed under the jurisdiction of the machine control specialist and machine usage would be consolidated and recorded on standardized forms.

It was in this manner that Mr. T. Corpuz was appointed to the machine counterpart in February of 1972. He is currently 44 years of age and his previous position was as a Program Technical Advisor at the head office of BAE. He had received training in agricultural machinery for approximately 10 months at Uchihara International Training Center in 1965 and had again come to Japan in 1973 to participate in a 6 months group training course in agricultural machines. In addition to these training courses, Mr. S. Avacan, senior mechanic, was sent to Japan to undergo a 6 month training course in machine maintenance in 1974.

Variations in the staff members of the machinery division are as follows.

Table 9. Philippine Staff of Machinery Division

Type of Position	Staff			Wages (Daily)		Remarks
	Dec., 1971	Feb., 1972	July, 1974	1972	1975	
Philippine Counterpart Technical Staff		1	1	Monthly - Peso 666.00	Monthly - Peso 732.60	Monthly Wages from BAE, Separate 100 peso allowance from NFAC
Non-technical Staff, Senior Mechanic		1	1	Daily 10.00	Daily 16.50	Separate allowance of 50 peso per month
Assistant Mechanic	1	2	2	8.40	12.00	(One of which is a welding specialist)
Heavy Machinery Operator	3	5	2	9.00	14.00	"
Tractor Operator		1	1	8.40	10.00	"
Assistant Tractor Operator		2		8.00		"
Pump Operator		1	1	9.00	11.00	"
Rice Mill and Drier Operator		2	1	8.40	12.00	"
Store Keeper	1	1	2	8.40	14.00 10.00	" (Assistant - 10 peso)
Watchman	2	2	2	8.00	10.00	"

Note : 1) No changes in staff members from July, 1974 to date.

2) It is customary to give salary raises in July each year as this is the end of the fiscal year, however adjustments are sometimes made to offset the effects of increases in commodity prices. (November, 1974)

3) Although the wages for the nontechnical staff were paid directly by NFAC until June of 1974, since NFAC had turned over the project to BAE in July of that year, wages have been coming from BAE from that time.

4) The current nontechnical staff totals 23 of which 8 work directly with the machines.

4. Control and Maintenance of Machines

Particularly strong attention was drawn to the need for the mechanics and operators to be trained in machine usage, daily maintenance, inspection before operation particularly confirming the correct oil level. In other words, this is a problem of their basic attitude towards the usage of the machines.

Actual examples of the principal troubles that occured in this project are as shown in Table 10, the majority of the trouble stemmed from the operator's carelessness.

As a preventive measure, a list of items requiring strict attention was prepared and handed to each person.

The list of the items was as follows.

(1) Care in the usage of the machines

This notice was principally for the mechanics and operators.

1) Inspection and Maintenance to be conducted
   a) 10 Hour maintenance (Daily inspection)
   b) 20, 50, 100, 200, 500, and 1,000 hour inspection and maintenance
2) Warm up engine before operation
3) Clean and inspect engine and chassis every Friday afternoon over a 2 hour period from 3 to 5 P. M.
4) If abonormal conditions or abnormal noise is observed from the engine or other parts during operation, stop work immediately and report the trouble at the earliest possible time.
5) The clutch shift levers must be operated carefully and positively.
6) Reckless driving is strictly forbidden

Of the above, it was decided that the final check in (1) would be carried out by a mechanic or a member of the technical staff.

Although the results cannot be said to be perfect due to the individual difference in talent of the operators, by removing those operators who repeatedly cause accidents or troubles due to carelessness as unfit, a feeling of responsibility is implanted which serves to prevent accidents in advance. In this connection, 2 of the operators were considered as unfit and were transferred to other positions where they would not handle machines.

Table 10. Actual State of Machine Troubles and Their Repairs

Machine Name	Date	Trouble Area	Cause of Trouble
Cargo Truck	May, 1971	Broken Rear Shaft	Twisted and broken due to rough roads and overloading
Dump Truck	Oct., 1971	Broken Windshield Grass	Accident caused by flying rubble during work
Kubota Engine ER-65N	Mar., 1972	Cylinder Head Interior Cracked	Lack of cooling water. Careless inspection
"	"	Radiator Leaks	Soldered joints in the cooling system melted.
Kubota Engine ER-30N1	Mar., 1972	Crankshaft Assembly Damaged	Insufficient lubricating oil. Careless inspection
Bulldozer D50A	Oct., 1972	Crankshaft Damaged and Bearings Frozen	Chassis sank in highly soggy paddy field causing water seepage into the crank housing and dilution of the lubricating oil.
4-Wheel Tractor Attachments	Feb., 1973	Rear Grader Broken	Rough operation in highly soggy paddy field
4-Wheel Tractor L-27	Oct., 1973	Bevel Gear Mounting Bolt Broken	Accident caused by overloading during levelling operations in highly soggy paddy fields
"	Mar., 1974	Spiral Bevel Pinion Mounting Bolts Broken	Overload
Combine	Nov., 1973	Clutch, Wheel Gear Broken	Rough operation while harvesting in wet paddy field
Power Tiller KL-1100	Dec., 1974	Crank Bearings Damaged	Water seeped into crank housing and diluted the lubricating oil when the unit sank in wet paddy field during operation.
Large-sized water Pump		Impeller Cracked	Rubble sucked in during initial operations. Attach screen to inlet.
Bulldozer D50P	Nov., 1973	Drop in Horsepower	Worn piston rings. Replace
" D50A	Dec., 1974	"	" "
Shovel Dozer D30S	Jan., 1973	"	" "
4-Wheel Tractor L-350	Apr., 1975	Sharp Drop in Horsepower	Worn piston rings. Order special or have made locally.
Yanmar Engine for Large-size Pumps	Mar., 1974	Overheat	Mud sediments in the cooling chamber. Clean
"	July, 1975	Drop in Horsepower	Worn piston rings. Replace
Kubota Engine ER-65N	Oct., 1973 Jun., 1975	"	" "
" ER-30N1	Nov., 1973 Jun., 1975	"	" "
Others, Including Vehicles etc.		Drop in Power and Difficult to Start	Periodic maintenance in addition to overhaul.

(2) Machine Usage System and Collection of Records

In this project, over 3 hours were allotted for staff meetings every fourth Friday to discuss overall problems and also to have the respective supervisors in each division to submit progress reports for that month along with any problems. In addition, a general plan for the following month were required to be submitted for study and discussion by all of the attendants. In the case of the machinery division, initial discussions are held with the counterparts thus leaving the matter of making progress reports and explaining future machine maintenance programs to the meeting. Construction, cultivation and public relations sections submit their requests for machines in the following month and a general usage plan is prepared. Although there will be times when requests for equipment cannot be met due to the nature of the repairs being made (bulldozer tracks worn), discussions were held as to measures to cope with this type of situation and plans were drawn up whereby the equipment would be borrowed from an external organization.

In actual practice, the machine usage system will be conducted by the construction and cultivation division specialists requesting further details based on the foregoing meeting as to the following week's machine usage plan. Machine work will consist principally of the construction type of land consolidation and the cultivation type of tillage on the field where controlled directly by Administration. When there are requests from the farmers within the project area for rental of equipment, adjustments are sometimes difficult. Although there will be many requests of machinery from various divisions, adjustments should not be difficult if there is mutual understanding of daily activities.

Note : Please refer to attached reference data 1 and 2 in relation to the Machine Usage Plan form. Refer to attached reference data 3 in relation to the Rental Request form.

Next, in relation to consolidation of records, as an exclusive counterpart had not been assigned as the machine supervisor up to the time that the specialists were assigned, records on machine usage were not available. These records are indispensable in grasping the actual usage condition of the machines to carry out a proper maintenance program. Reference data from No. 4 to No. 13 attached to the end of this report are those and we were heavily dependent on our counterpart, Mr. Corpuz for the preparation of these recording forms.

The forms prepared in this manner were handed to each operator with compulsory instructions to fill out the form with information such as the usage time, consumption of oil and fuel, and other necessary data. Similarly, service record forms were handed to each mechanic with instructions to fill in daily service data and submit a report at the end of each month.

To the operators and mechanics, this system resulted in their becoming

extremely careful in their daily maintenance and in their 50 and 100 hour inspection and maintenance procedures. In addition, the life of wearable parts and their period of replacement could be forecasted resulting in our ability to meet requests for replacement parts. Also, the submission of these record forms served as a form of performance records for the operators and acted to increase their efficiency.

Although we believe there are many ways of analyzing these various records, simple decisions will not be made in each project. I believe it will be effective informing future cooperative systems that JICA headquarters will set the several themes and get the records of them from respective projects.

(3) Maintenance of the Machines

Control and preservation of the machines means to keep them in good repair and condition for immediate use, that is to say, the most important problem is the maintenance. From the standpoint of the machines themselves, the more they used, the heavier the wear and deterioration. Although thorough coutermeasures are taken, machines inexorably recede from the objective of preservation and control. We believe that it is not incorrect to state that plus elements are zero.

Following is a list of the minus elements in the maintenance and control of machines.

(1) Natural wear
Replacement and adjustment of parts that wear in direct ratio with the frequency of usage.

(2) Problems in the quality of fuel and lubricating oils
As strict quality control measures are not in force locally as in Japan in relation to gasoline, diesel oil, lubricating oil, grease, etc., poor quality products are prevalent and there are few from which to select.

For this reason, the performance of the carburetor drops the efficiency, the elements and filters become clogged quickly, wear in machine parts and carbon deposits advance at twice the normal rate thus creating conditions unfavorable to the life of the machine.

(3) Problems relating to the technical skills of the mechanics and operators.
In the case of this project, we were fortunate in having competent personnel for our senior mechanics and therefore had no mechanic problems. However, we believe cases of this nature are extremely scarce in projects carried out in developing countries.

In the case of the operators, it will be desirable to carry out thorough mechanical training during the initial stage of the project. It will also be necessary to conduct strict screening for suitability when making selections. Not only in this project but in general, the mechanical knowledge and technical skills of the operators are still very low.

(4) Adverse environmental conditions

a) Topography and soil conditions

Conditions such as highly ill drained paddy fields or sandy field which cause rapid wear and tear on machinery are both in evidence. For instance, when sunny weather continues during the dry period, clogging of the radiator and filters of the machines with sand and dirt will be severe and will be the cause of overheating and wear in the various mechanical parts. In addition, as the entire island of Mindoro is high in salt content, rust and corrosion of the vehicles is a problem in particular. The paving on the main roads crack and peel to form pot holes which gives one the feeling of driving over a river bed.

b) Weather Conditions

There are many rainy days throughout the year and during the dry period when comparatively fine days continue, one is subjected to the burning rays of the sun. If one can imagine the machines being operated in Japan during the monsoon season in June and in mid-August, we believe that one can understand the wear the machines will undergo.

If conditions in (a) and (b) exist at the same time, the fields will be in extremely soggy condition (continually wet from June to December) and if care is not taken when operating bulldozers, shovel dozers, tillers, and 4-wheeled tractors, they will tend to sink into the mire.

The foregoing are the principal items then we will touch on the problem of maintenance, which is the lack of spare parts. As previously explained, although the 3rd stage supply of machines and parts are made in compliance with requests from the project area and the time of requirement is estimated, as it normally takes over a year for the parts to arrive, the machines are often purposely overworked to maintain work schedules. If the requested number of machines are reduced (equivalent to a reduction in budget) due to spiralling parts costs commencing with the problem of oil, the machine maintenance schedules become disrupted and it will become necessary to make emergency repairs to keep the machines from breaking down completely. Although this is truly a perilous situation, various reasons exist at the site which prevents halting the use of the machines although it is understood that trouble in one part of the machine may lead to trouble in other parts. We believe that there is still room for innovation in supplying machines and parts by holding discussions among the project supervisor, specialists, and other people concerned.

In addition to demand for the normally wearing parts, unexpected situations develop where parts become necessary to repair unforeseen breakdowns (Table 10, Parapraph 40) and in the majority of the cases, these parts will not be available from stock nor can they be procured locally. Emergency requests were therefore made in

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Table 11, MECHANIC'S REPORT OF ACCOMPLISHMENT
APRIL 1975

Date	Machinery	Activities	Remarks
1975			
April 1-2	Payloader	Disassembled the steering clutch due to spring tension w/o was very weak.	Not yet finished. No available spare parts.
" 3-4	Station wagon	Disassembled the differential due to broken stud, oil seal, brake liming.	- do -
" 14	Bulldozer D50A	Disassembled starter due to faulty connection, cleaned armature, brush, commutator, adjusted the steering clutch.	
" 15-16	Dump truck 2	Disassembled cylinder head due to faulty gasket, grinded valve & adjusted the valve clearance.	Damaged parts : 2 pcs. exhaust valve 3 pcs. intake valve
" 17	ER 30 KUBOTA generator	Disassembled the engine due to worn out crankshaft bearing, cleaned & adjusted valve clearance.	
" 18	Dump truck I	Disassembled front wheel due to stocked up wheel brake cylinder, cleaned & adjusted brake shoe.	
" 21	Kubota Power tiller	Repaired the engine & adjusted the steering wheel.	
" 23	Toyota jeep	Repaired the carburator cleaned spark plug & adjusted the gap of the contact point.	
" 28	Grass cutter	Repaired the carburator cleaned spark plug, change oil & adjusted the gap of the contact point.	
" 29	Dump truck II	Disassembled the front spring due to broken center bolt. Changed rubber bushing.	
" 30	Yanmar water pump (irrigation)	Disassembled air pipe due to stocked up of the charge valve & grinded the seating of the air pressure valve.	

Respectfully submitted by :
(SGD.) SANCHO M. ABACAN
Sr. Mechanic

Table 12. MECHANIC'S REPORT OF ACCOMPLISHMENT

MAY 1975

Date	Machinery	Activities
1975		
May 5	Dump truck No. 2	Repaired the radiator, cleaned carburator, spark plug, and adjusted the gap of the contact point.
" 6	Kubota generator ER 30	Disassembled the engine due to hard starting. Damaged parts : 2 pcs. - side cover bearing 1 pc. - oil seal 1 pc. - plunger
" 7	Dump truck No. 1	Repaired the carburator, cleaned spark plug, and changed manifold gasket.
" 8-9	Station wagon	Assembled the differential. Damaged parts : 1 pc. - shaft pinion 1 pc. - oil seal 1 pc. - pin dowel 2 pcs. - flower gear 2 pcs. - shim (copper)
" 14	Kubota generator	Disassembled the engine due to loose compression Changed piston rings, changed engine oil, and adjusted the valve clearance.
" 15	Cargo truck N	Disassembled the starter due to stocked-up of the bendix drive, cleaned the slat of the drive shaft.
" 19-20	Station wagon	Disassembled the water pump due to overheat Damaged parts : 1 set - Water pump repair kit 2 pcs - Steering cross join buching
" 21-23		Overhauled. Damaged parts : Rebored four (4) cylinder lines 1 set - piston 1 set - piston ring 1 set - overhauling gasket 2 pcs. - Engine support 1 pc. - main drive packing

Respectfully submitted by :

(SGD.) SANCHO M. ABACAN

Sr. Mechanic

each instance to have the parts shipped over. Although there were times when difficult requests were made, thanks to the competent handling by the project group, wherever possible these parts were air freighted to enable the project work to continue on schedule. Here I would like to express my deep appreciation to the officials in charge for their understanding and support.

As mentioned above, we have given a general explanation of the various problems in machine servicing, please refer to Tables 11 and 12 for examples of service work performed. Also, as the interrelation between the actual conditions of repair and maintenance and that of the length of usage like distance travelled have been classified and consolidated in the details of the general report on the part of machinery, please make use of them.

Important conditions prerequisite to realizing a complete and thorough maintenance program would be as follows.

(1) To obtain good mechanics and operators as well as to train them thoroughly
(2) Maintain a stock of necessary wearing parts
(3) Obtain tools, instruments, and machine tools with some degree of accuracy that will be needed for repair and maintenance.

The lack of parts during repairs is the bottleneck in carrying out maintenance. There are some manufacturers that supply spare parts, approximately 10% for their machines at time of delivery, there are many machines that have no spare parts whatsoever.

We cannot say what the proper percentage of spare parts should be due to the size and nature of the project, however, as it is possible to estimate the general length of usage by considering the nature of the project in conjunction with the length of the agreement plus alpha, it will be desirable to have parts supplied in stages in relation to this estimate.

Although the conditions of usage will differ according to the nature of the work and to the type of machine, and differences will also arise in the amount of wear, as it is difficult to predict amount of spares and the time to supply, it will be desirable to have approximately 15% to 30% spare parts supplied for all machines at time of initial deliver. Effective use of the machines supplied will therefore depend on continued correct maintenance with these parts. However, it will not be a good policy to have the manufacturers select the parts. One should be careful whether non-essential items are included or that the amount is enough or not. Although the difficulty of selecting the spare parts for all of the vast number of machines supplied may well be imagined, since the effective usage of the machines at the site will have great bearings on the project work, we would urge that surveys and studies should be carried out in this respect.

There is one more problem in machine maintenance of which we are acutely

aware. That is the procedure of purchasing parts locally. In the case of the Philippines, a considerable number of certain types of agricultural machines are being imported from Japan. Also, as machines are being assembled and sold locally by the importers and joint corporations, if the machines supplied are of the same type, in addition to it, it will be also easy for the government of the Philippines to get the spare parts as well as various services. This will then create an extremely advantages, with respect to the problem of maintenance.

Although this is naturally limited to certain types and quantities and therefore applicable to only a portion of the machines, those sold well locally also have high utility in the project. It will therefore be desirable to consider market research of the host country and a research of export conditions from Japan as important prerequisite conditions for supplying machines and investigate all facts in an effort to develop. Further, All possible methods will be studied to obtain long and effective usage from the various points of view by the Japanese Government.

Reference Data from No. 18 to 21 are examples of some studies made in this respect and Data No. 20, in particular, presents methods of purchasing parts to enable the Philippine Government to attain self reliance in the maintenance and control of the machines subsequent to the hand over of the project. We would like to explain the state of sales of machine parts in the host country.

Generally speaking, dissemination of agricultural machinery is lower than the vehicles and the number of sales outlets is also less. Also, as the sales amount of each store is small, one cannot expect too much on the inventory of parts in relation to the types of machines handled. However, parts are procured in one way or other such as obtaining them from the main store or ordering them from the head office of importer. With the exception of a very few manufacturers, no parts are on sale for the machines supplied for this project. Bearings, however, may be obtained if one searches closely in the downtown Manila area or Pasay city where many parts sales stores are concentrated. Disregarding prices, the ease or difficulty of obtaining parts in this area is summarized as follows.

(1) Machines for which parts are comparatively easy to obtain or for which methods of purchasing exist, the names of the manufacturers.

a) Heavy machinery such as bulldozers and shovel dozers; Kubota Manufacturing Co.

b) Vehicles such as dump trucks, jeeps, etc. Toyota Auto Sales Co.; Mitsubishi Heavy Industries

c) Agricultural Machines such as tillers, pumps, engines, etc.; Iseki Farm Machinery, Kubota Iron Works, Mitsubishi Farm Machnery, Honda, and Fuji-Robin

(2) Machines for which parts are difficult to procure.

a) Special machines for construction purposes such as cranes, concrete mixers, and stone crushers

b) 4-Wheeled tractors - Japanese made not in evidence. U.S. models make up the majority along with some Fergusons and Fiats

c) Office and special machinery, copy machines, wireless sets.

(3) Manufacturers with joint ventures in the Philippines even if their imports are small: Satake Seisakusho, Hatsuda Kogyo, Matsuyama Seisakusho, Honda Giken

Although we believe that machines from a number of Japanese manufacturers have been imported to this country, we wish to repeat that this report principally covers machines related to this project.

As you know from the foregoing, in relation to the parts required for the maintenance of the machines in this project, only those parts for the bulldozers, shoveldozers and vehicles are comparatively easy to obtain. However, this does not mean that all of these parts are immediately available from Japan, according to experience, as in the case of great majority. In relation to machines other than these, the actual state is the lack of parts in the distributor's inventory due to the different types of machines imported.

In the past, there were a number of cases in which parts were specially made due to the need for emergency repairs but these were unavoidable cases and replacement with the original part at the earliest date becomes a matter of importance. For instance, in the case of piston rings, there is some concern that the quality of materials and techniques of repairing may lead to serious breakdown in future. In addition, close attention must be paid to the operating condition of machines that are repaired in this manner. An example of the durability and especially the problem of quality in these cases is that of the pins and bushings in the bulldozer. The parts manufactured in Manila had a life of only 400 - 500 hours use as compared to the original Japanese part with a life of 2,000 - 2,500 hours. (Refer Item 11, Table 7). As proof of this, subsequent to replacing the part with a Japanese made in April of 1974, it has already seen 1,500 hours of use and is still in condition to withstand another 1,000 hours of use.

However, the facts that are available in a developing country for emergency repairs of this nature should probably be appraised.

5. Mechanical Training

Due to the extremely busy work involved in land consolidation during the period of the 5 year agreement, there was no leeway to carry out a mechanical training program. As explained in the previous chapters, however, seminars were continuously held to instruct

the mechanics and operators working in this project on the function of the machines and their operational technique and also gave guidance in relation to maintenance techniques.

On special heavy machineries such as bulldozers, shovel dozers and so forth, we would solicit the assistance of Mr. Tezuka, engineer of Komatsu Manufacturing Co. 's Manila office, and 2 others at times to conduct one week seminars on machine operation and maintenance techniques etc.

On the other hand, training programs were held for the farmers in conjunction with the agricultural machinery rental system in which seminars were conducted for 36 of the farmers within the project area in connection with general farm machinery especially on power tillers. As only one of these farmers owned a farm machine (a 60PS 4-wheeled tractor), instructions were principally on inspection before and after use, care in use, actual operating technique, etc. since no benefit would be obtained from theoretical explanation of mechanical structure and maintenance technique.

In addition, practically all of the visitors to the project had deep interest in agricultural machinery and would invariably request demonstrations. Many of them would also desire to operate the equipment themselves. In these instances, we would repeatedly be asked the efficiency of the machine, its price, and the method in which they could purchase the same.

Following the mechanical training, those who have completed a formal curriculum may undergo training in milling, adjusting and processing. This training was conducted twice, the first being carried out during the agreement period for about 2 weeks from 23 April to 5 May, 1973 and the second after expiration of the agreement period for a period of approximately 1 week from 23 to 30 June, 1974. In the first training session, Dr. Bhattacharya of Satake Seisakusho came especially to act as the visiting instructor. Private millers made up the bulk of the students in the second session along with a sprinkling of government technicians. We will delete details here as this has already been explained in the general report.

Next, in connection with mechanical training carried out subsequent to the expiration of the agreement, and within the framework of the project plans for 1975 by NFAC, technical training for increasing rice yield was carried out once a month (for a period of 1 week) with emphasis on farmer education and mechanical training twice a year (2 weeks at a time) for the government technicians and farmers. Exchanges of opinions were carried out with our counterpart Mr. Corpuz in relation to the mechanical training course and a curriculum prepared. Educational material such as wall charts, various manuals and pamphlets in relation to the machines supplied for this project were obtained from the manufacturers and made complete preparations. Despite these preparations, however, this plan could not be carried out. The following may be considered the reasons for our inability to carry out this program.

Subsequent to the expiration of the old 5-year agreement, that is, after July of 1974,

the name RP-JAPAN Pilot Project was renamed South Tagalog Agricultural Technical Training Center. The nature of the work however indicated trends towards propagation of training in future and therefore control and operation of the project were turned over to BAE by NFAC. However, as the BAE organization was lacking in mechanical technicians to conduct the training courses and, as it was also lagging administratively in the field of agricultural machinery policies compared to its agricultural policies which is directly related rice production such as the application of fertilizer, irrigation facilities (the Masagana 99 Movement for example), water resources development programs, little attention was payed towards conducting the training program of machineries and nothing was done in this respect.

However, in connection with technical-training for increased rice yield given for the farmers, as this program was carried out once a month, seminars on the usage of agricultural machines were also conducted at the same time. Drills were conducted on 4-wheeled tractors, power tillers, rice planters, pest control machines, threshers, driers, milling plants, etc. The participants of the training were a number of the farmers such as barrio captains, counselors, exemplary farm owners who were in leader position in various villages, and they usually owned power tillers and other small farm machines.

During the period of the rice production increase training program from September, 1974 to June, 1975, instructive guidance was given to 226 farmers from 11 provinces in southern Tagalog and from distant provinces such as Quezon and Rizal.

Further, we wish to repeat that the main role of this training program was the extension of cultivation.

6. The actual state of mechanized farming in Oriental Mindoro

Although Oriental Mindoro is a farm province blessed with environmental conditions as a rice-producing belt, its agricultural development was considerably behind the various provinces in Luzon because of transportation facilities and produce distribution were inconvenient due to its island state. The attention of the central government has recently been drawn to our project and construction of industrial roads, agricultural development projects, under the 5-year plan, were conducted from July of 1975 with loans from World Bank.

Although the 1,000 hectare farm development project in the vicinity of lake Naujan is one of these, if reclaimable arable land exist in the range of 200 to 300 hectares in various districts and, if capital is available, they may be developed into highly suitable rice farms, dry field farms, orchards, etc.

Compared to its sister project on Leyte Island, the cultivated area per farm within this pilot farm is considerably greater with an average of 3 hectares than that of Leyte. We cannot say exactly what is the average size outside the project area because accurate

data is not available, however, it is estimated that the general average is 1.5 hectares.

The medium class farmers with whom we have close contact were stable farmers owning coconut farms or orchards equivalent to or more than paddy fields of 10 to 15 hectares. Practically all of these farmers owned 1 or 2 power tillers, threshers, unhusked rice driers (flat type), etc. and those of a larger scale used 4-wheeled tractors. However, in general, they are still in the stage of animal power farming whose cultivation is carried out by carabao.

The development of foot and mouth disease in May of 1975 has already been reported in our monthly publication and was of such ferocity to produce a disease incidence of 80%. At that time we had forecasted that rice planting during the monsoon season would not even reach 50 to 60%, during our farm inspection trip in July, we were astounded at the inherent strength, of the farmers practically when 100% of the planting had been completed in all of the areas. This served to change our impression of the farmers in this country.

No special effective measures were carried out through government channels to cope with this sudden disaster. Due to the self preservation of each farmer, cultivation was carried out by means of maximum usage of rental machines. For instance, even a 4-wheeled tractor displayed in the store front of a farm equipment sales store in Calapan city was supplied for rental and was used for custom work in the various farms. However, the rental rate was so high as 380 peso per hectare for plowing and puddling that farmers were not financially able to stand. Further, as the rental rate for the 4-wheel tractor belonging to the project was approximately 70 peso it was extremely advantageous to the user.

Although there was a rash of machine rental requests from farmers outside the project area at that time, it was regretful that we were unable to cooperate actively because of the terms of agreement prohibiting loans outside the project was still in force and also due to the fact that number of machines were, in fact, not enough to cultivate the 100 hectares within the project. In any event, the fact that the farmers completed planting by some means or other in all areas in Oriental Mindoro, though missing the prime planting season, would indicate that a substantial number of the farmers owned farm machines.

Although the time of cultivation was delayed by the foot and mouth disease, we decided to launch our survey of the actual state of agricultural machinery in Oriental Mindoro. Requests were made to government related organizations in this province for per pertinent data but none could be found. We therefore approached to the former director of this project Mr. Del Rosario (now BAE director) to obtain his cooperation in this survey and received his ready consent. As detailed field surveys were conducted on each district with the cooperation of the BAE extension workers, approximately 3 months were required for the survey period.

Although the scope of the survey covered approximately 30% of the total farming villages in Oriental Mindoro, as the number of farm households and area of the cultivated

paddy fields of the remaining villages were calculated in arriving at the total figures, we believe that the figures shown are fairly close in all. We deeply appreciate the cooperation of Mr. Del Rosario and all of the BAE extension workers.

Although much can be seen from Reference Data No. 18 consolidated in this manner, mechanized farming in Oriental Mindoro still has a long way to go and is of no comparison with that in the United States, Europe and Japan. The actual present state of farming is still usually by means of animal power. Of the types of farm machinery owned by the farmers, the principal types are 4-wheel tractors, power tillers, threshers, driers, etc, and practically no rice planters, power weeders, or harvesters are used. As this is due to the form of farming in this country in which it is customary for the farmers to mutually help each other in planting and harvesting, there is little hope for rapid popularization of these types of machines.

However, for farmers with stable large scale operations, mechanized farming is of extreme interest. In this instance it is needless to say that the principal obstacle is the high price of the machines which is usually approximately 3 times that sold in Japan. On the other hand, as profits are only 1/3, purchasing machine is not a simple task. Although efficiency will deteriorate for this reason, a large number of comparatively inexpensive domestically produced machines are also in use. Refer to the following comparison table.

Machine	Domestic Machines		Japanese Made	
	Price	Remarks	Price	Remarks
Power Tiller	7,000 Peso	RP-65, 6.5 HP Mounted with Mitsubishi gasoline engine	10,700 Peso	6.5HP Technical tie up with H Company
"	9,500	800GT, 8HP Stratton gasoline engine	29,250	8.5HP M Company diesel engine
Pump	3,000	2.5"	4,450	2.5" M Company
Thresher	2,500	4HP Gasoline Engine		
Drier	2,000	Flat Type		

There are farm machinery sales stores in Calapan city in dealing both domestic and Japan made products such as Iseki, Mitsubishi, Honda, Kubota, 4-wheel tractors, and that of IH, Ford, John Deere, Fiat, Ferguson and so on. Prices are 75,000 pesos for a 44 HP IH and 110,000 pesos for a 62 HP Ferguson.

Mechanization of farming has developed in accordance with the environmental conditions of each country such as America or Japan. In the Philippines, also they are still groping around for a type suitable to the country. The Philippine Government is currently restricting imports of farm machinery due to its worsening position of foreign currency and it is believed that they will advance domestic production eventually. On one hand, it is also

said that land reform is under study and that a system will be instituted in which paddy fields will be limited to approximately 7 hectares. Taking these miscellaneous conditions into consideration, one can believe that mechanization in relation to cultivation of rice will be on a small scale with the addition of animal power for the time being.

Sales of machines are carried out on a loan basis, from the standpoint of productivity, and this is not a profitable investment for the farmers as the interest on the loans is as high as 11%. We also believe that care should be taken not to increase the cost of rice production as the result of encouraging too much the modernized farming by the excessive use of fertilizers, agricultural chemicals and mechanization.

We are often asked for advice on machine purchases by middle class farmers and a guide line used in giving advice is to reconsider the purchase if the cost of the machine exceeds 5 times of the total annual profit (2 crops). Although it is pleasing to note that Japanese agricultural machinery is selling well in this country, we should refrain from encouraging machine purchases without consideration of after service.

Next, in the mechanical work system in this project, the plan shown in Figure 17 was set up but implementing was extremely difficult because of satisfactory arrangements could not be made with the farmers. However, this plan was set up as a matter of discussion as a plan of this nature would naturally be demanded if the pilot farm were considered to be one form of business. We are in hope that the Philippine staff will now implement a complete cultivation plan for the entire project in future by making further improvements of their own to this plan.

Also, refer to Reference Data No. 18 "State of Ownership of Agricultural Machinery in Oriental Mindoro" that are attached at the end of th s article. For future cooperation with the project, we have set up a tentative plan as in Tables 19 and 20 with reference to the machines that would be required to operate a 100 hectare farm. We would appreciate your reviewing this plan and favoring us with your guidance.

Table 13. Standard Work Efficiency of the Principal Machines Owned by Pilot Farm (For Paddy Fields)

Type of Work	Machine			Engine Output (PS)	Nature of Work	Work Efficiency					Number of People Required
	Name	Make and Model	Standards			Operating Width (m)	Operating Speed (km/hr)	Effectiveness in Paddy Work (%)	Paddy Work Capacity (a/hr)	Working Time (min. /ha)	
Plowing	Bottom Plow	Kubota L-350	14 x 2	35	Throw-in, plowing on the square	0.68	5.81	62	24.5	245	1
		Kubota L-27	14 x 2	27	"	"	4.14	"	17.4	345	1
	Rotary	L-350	1.88m	35	Continuous round-about plowing, headland plowing on the square	1.7	2.42	75	30.8	195	1
		L-27	1.66m	27	"	1.5	2.04	"	23.0	261	1
		Kubota KMB200		9	Continuous round-about plowing	0.6	2.36	89	12.5	480	1
		Kubota KR850		7	"	0.48	1.73	"	7.4	812	1
		Iseki KL1100		9	"	0.6	2.0	"	10.7	561	1
Puddling	Rotary	L-350		35	Diagonal cross puddling	1.7	3.98	82	55.5	108	1
		L-27		27	"	1.5	2.78	"	34.1	176	1
		KMB200		9	"	0.6	3.25	"	16.0	375	1
		KR850		7	"	0.48	2.78	"	10.9	550	1
		KL1100		9	"	0.6	3.5	"	17.2	348	1

Continued

Type of Work	Machine			Engine Output (PS)	Nature of Work	Work Efficiency					Number of People Required
	Name	Make and Model	Standards			Operating Width (m)	Operating Speed (km/hr)	Effectiveness in Paddy Work (%)	Paddy Work Capacity (a/hr)	Working Time (min./ha)	
Plant Pest Control	Hand Duster	Kyoritsu SETE11	Knapsack type			5.0	1.2	54	32.4	185	1
	"	Hatta New Golden	"			4.0	1.4	54	30.2	199	1
	Hand Sprayer	Maruyama Type 8			For seedling						
	Power Sprayer	Maruyama CSP-1	36 l/min.	4	100 l/10a	14.0	2.7	35	132.3	45	5
	"	Maruyama MS400E	41 l/min.	4	"	15.0	2.7	35	141.8	42	5
	"	Kubota HS-23	60 l/min.	8	"	16.0	2.7	35	151.2	40	5
	Power Duster	Kubota ADM30	5 kg/min.	3		6.0	2.0	50	60.0	100	2
Harvesting and Threshing	Binder	Kubota HC-500	Double cutting	3	Rotary cutting	0.5	1.9	65	6.2	968	1
	Combine	Iseki HD-50	"	7	"	0.5	1.9	55	5.2	1152	2
	Automatic Thresher	Kubota JT-N480		3					15.0	400	4
Planting Seedlings	Rice Transplanter	Iseki PF-200	Dual planting	2.5		0.55	2.0	56	6.2	977	2

Table 14-1. Standard Work Efficiency of Carabao

Type of Work	Nature of Work	Equipment Used	Paddy Working Area (a/hr)	Working hour (min. /ha)	Number of People Required
Plowing	Plowing on the Square	Side-turning local plow	2.1	2857	1
Puddling, Levelling	Cross plowing	Local harrow	3.1	1935	1

Table 14—2 Study Chart of the Usage Efficiency and Usage Plan of the Principal Agricultural Machines (per 100 ha)

Type of Work	Machine Name	Horse Power	Usage time for Machines Required for Planned Area								Possible Working Time During the Period of the Planning								Usage Efficiency
			Machine Used		Usage time per Hectare	Number of Times Used	Area Worked	Time Required			Work Hours per Day			Possible Work Days				Possible Work Hours	
								By Type of Work						Work					
			Name	Number of Units				Overall time Required	Time for each Machine	Work Process	Work Hours	Actual Work Ratio	Actual Work Time	Period	Number of Days	Percentage of Possible Work Days	Possible Work Days		
				Unit	hrs.	time	ha	hrs.	hrs.	hrs.	(hrs.)	(%)	(hrs.)	(date–date)	(days)	(%)		(hrs.)	(%)
Plowing	Tractor L – 350	35	Bottom plow	1	4.1	1	30	123	123	"	8	75	6	May 1–May 30	30	80	24	144	85.4
	L – 27	27	"	1	5.8	1	20	116	116	"	"	"	"		30	"	"	144	80.6
	Carabao		Short sole plow	28	47.6	1	50	2380	85	"	"	"	"		30	"	"	144	59.0
Puddling	L – 350	35	Rotary	1	3.3	1	30	99	99	"	"	"	"	June 6–June 30	25	"	20	120	82.5
	L – 27	27	"	1	4.4	1	20	88	88	"	"	"	"		25	"	"	120	73.3
	Power Tiller KMB200	9	"	2	6.3	1	15	94.5	47.3	"	"	"	"		25	"	"	120	39.4
	KL 1100	9	"	2	5.8	1	15	87	43.5	"	"	"	"		25	"	"	120	36.3
	KR 850	7	"	3	9.2	1	20	184	61.3	"	"	"	"		25	"	"	120	51.1
Levelling	Carabao		Tooth harrow rotary leveler	28	32.3	1	100	3230	115.4	"	"	"	"		25	"	"	120	96.2
Pest Control	Hand Duster		Knapsack type	10	3.1	1	50	155	15.5	"	"	"	"	Twice in 10 days	10	"	8	48	32.3
	Power duster	3	"	5	1.7	1	50	85	17	"	"	"	"		10	"		48	35.4
	Power sprayer	4	Trailing type 36 liters/min.	2	0.8	2	100	80	40	"	"	"	"		10	"		48	41.7
	"	8	Portable type 41 liters/min.	1	0.7	2	100	70	70	"	"	"	"		10	"		48	72.9
Threshing	Fully automatic thresher	3	Portable type	3	6.7	1	100	670	223.3	"	"	"	"	for 30 days	30	"	24	144	155.8

NOTE : The percentage of actual work hours was.

Table 15. Study Chart of the Efficiency and Load Area of Various Machine (Per 100 ha)

Machine Name	Type of Work	Number of Units	Machine (attachments)	Paddy Field Work Volume (a/hr.)	Number of Operations (times)	Area Worked ha	Overall Time Required (hrs.)	Work Time per Machine (hrs.)	Possible Work Time (hrs.)	Efficiency of Usage (%)	Load Area (Work Area Possible) ha	Actual Work Area ha	Remarks
Tractor L-350	Plowing	1	Bottom plow	24.5	1	100	144	144	144	100	35.3	60.4	Note : *Although the total number of carabao owned by the farmers in the project farm is 41, but their usage set at 70%. Number of work hours possible * According to Table —
L-27		1	"	17.4	1		144	"	"	"	25.1		
Carabao*		28	Short sole plow	2.1	1		4032	"	"	"	84.7	84.7	
L-350	Puddling	1	Rotary	55.5	1	100	120	120	120	"	66.6	107.5	
L-27		1	"	34.1	1		120	"	"	"	40.9		
Power Tiller KMB200		2	"	16.0	1		240	"	"	"	38.4		
KL1100		2	"	17.2	1		240	"	"	"	41.3	113.9	
KR850		3	"	10.9	1		360	"	"	"	39.2		
Carabao	Levelling	28	Tooth harrow leveller	3.1	1	100	3360	"	"	"	104.2	104.2	
Rice Trans-planter	Rice Trans-planting	1	Double row	6.2	1	-	120	"	"	"	7.4	7.4	
Manual Duster	Pest Control	10	Knapsack type	32.4	1	100	480	48	48	"	155.5	209.5	
Power Duster		5	"	60.0	1		240	"		"	144.0		
Power Sprayer		2	Trailer type	132.3	1		96	"	"	"	127.0		
"		1	"	151.2	1		48	"	"	"	72.5	267.6	
"		1	Portable type	141.8	1		48	"	"	"	68.1		
Binder	Threshing	1	Double cutting	6.2	1	-	144	144	144	"	8.9	8.9	
Combine		1	Auto threshing double cutting	5.2	1s	-	144	"	"	"	7.5	7.5	1s = Season
Automatic Thresher		3	Portable type	15.0	1s	100	144	"	"	"	64.8	64.8	

Table 16. Mechanization in the Pilot Farm (Complete work system employing animal power and medium - sized machines)

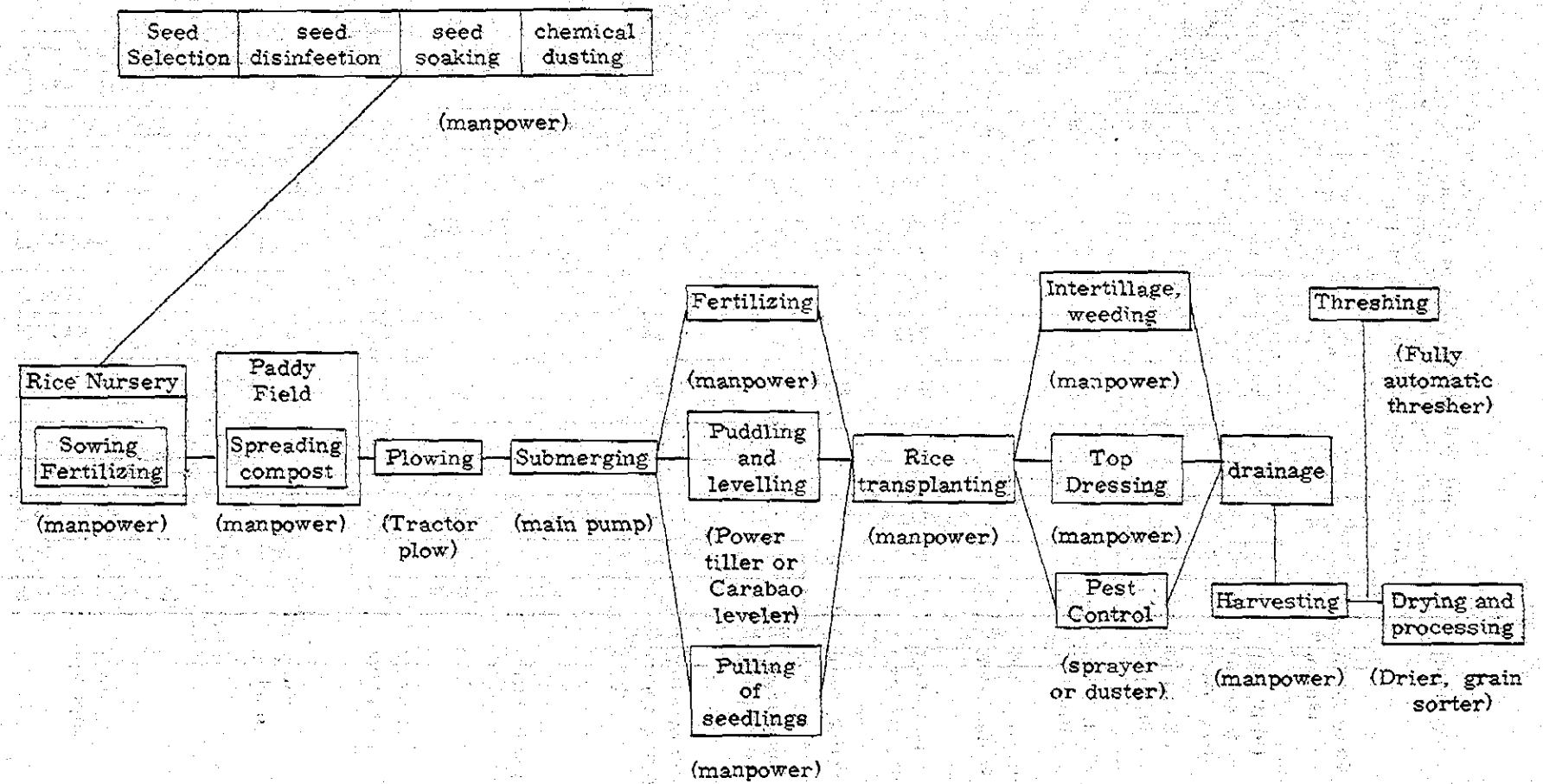

Table 17. Production Costs for One Hectare

	Method Used	Time	Rental Fee	Labor Costs	Fuel Costs	Production Costs
Seed Pretreatment	manpower	9.0		₱ 9.00		₱ 9.00
Rice Nursery bed Plowing	power tiller	1.6	₱7.52	* 3.20	₱3.55	14.27
Preparing Nursery Bed	manpower	16.0		16.00		16.00
Fertilization, Sowing	"	18.0		18.00		18.00
Spreading Compost	"	8.0		8.00		8.00
Paddy Field Plowing	tractor	4.1	40.18	* 8.20	19.89	68.27
Water Management	manpower	65.0		65.00		65.00
Fertilization	"	8.0		8.00		8.00
Puddling	tractor	3.2	40.64	* 6.40	15.52	62.56
Levelling	animal power	32.8	32.80	32.80		65.60
Pulling Seedlings	manpower	32.0		32.00		32.00
Rice Transplanting	"	96.0		96.00		96.00
Intertillage and Weeding	"	25.0		25.00		25.00
Pest Control	automatic spraying	1.7	2.55	* 3.40	4.76	10.71
"	automatic dusting	1.4	10.08	* 2.80	5.21	18.09
Top dressing	manpower	4.0		4.00		4.00
Reaping	"	120.0		120.00		120.00
Threshing	automatic thresher	6.7	10.72	26.80	6.50	44.02
Drying	Drier	14.0	35.00	(included in rental)	(same as above)	35.00
Subtotal		466.5	179.49	484.60	55.43	719.52
Cost of Seeds						67.00
Cost of Fertilizer						417.60
Cost of Farm Chemicals						153.75
Cost of Transportation						16.00
Cost of Water						125.00
Other Miscellaneous Costs					5.54	5.54
Total			179.49	484.60	60.97	₱1,504.41

Note : 1) Labor costs = 1 peso per hour except in the case of operator with machine which is 2 pesos (*).
2) Percentage of production costs occupied by machine expenses = 248.92/1,504.41 = 16.5%.
3) As 466.5 hours is the actual work hours, the required work time will be increased by 30% to approximately 666 hours.

Table 18. Cost of Supplies (Fertilizer, Farm Chemicals, Fule etc.) (As of August, 1975)

Item	Details	Consumption	Unit	Unit Cost	Unit Cost in 1972	Remarks
Fuel Costs	diesel oil	5 l/hr	l	₱0.97	₱ 0.32	4-Wheel Tractor L-350, 35HP
"	"	1 "	"	"	"	Fully Automatic Thresher with 3HP Engine
"	Light oil	3 "	"	0.74	0.27	9 HP power tiller using diesel or light oil
"	mixture of gasoline and Mobile oil	2 "	"	1.40	0.43	3 HP power duster
"	gasoline	3 "	"	1.24	0.36	4HP power sprayer
Cost of Seedlings	Variety C4-63(G)		cav.	67.00	40.00	45kg per Cavan
Fertilizer Costs	14 - 14 - 14	214 kg/ha	kg	1.39	¢60.5	
"	Urea	65 kg/ha	kg	1.84	¢62.5	
Cost of Farm Chemicals	Diazinon	1.5 l/ha	l	30.50	₱7.22	Amount used at one time
	BHC powder	30 kg/ha	kg	3.60	1.17	
Cost of Water				125.00	50.00	As paddy fields were being prepared in 1972, the cost of water was held down during this year.

Note : 1) The cost of fuel for the drier has not been included as its usage costs have been included in the rental costs.
2) Lubrication oil has not been listed under fuel costs but has been included in miscellaneous costs at 1/10 of the fuel costs.

Table 19. Mechanical Power Required for the Operation of a Farm with a Paddy Field of 100 Hectares

Work Process	Type of Work	Name and Standards of Machines Used	Suggested Machines	HP	Machine Usage Per-	Load Area per Machine	Number of Machines and Work Tools to Approximate the Load Area	Reference: Usage Time Per Machine in a 2 Crop Year
Land Preparation ↓ Rice Transplanting	Plowing (Animal plow* rotary plow), Puddling, Levelling	Bottom plow (disk plow, resin blade plow), Rotavator, Paddy Harrow, Rear Grader, Leveler	4-Wheel Tractor L-350	35PS	100%	*35.3 ha	Tractor and main plow 2.8 units	288 hrs.
						*43.5	Tractor and main rotary 2.3 units	288
						66.6	" " 1.5 units	240
			L-27	27	"	*25.1	Tractor and main plow 4.0 units	288
						40.9	Tractor and main rotary 2.4 units	240
			Power Tiller KR-850	7	"	* 6.5	Power tiller and main rotary 15.3 units	288
						13.1	" 7.6 units	240
	Rice transplanting	Powered, 2-row	PF-200	2.5	"	7.4	13.5	240
Weeding	Intertillage weeding	Hand weeder			"	4.0	25.0	240
Pest Control	Plant pest control	Portable type 41/hr.	MS400E	4	"	68.1	1.5	96
		Knapsack type powered sprayer	ADM30	3	"	28.8	3.8	96
Harvesting ↓ Drying and Processing	Reaping, Threshing	Double bundler	Binder HC-500	3	"	8.9	11.2	288
		Self-propelled, double row	Combine HD-50	7	"	7.5	13.3	288
		Automatic thresher	JT-N480	3	"	21.6	4.6	288
	Drying	Circulating type	NCD-12	2 KW	"	5.0	20.0	-
	Processing, Grain sorting	Grain sorter	SATAKE PC-1B	3	"	34.0	3.0	240

Table 20. Actual Number of Machines Required in a 100 Hectare Farm (Paddy Field) (Draft)

Work Process	Type of Work	Type of Machine and Output	Number of Units	Standards or Attachments	Number of Units	Remarks
Preparatory Tillage ↓ Rice Transplanting	Plowing Puddling Levelling Ridging Drainage Ditch-construction	4-Wheel tractor, 35PS Class	2	Bottom plow 14" x 2	2	Basic conditions 1) The tractor must have more than 35 HP or it will not be able to display the functions of a 4-wheel tractor. We should consider 35PS as the minimum. 2) It will be desirable to have as many different types of attachments as possible. As these may also be used for secondary crops (vegetables and legumes) in low-land rice, partial dry farming was also considered. 3) Although spare parts are described in a separate chapter, the life of the attachments, in particular, must be considered to have 50% of the life of the machine. Although depending on the condition of the soil, as it will be necessary to replace the rotary blades every 300 hours, methods of procuring spares must be studied in advance.
				Disk plow 26 x 2	1	
				Resin blade plow 12 x 3	1	
				General purpose plow 8 x 5	1	
				Rotary 160cm width	2	
				Paddy field harrow 340cm width	2	
				Rear grader 240cm width	1	
				Puddler leveler plate 270cm width	2	
				Ridger, 2 row	1	
				One-side hiller for drainage ditch	1	
				Grain drill, 7 rows	1	
				Turning strake, 8 blade type	2	
				Folding strake, 12 blade type	1	
				Cage wheel for paddy field	2	

Continued

Work Process	Type of Work	Type of Machine and Output	Number of Units	Standards or Attachments	Number of Units	Remarks
Land Preparation ↓ Rice Transplanting	Plowing Puddling Levelling Ridging Drainage Ditch-construction	4-Wheel Tractor, 45PS class, 4-wheel drive	1	Bottom plow 14 x 2	1	It will be desirable to have one 4-wheel drive tractor for use in extra paddy field as there are many instances in which tractors, plows etc. sink in submerged paddies and reduce work efficiency by 50%. It will therefore be necessary to have tractors available with functions to immediately pull out the boggeddown equipment. In addition to harvesting, trailers may be used for transporting fertilizer, small mechinery, attachments, etc.
				Disk plow 26 x 3	1	
				High-cut plow 8 x 4	1	
				3-Piece link rotary 200 cm width	1	
				Paddy field harrow 340 cm width	1	
				Rear grader 240 cm width Turning strake, 9 blade type	1	
				Turning strake, 9 blade type	1	
				Dump trailer, 2 tons, 3-way opening.	1	
		4-Wheel Tractor, 60PS class	1	Bottom plow, 12 x 3	1	One 60HP tractor will be required. The reason for this is the necessity for a high capacity machine when planting is delayed due to inclement weather conditions etc. Also, it is desirable to have a powerful tractor for the revision of level of paddy fields. As attachments, it will be desirable to add a boring machine for the main under-drainage. Further, as there are attachments with common use but as their time of usage is restricted due to overlapping of the planting period, those with and without common use have been listed separately.
				General purpose plow, 8 x 5	1	
				Paddy field plow 14 x 3	1	
				Paddy field harrow, 340 cm width	1	
				Disk harrow, 20 x 24	1	
				Tooth harrow, 30 x 4	1	
				Culti packer, 8" Cambridge roller	1	
				3-Piece link roller 200 cm width	1	
				Turning strake, 9 blade type	1	

Continued

Work Process	Type of Work	Type of Machine and Output	Number of Units	Standards or Attachments	Number of Units	Remarks
Land Preparation ↓ Rice Transplanting	Plowing Puddling Levelling Ridging Drainage Ditch-construction	Power tiller, 9PS class, water-cooled diesel engine	5	Rotary 65 cm width	5	Although this is for plowing and puddling work, these are used in small paddies where 4-wheel tractors are difficult to use. Spare rotary blades required.
				Iron wheel for paddy field use, normal type	5 sets	
				Cage wheel for wet paddies	5 sets	
		Power tiller, 7PS class, diesel engine, water-cooled	5	Rotary, 60 cm width	5	Same as above In addition to hauling harvested produce, the trailers are used to haul supplies.
				Iron Wheels for paddy field use, normal type	5 sets	
				Cage wheels for wet paddies	5 sets	
				Trailer, 500 kg	5	
		Home tiller, 6PS class, air-cooled gasoline engine	5	Rotary, 45 cm width	5	Used for plowing portions along the sides of the foot paths left unplowed by the 4-wheel tractor and other small scale work such as plowing and puddling in small test plots. In addition, this is indispensable for plowing and puddling extra wet paddy fields. The sowing machine may be used for direct planting of rice or for planting legumes.
				Iron wheel, normal type	5 sets	
				Cage wheel or puddling rotor	5 sets	
				Dual plow	5	
				Paddy field harrow	5	
				Riding rake	5	
				Seeders, 2 and 3 row use	2	
		Rice planter, 2-row use (machine in which Dapog seedlings can be used such as the Iseki PF Model)	3	For both small and medium seedlings, Automatic float type swing system		Although 14 units will be necessary from the point of view of production per machine, due to the low labor costs at the site, it will be advantageous to rely on manpower for the rice planting operation. However, these are very effective for test cultivations, display, and training use.

Continued

Work Process	Type of Work	Type of Machine and Output	Number of Units	Standards or Attachments	Number of Units	Remarks
Controls	Extermination of plant pests	Speed sprayer, towed by tractor, over 45 l/min.	1	Tank over 500 liters, spray width over 20 m		Farm roads must be available for the use of this type of equipment. The usage of this equipment will therefore depend on the existence of an organizational system for cooperative control work.
		Power sprayer, portable type, over 30 l/min.	1	200 liter polyethylene container, spray width over 15 m		May be operated in paddy fields where farm roads do not exist. This may be used in conjunction with the above speed sprayer to form a power sprayer capable of the controlling 100 hectares.
		Power duster, each with nozzle and 30 m ribbed hose	10	Knapsack type (powder, mist, and granular chemicals may be used)		Although preliminary calculations indicate that 4 units are sufficient, as these are highly wearable machines and, as they will also be required for display and training use, spare units will be required.
Harvesting ↓ Drying and Processing	Reaping, Threshing	Binder	1	Double-bundler		Actual usage value low but used for display, training and tests
		Combine, riding type, 11PS class	2	Cutting width 90 cm, with straw cutter and for wet paddy use		Although approximately 10 units of the 11PS class are considered necessary, as problems are involved in harvesting rainy season crops and, as manual reaping costs are low, these will be used for display, training, and tests.
		Fully automatic thresher	7	Portable type		Considering the rainy season harvests, machines that have comparatively simple raw threshing functions will be desirable.
	Drying	Drier	20	Circulating type		1.5 Ton class desirable. Use in conjunction with a sorter.
		"	4	Flat type		1.5 Ton class. For drying unhulled rice with high water content.
	Processing, Sorting	Winnower	2	Powered		1 Ton per hour capacity. Principally for selecting grain size.
		Sorter	4	Separates foreign material by vibration		1.5 Ton per hour capacity. Used for grain sorting and drying.

Continued

Work Process	Type of Work	Type of Machine and Output	Number of Units	Standards or Attachments	Number of Units	
Others	Items other than the above used for controls and tests.	Hand weeder type	100	15 cm width		Spares required as wear rate is high. 20 Units may be initially purchased for weeding between stalks
		Hand sprayer	10	Knapsack type		For test area and nursery use.
		Hand duster	10	"		Same as above
		Grain pump	2	5HP class		Used for storing unhulled rice. Desirable to use in conjunction with the drier and sorter.
		Movable tent	2	Steel supports with roller		Used for outdoor drying and various work during sudden changes in weather conditions.
		Grain storage tank	5	1 Ton capacity		With discharge opening. For housing and storing grains.
		Storage drier	3	3 Ton capacity		For storage of grains to be distributed to extension and guidance areas. May also be used for display, training and instruction.
		Cutter	2	3 - 5HP class		To cut rice straw which will be returned to the paddy field.
		Weeder	10	With power for use on levees and foot paths		In addition to test equipment, it will be necessary to study the need for other suitable equipment such as farm hand tools or sheets, sparrow prevention ropes, vinyl temporary foot paths, rice planting rope, wheel barrows, etc. It will also be necessary to consider spares or initially increase the number of items that have high wear rates.
		Other Machines				

7. Reflections and Future Problems

Although many knotty problems were encountered during the progress of this project, the majority of these were resolved with appropriate support from the related agencies through the mutual cooperation and efforts of the Philippine Staff. However, in relation to these types of problems, there are a number of unsolved problems in addition to some that were reported in the various chapters already set forth. In the advancement of similar projects in future, it will therefore be desirable that the concerned persons in the subject countries thoroughly study these problems.

In this chapter we wish make a frank presentation of our opinions covering points requiring reflection by both ourselves and others and problems that require correction.

(1) Overall Problem Areas

First, in relation to surveys prior to the commencement of the project, normally the cooperating countries will dispatch a survey team approximately 3 to 4 times prior to the signing of the agreement to carry out various surveys in that region. Although area survey becomes the main element in determining the course of the project in all cases, since the stay of the survey team is extremely short approximately 1 week, we believe it is difficult to fully grasp the actual conditions in the area. If we were to mention the conclusion first, it would be that, although the basic aim of the project is set forth to some extent in the survey report, opportunity is scarce for the specialists that were dispatched to meet with their counterparts in the Philippines during the actual work hours.

We believe considerations should be given to extend the preparatory period slightly and also a longterm station of survey member in the area. In a recent example, this is being conducted by the Cagayan Integrated Agricultural Development Project (CIADP). Further, the various data required by the survey should be initially obtained from the host country. This will prevent unnecessary energy loss on the part of the survey team and will contribute to their concentrating their energies to future surveys on location.

In addition, the period in which the survey team is dispatched becomes another important element. As is already widely known, the weather in most of the southeast Asian countries is devided into dry and rainy seasons. In particular, the difficulties experienced in carrying out the project under the adverse conditions during the rainy season is almost beyond imagination. This greatly affects the land consolidation process and the various farm work involved. That is, these conditions should be thoroughly studied as a part of the survey and it will be desirable for example to consider the types of machines to be used.

Next, in relation to the basic facilities such as office buildings and warehourses, it will be desirable that these be completed prior to the arrival of the specialists upon implementing the agreement. It will further be desired that all counterpart members

in each field be assigned. At the same time, it is very important that the cooperating country immediately ship the initially required supply of machinery corresponding to the dispatch of the specialists. Delays in supplying the machines will not only delay implementation and progress of the project but will also discourage the work incentive of the staff.

When the specialist will be changed during the period of the agreement, it will be desirable that both members work together at the site for a certain number of days so that the work may be properly continued. As it will have a greatly adverse effect on the work if any supervisory positions were left blank for several months, particular care must be taken in carrying out member changes.

As the number of year of the agreement are fixed, the responsible leaders in particular, and regular members, are carrying out our duties with a strong consciousness of the responsibility of completing the project within the time allotted. Therefore, we believe that progress and results of the work will be greatly improved if the items described were correctly correlated.

(2) Problems relating to the usage and maintenance of the machines

Of the various mfchines, the method of usage of the heavy machinery (bulldozers, shoveldozers, etc.), vehicles, and agricultural machinery may be classified into two types of (1) those used in the direct-controlled farms and (2) those rented to the farmers within and outside the project area. Here, we will touch mainly on the latter method where rental fees must be collected when renting equipment to the farmers.

In special businesses such as this project where operation is directly under the control of the government, it is extremely difficult to calculate rental fees (cost of machine usage). In other words, difficult reciprocal problems would exist if the rental fees were pegged too high, the farmers will not like to use the machines and if too low, we would not only be unable to cover depreciation and maintenance costs, let alone our repair expenses.

However, as machines are not one-time consumption items such as fertilizers and agricultural chemicals, but are durable supplies that may be used for many years with proper control and maintenance, a suitable rental fee must be collected that will not be an excessive burden to the farmers. Also, in relation to the control and maintenance of the machines, as the rental fees and their accumulations are insufficient to cover the maintenance of the machines, maintenance during the period of the agreement is carried out by parts being supplied by the Japanese Government and expenses paid by the local Government from their special budget.

Concern is then expressed as to what happens when the agreement expires and the flow of parts halt. Reviewing past examples, it must be regretfully stated that, in all countries and all areas without fail, the true state of affairs is the speedy

deterioration of the machines to scrap condition subsequent to the expiration of the agreements.

Compared to the conditions in the above countries, the understanding and support of the NFAC and the related Bureaus were so entirely satisfactory towards this project and it could almost be said to be exceptional. As may be discerned by referring to Item No. 21 of Reference Data II, during the 5 year period of the agreement and the 2 years extended CP period, the repair expenses disbursed by the local government reached 119,733.46 peso (As of March, 1976).

During the recent 2 years period in which the mutual relations between repairs, parts replacement and the life of the machines had reached their peak, average yearly expenditures of approximately 25,000 pesos were entered. As these machines will endure several more years of usage under proper control and maintenance, we pray that this type of self effort will be continued at the project site.

Further, though the 7th shipment of supplies is currently (April, 1976) being prepared, they would already have received a part of them. The supplies being supplied at this time are divided into 4 shipments and it is hoped that all supplies will arrive prior to the departure of the specialists (mid-June). The current shipment consists mainly of parts and is sufficient for a 3 years supply for the principal machinery owned by this pilot farm. If we may offer honest advice from experiences gained to date, refrain from replacing parts as cheap items but restrict replacements to those parts that truly must be replace in relation to their application and purpose and use these valuable parts with care.

Finally, we would like to touch on the problem of rental fees which was previously briefly mentioned. Prior to this however, since the methode of calculation of machine usage expenses employed by the Ministry of Agriculture and Forestry, Japanese Government is available, we wish to offer this as reference.

(3) Calculation method of machine usage expenses

Although the expenditures included in machine usage are classified in various manners in relation to its role and characteristics in operations, the following methods of classification are normally employed.

1) Direct and indirect expenses

As expenses are to be classified in relation to certain specified crops, when using machines for various work involved in 2 or more types of crops such as rice, wheat, livestock fodder, etc., it will become necessary to divide the usage expenses to the respective crops and the type of work involved. When calculating machine usage expenses by crop and type of work, expenditures such as fuel costs that may be directly calculated for certain crops are called direct expenses while common expenditures such as depreciation and interests on capital which must be artificially distributed to the different crops are called

indirect costs.

2) Fixed costs and variable costs

This classification is in relation to the degree of usage of the machines with a fixed amount regardless of the annual hours of usage called fixed costs and costs that vary in relation to the annual hours of usage being called variable costs.

3) Maintenance costs, operating costs, and labor costs

This is a classification in relation to the nature of the usage of the machines. Maintenance costs are costs involved in control and maintenance of the machines owned and normally have the characteristics of fixed costs. Operating costs are expenses involved in the usage of the machines and may be called variable costs. Labor costs are handled as variable costs in the majority of the cases. Although usage expenses may be classified into the above 3 categories, here, we will classify and treat them as those under (2) and (3) or as maintenance expenses (fixed costs), operating expenses (variable costs), and labor costs.

A. Method of calculating machine usage expenses

If the basis and method of calculation of each item of expenditure were indicated in relation to work costs (cost accounting system) and machine usage expenses (cost calculation system) based on the classifications described above, it would be shown in the following table. A general explanation of how to calculate the various expenses will be given based on this table.

A List of Calculating Methods for Machine Usage Expenses

Expenditures \ System of Calculation			Cost Accounting System (Work Costs)	Cost Calculating System (Machine Usage Expenses)
Maintenance Costs (Fixed Costs)	Depreciation Costs		° Average yearly depreciation = (Purchase Price - Residual Value) / Durable Year ° Variable Annual depreciation = (Purchase Price - Residual Value) / Durable Hours X Annual Hours of Usage ° Purchase Price List ° Table of Durable Year ° Table of Durable Hours	° Use actual purchase price excluding any subsidies. ° Add depreciation costs to the actual purchase price. (Condensed calculation)
	Repair Costs		° Average Annual Repair Costs = (Purchase Price x Coefficient of Total Repair Costs) / Number of Durable Year ° Average Repair Costs per Hour = Purchase Price X Coefficient of hourly repair costs ° Coefficient Chart of Repair Costs	° Sum up the annual repair costs ° Comply with cost accounting methods during the planning stage.
	Garage Costs		° Annual Garage Costs = Purchase Price x Coefficient of Garage Costs ° Table of Garage Cost Coefficients	° Annual Garage Costs = Total Garage Cost per Year X (Area Occupied by Machine / Total Area of Garage)
	Miscellaneous Burden Charges	Interest on Capital	° Average Annual Interest = (Purchase Price + Residual Value) / 2 x Annual Rate ° Annual Rate is 0.056 or 5.6%	° On loans, enter the actual interest rates corresponding to the conditions of the loan ° Do not enter interests on owned capital.
		Taxes and Public Charges	° Annual Taxes and Public Charges = Purchase Price x Percentage of Taxes and Public Charges ° Taxes & Public Charges to be 0.5%	° Enter Taxes and Public Charges actually paid ° Use cost accounting methods during planning stage.
		Insurance	° Annual Insurance Costs = Purchase Price x Insurance Percentage ° Insurance Percentage to be 0.25%	° Enter actual insurance paid ° Use cost accounting methods during the planning stage

Continued

Expenditures \ System of Calculation		Cost Accounting System (Work Costs)	Cost Calculation System (Machine Usage Expenses)
Maintenance Costs	Annual Fixed Cost Percentage	° Annual Fixed Cost Percentage = (Annual Fixed Costs (Total maintenance costs)) / Purchase Price x 100 ° Annual Fixed Costs percentage Table	° Will be convenient if determined by machine type ° Comply with cost accounting methods during the planning stage.
Operating Costs (Variable Costs)	Fuel Costs	° Fuel Costs per Hour = Fuel Consumption by Machine x Unit price ° Table of Fuel Consumption per Machine and Unit Costs	° Enter actual fuel consumption ° Comply with cost accounting methods during planning stage
	Lubricating Oil Costs	° Enter as 30% of the Fuel Costs	° Enter actual fuel consumption ° Comply with cost accounting methods during planning stage
Labor Costs		° Separate into operators wages and helper's wages and, based on the wage scale at the time of employment, evaluate and enter the hourly wages	° Do not enter family member labor which does not require payment of wages. ° Enter actual wages paid. Will differ according to the organizational system of operation and the method of employment of the operator.
Management and Operational Costs		° As a rule, this is not entered	° Miscellaneous expenses such as administrative expenses, accounting expenses, operator training expenses, management allowance, etc. are to be entered in relation to accomplishments. ° During the planning stage, enter usage income within the range of 10 to 20%.
Repayments of Capital and Interest in Relation to Loans		° Do not enter	° Although these should not be included as payments as a rule, many of the farmers are under the impression that they may be handled as expenses ° Interest rates will depend on the terms of the loan

B. Method of determining maintenance costs (fixed type costs)

(1) Depreciation costs

In this calculating method, we have the fixed installment method (linear method) and the fixed percentage method (diminishing balance method). Although the annual depreciation is fixed in the fixed instalment method, in the fixed percentage method, as the years depreciation is determined by multiplying the book value at that time with a fixed percentage, the amount of depreciation is reduced every year. However, from the viewpoint of studying the economic characteristics of the machines, since there is little need to study the annual usage costs of the machines covering their years of usage, if it is expressed in the simple and convenient fixed instalment method, it will be as shown in equation (1)

(1) Average Yearly Depreciation = Purchase Price - Residual Value/ Durable Years.

When setting up usage plans for the machines, it will be necessary to calculate the variable annual depreciation costs as in the following equation (2) if there is severe discrepancy with the standard annual usage hours.

(2) Variable Annual Depreciation = Purchase Price - Residual Value/ Durable Hours X Annual Hours of Usage

Repair Costs

When calculating repair costs during the planning stage, it is usually expressed by the coefficient of the total repair costs which is derived by taking the total repair costs required from the time of purchase until discard to the purchase price. The annual repair costs may be indicated by equation (3).

(3) Average Yearly Repair Costs = Purchase Price X Coefficient of Total Repair Costs/Durable Years

(4) Average Repair Costs per Hour = Purchase Price X Coefficient of Hourly Repair Costs

Note : The coefficient of hourly repair costs will be dependent on the durable hours (durable years X annual hours of usage). Refer to Table 88 of the Agricultural Experiment Station, the Ministry of Agriculture and Forestry, Japan, and Table 89 showing the estimates in this project. They were both derived by the cost accounting method.

(2) Garage Expenses

Although this is derived by multiplying the annual maintenance cost per square meter of the garage by the area occupied by the machine, it may also be derived by employing the coefficient of garage expenses in relation to the purchase price of the machine and calculate as in equation (5).

(5) Garage Expenses = Purchase Price X Coefficient of Garage Expenses

(3) Capital Interest

The average annual interest may be obtained as in equation (6).

(6) Average Annual Interest = Purchase Price X Residual Value/2 X Annual Interest Rate

Note : In Japan, the annual interest rate relative to agricultural matters is normally 6 to 7%.

(4) Taxes and Public Charges

In addition to fixed assets taxes, light automobile taxes, special automobile taxes, etc., there are tractor registration fees, inspection fees, license plate fees, etc. and they may be lumped and entered as a portion of the purchase price. In cost accounting, approximately 0.5% is usually estimated to be the percentage and calculations may be made as in equation (7).

(7) Annual Taxes and Public Charges = Purchase Price X Percentage of Taxes and Public Charges (0.005)

Although cost calculations will depend on past performance, when unknown, comply with cost accounting procedures.

(5) Insurance

Automobile accident compensation insurance and the operator's accident compensation insurance special coverage is available and, in cost accounting, they are indicated as a percentage of the purchase price. The percentage of insurance is normally considered to be about 0.25% and calculations are made as in equation (8).

(8) Annual Cost of Insurance = Purchase Price X Insurance Rate (0.0025)

Although cost calculations will depend on past performance, when unknown, comply with cost accounting procedures.

(6) Annual fixed cost percentage

As it is troublesome to carry out calculations each time on the respective expenses with fixed cost characteristics that are included in the maintenance costs from (1) to (6), and also to simplify calculations for the purpose of economy during the planning stage, the method of expressing the total amount of these expenses as a percentage of the purchase price of the machines may be employed. This percentage is called the annual fixed cost percentage and it will be convenient if the annual fixed costs were obtained from equation (9).

(9) Annual Fixed Costs = Purchase Price X Annual Fixed Cost Percentage

C. Method of determining the operating costs (variabale costs)

(1) Fuel Costs

The hourly fuel costs are calculated by multiplying the hourly fuel consumption of powered equipment by the unit cost of the fuel. However, as the hourly fuel consumption will differ with the type of work, the proper method would be compared to the fuel consumption by machine.

Note : Refer to table in chapter 91 with reference to fuel consumption by machine.

(2) Lubricating oil costs

Normally an estimate of 30% of the fuel costs will be satisfactory.

D. Method of determining labor costs

Labar costs are the wages of the operators driving the machines. Although the characteristics and standards of the operator's wages will differ in each case, in calculation of costs, it will be necessary to enter the wages paid and in cost accounting it will be necessary to enter family labor and hired labor together. Hired labor wage standards shall be employed for family labor wages.

E. Method of obtaining management and operating costs

As cooperative usage by agricultural cooperative associations and farmers collectives are involved when utilizing medium and large machinery, clerical or accounting expenses, staff wages and other miscellaneous expenses also will become necessary. The amount shall be within the range of that permitted by the finances of the organization concerned and may be estimated to be approximately additional 10% of the usage income.

Although the foregoing reference data has been attached, we wish to next show the machine usage costs calculated as a draft for this project. This draft was prepared in 1973 and plans for revision of the rental rates were submitted to NFAC. As a result, we were permitted to use these rates from July of 1974. However, in line with the subsequent increase in oil prices, machine, parts, and labor costs have also risen and we believe the time has now arrived when a restudy is again required.

In determining rental fees (machine usage expenses), the following matters were studied from the various matters involved and just rental fees were calculated from the greatest common divisor. We now wish to express a few opinions as follows.

(1) Special conditions exist in that the machines are supplied by the Government and and are not procured locally.

(2) A prerequisite to determining rental rates should principally be the calculation of depreciation (machine price) and repair costs. An important item here, however, is whether to set the price of machine as the cost at time of purchase

in the supplying country or, the depreciation - replacement of the machine should be considered as the price set at the actual market price in the host country. This would also apply to repairs and parts purchased.

Considering the nature and contents of the work, if we were to take the former (employed in the draft), we feel that the government of the host country must predict and prepare the necessary budget to cover future losses in machine maintenance and control generated by the difference in value.

(3) If rental rates are high, the counter argument would be happened that the farmer's request for usage will decrease. However, as the current rental rate is only 1/3 of the standard external rates, in addition to spoiling the farmers, these unreasonably low rates will make operation of the project difficult. In other words, aid is not always all good. It is more important, rather, to have the farmers realize the benefits of public projects and also the responsibilities involved. For example, payment of water costs and machine rentals are not on time and the farmers lack a sense of duty towards public interests.

In the draft, a plan is set forth whereby a 20% discount on rental fees would be given to the farmers in the pilot farm area when renting machines.

As reference, we would like to add that, in the case of Thailand, rental rates during the initial year of the project was 50%, in the second year 75%, and from the third year on 100%.

(4) Although fuel costs are borne by the user according to the current rental rules, the practice is for the user to purchase his own fuel and keep separate from rental fees. As this causes inconvenience and presents problems, we believe it would be preferable change over to where fuel costs and lubricating oil costs are included in the rental fee.

(5) Garage costs, capital interests, taxes, public charges, and insurance in the maintenance costs (fixed costs) have been deleted due to the difficulty in ascertaining the actual conditions and the complex calculations involved, and a variable cost percentage of 30% added to anticipate rises in machine and parts costs. Although this will not be realistic in the case of sharp price increases due to inflationary conditions, we believe this may be left in effect for three year periods under normal conditions.

(6) With reference to operators, it will be desirable to train the farmers and have them operate the equipment wherever possible. However, in the case of large machinery or special machinery, it will be necessary to use special operators.

(7) Although management and operational costs are not required in this project, one possibility may be considered in which these costs may have to be entered when the administration turn over the operation of the irrigation pump (Large

type, ϕ16", 53HP) to a water supply association organized by the farmers.

Also, when a special project or machinery center is established, it will be necessary to organize it in a systematic manner (a completely direct controlled system should be avoided as abusive practices may result) and set up a management committee.

Please refer to the various basic data for establishing tentative rental rates that is attached after chapter 95 of this paper.

Λ. Correlation table between durable years and durable hours of the machines.

The purpose of prepairing this chart was due to the fact that, although the durable years are indicated in the machine instruction manual as a certain number of years, in the majority of the cases, the durable hours are not indicated due to differences in environmental usage conditions resulting in difficulty in arriving at correct figures and also due to the manufacturers reluctance to indicate these figures because of their sales policies. However, as this will be inconvenient in drawing up project plans and in the maintenance and control of machinery, I have prepared this table by utilizing the normal durable years of machines from various past reference material and also by adding my experiences.

As I do not believe this is complete from the beginning, any criticisms or improvements from the readers will be greatly appreciated. Giving a brief description of the preparation of this table, I wish to explain that the prime condition is to estimate the annual usage hours of the machines by judging the nature of the work. As shown in the following table, if the annual usage is between 100 to 1,500 hours, this may be divided into 6 stages and approximate durable hours will be obtained by illustratively comparing the conventional service years to each.

A - 1 Table of Durable Years and Durable Hours for Heavy Machinery

Note : Fugures in parenthesis are selected durable years

Application and Type of Work	Type of Machine	Annual Usage Hours (hrs.)						Durable Hours
		100	200	300	500	1,000	1,500	
Land Consolidation, Construction Work	Bulldozer			15 years	10	(7)	5	7,000
	Dozershovel			15	10	(8)	6	8,000
	Back Hoe			15	10	(8)	6	8,000
	Crane Truck			15	10	(7)	5	7,000
	Cargo Truck			10	8	(5)	4	5,000
	Dump Truck			10	8	(5)	4	5,000
	Concrete Mixer			10	8	(5)	4	5,000
	Chain Block				15	(8)	7	8,000
	Belt Conveyor			6	4	(2)	1.5	2,000
Irrigation	Pump ϕ16"			20	15	(10)	8	10,000

A - II Table of Durable Years and Durable Hours for Agricultural Machinery

Application and Type of Work	Type of Machine	Annual Usage Hours (hrs.)						Durable Hours (hrs.)
		100	200	300	500	1,000	1,500	
Plowing, Puddling	4-Wheel Tractor		15 years	12	10	(8)	6	8,000
	Power Tiller	12	9	(7)	5			2,100
	Rotary	12	9	(7)	5			2,100
	Bottom Plow	15	12	(10)	7	5		3,000
	Disk Plow	12	9	(7)	5	3		2,100
	Disk Harrow	13	10	(8)	6	4		2,400
Planting	Rice Planter	12	9	(7)	5			2,100
Intertillage Weeding	Hand Weeder	5	4	(3)	2			900
	Power Weeder	10	7	(6)	5			1,800
Ditch Digging	Ditcher	12	9	(7)	5			2,100
Irrigation	Pump ϕ2"			15	10	(7)	5	7,000
	Pump ϕ3"			15	10	(7)	5	7,000
Power Source	Diesel Engine			14	12	(10)	8	10,000
	Gasoline Engine			12	10	(8)	6	8,000
	Kerosene Engine			12	10	(8)	6	8,000
Plant Pest Control	Manual Duster	10	8	(7)	5			2,100
	Manual Sprayer	10	8	(7)	5			2,100
	Power Duster	10	8	(7)	5			2,100
	Power Sprayer	10	8	(7)	5			2,100
Harvesting	Binder	10	8	(7)	5			2,100
	Combine	10	8	(7)	5			2,100
Threshing	Foot-Operated Thresher	15	12	(10)	7			3,000
	Power Thresher	14	10	(8)	6			2,400
Hauling	Trailer	10	8	(7)	5			2,100
Drying	Drier	14	10	(8)	6			2,400
Straw Cutting	Cutter	10	8	(7)	5			2,100
Sorting Unhulled Rice	Blower	14	10	(8)	6			2,400
Electric Power	Motor				15	12	(10)	15,000
					15	12	(10)	15,000

B. Reference Table of Repair Cost Coefficients

B - 1. Estimated Repair Cost Coefficients of Principal Agricultural Machinery from Performance Results in Paddy Fields

Note : Data is from the Agricultural Experiment Station of the Ministry of Agriculture and Forestry

Application	Machine Name	Coefficient of Repair Costs(%)	
		Coefficient of Average Annual Repair Costs	Coefficient of Hourly Repair Costs
For Plowing and Tilling	4-Wheel Tractor	7.00	0.014
	Power Tiller	8.33	0.042
	Japanese Tractor Plow	4.00	0.027
	Japanese Tiller Plow	6.67	0.044
	Bottom Plow	4.00	0.027
	Disk Harrow	4.00	0.027
	Rotary	6.25	0.025
	Plow with Pulverizer	4.00	0.027
	Subsoiler	2.00	0.020
	Tooth Harrow	2.67	0.027
For Firming	Roller	0.67	0.007
	Cultipacker	0.67	0.007
For Puddling	Puddler Rake	1.67	0.008
	Paddy Field Harrow	1.67	0.008
Fertilizing and Seeding	Manure Spreader	3.00	0.020
	Lime Sower	2.00	0.020
	Broadcaster	2.00	0.020
	Grain Drill	4.00	0.040
For Rice Planting	Rice Planter	8.33	0.042
For Pest Control	Knapsack Type Power Duster	4.00	0.040
	Power Sprayer	4.00	0.040
	Power Duster	4.00	0.040
	Manual Duster	2.00	0.040
For Harvesting and Processing	Power Reaper	5.00	0.025
	Reaper Bundler	5.00	0.025
	Combine	5.00	0.025
	Automatic Thresher	2.50	0.025
	Power Huller	1.50	0.030
	Drier	1.50	0.004

Continued

Application	Machine Name	Coefficient of Repair Costs(%)	
		Coefficient of Average Annual Repair Costs	Coefficient of Hourly Repair Costs
For Hauling	Trailer (Large)	2.00	0.010
	Trailer (For Tiller)	2.50	0.013
	Truck	5.00	0.013

Note : The coefficient of total repair costs divided by the durable years is the coefficient of average annual repair costs and is the coefficient of hourly repair costs when divided by the durable hours.

B - II. Coefficient of Repair Costs Calculated from the Service Hours, (From the Mindoro Project)

Application and Type of Work	Machine Name	Limit of Durability		Coefficient of Repair Costs	
		Years	Hours	Annual Average(%)	Hourly Average(%)
Plowing Puddling Levelling	4-Wheel Tractor	8	8,000	7.00	0.007
	Power Tiller	7	2,100	8.33	0.028
	Rotary	7	2,100	6.25	0.021
	Bottom Plow	10	3,000	4.00	0.014
	Disk Plow	7	2,100	4.00	0.013
	Disk Harrow	8	2,400	4.00	0.013
	Tooth Harrow	10	3,000	2.67	0.009
	Scraper	10	10,000	2.00	0.002
Planting	Rice Planter	7	2,100	8.33	0.028
Intertillage Weeding	Hand Weeder	3	900	(7.00)	0.023
	Power Weeder	6	1,800	(8.00)	0.027
Ditch Digging	Ditcher	7	2,100	(8.00)	0.027
Irrigating	Pump ϕ16"	10	10,000	(7.00)	0.007
	Pump ϕ3"	7	7,000	(7.00)	0.007
Power Source	Diesel Engine	10	10,000	(5.00)	0.005
	Gasoline Engine	8	8,000	(7.00)	0.007
	Kerosene Engine	8	8,000	(7.00)	0.007
	Small Gasoline Engine	5	5,000	(7.00)	0.007
Pest Control	Manual Duster	7	2,100	(2.00)	0.007
	Power Duster	7	2,100	4.00	0.013
	Manual Sprayer	7	2,100	2.00	0.007
	Power Sprayer	7	2,100	4.00	0.013

Continued

Application and Type of Work	Machine Name	Limit of Durability		Coefficient of Repair Costs	
		Years	Hours	Annual Average(%)	Hourly Average(%)
Harvesting	Binder	7	2,100	5.00	0.017
	Combine	7	2,100	5.00	0.017
Threshing	Foot Operated Thresher	10	3,000	2.00	0.007
	Power Thresher	8	2,400	2.50	0.008
Straw Cutter	Cutter	7	2,100	5.00	0.017
Unhulled Rice Sorting	Blower	8	2,400	2.50	0.008
Drying	Drier	8	2,400	1.50	0.005
Hauling	Trailer	7	2,100	2.50	0.008
Electric Power	Motor	10	15,000	1.00	0.001
Milling	Rice Mill	10	15,000	5.00	0.003

Note : 1.) The coefficient of average annual repair costs were taken from data put out by the Japanese Ministry of Agriculture.

2.) Figures in parenthesis are estimated figures.

3.) Care must be taken when estimating the durable years and especially the durable hours because of variables in the coefficient of hourly durable service will arise according to the method of estimation. Although the annual hours of usage must be estimated by forecasting the degree of usage of the machines according to the scale and character of the project, the coefficient of hourly repair costs will vary under these conditions.

C. Standard Fuel Consumption and Costs by Machine in Paddy Field Work

Type of Work	Machine		Engine Output (PS)	Nature of Work	Fuel					
					Type	Consumption		Unit Cost	Cost	
	Name	Standards				l/hr.	l/ha	₱/l	₱/hr.	₱/ha
Plowing	Bottom Plow	12" x 1	10~15	Throw In & Round Plowing	Light Heavy Oil	2.0	21.5	1.15	2.30	24.73
		14 x 1	15~20	"	"	2.5	23.6	"	2.88	27.14
		16 x 1	30~35	"	"	3.0	24.8	"	3.45	28.52
		18 x 1	40~45	"	"	3.5	25.4	"	4.03	29.21
		12 x 2	20~	"	"	3.0	16.5	"	3.45	18.98
		14 x 2	30~	"	"	3.5	16.1	"	4.03	18.52
		16 x 2	40~	"	"	4.0	16.3	"	4.60	18.75
		12 x 3	40~	"	"	4.0	14.6	"	4.60	16.79
		14 x 3	50~	"	"	4.5	14.1	"	5.18	16.22
		16 x 1	30~	Plowing In	"	3.0	24.8	"	3.45	28.52
Plowing	Rotary	0.9 m width	10~15	Continuous Plowing In & Headland Plowing	"	2.5	24.5	"	2.88	28.18
		1.2 "	15~25	"	"	3.0	22.1	"	3.45	25.42
		1.6 "	30~45	"	"	4.0	17.1	"	4.60	19.67
		1.8 "	40~	"	"	4.5	17.3	"	5.18	19.90
Pulverizing	Rotary	0.9 "	10~15	"	"	2.5	18.7	"	2.88	21.51
		1.2 "	15~25	"	"	3.0	16.8	"	3.45	19.32
		1.6 "	30~45	"	"	4.0	14.8	"	4.60	17.02
		1.8 "	40~	"	"	4.5	14.9	"	5.18	17.14

Note : ₱1.00 = ¥40.00

Continued

Type of Work	Machine		Engine Output (PS)	Nature of Work	Fuel					
	Name	Standards			Type	Consumption		Unit Cost	Cost	
						l/hr.	l/ha	₱/l	₱/hr.	₱/ha
Plowing Pulverizing	Plow with Pulverizer	8" x 2	20 ~30	Replowing & Plowing near the foot path	Light Heavy Oil	3.0	27.3	1.15	3.45	31.40
		8 x 3	35 ~45	"	"	4.0	24.2	"	4.60	27.83
		8 x 4	40 ~60	"	"	5.0	23.0	"	5.75	26.45
Levelling	Tooth Harrow	30 x 2	15 ~25	Vertical Plowing & Spiral Turning	"	2.5	3.1	"	2.88	3.57
		30 x 3	25 ~	"	"	3.0	2.6	"	3.45	2.99
		30 x 4	35 ~	"	"	3.5	1.9	"	4.03	2.19
Compact of Soil	Roller	K6 Type	15 ~	Plowing In	"	1.5	2.9	"	1.73	3.34
		K8 Type	35 ~	"	"	2.0	3.0	"	2.30	3.45
Puddling	Puddling Rake	Power Tiller	3 ~	Vertical Puddling & Slanted Puddling	Gasoline	1.0	4.4	1.42	1.42	6.25
		"	8 ~	"	Kerosene	1.5	3.4	1.15	1.73	3.91
		Tractor	12 ~14	"	Light Heavy Oil	2.0	3.6	"	2.30	4.14
	Paddy Field Harrow	10 Blades	15 ~20	"	"	2.5	4.3	"	2.88	4.95
		12 "	20 ~30	"	"	3.0	4.6	"	3.45	5.29
		20 "	30 ~50	"	"	4.0	3.7	"	4.60	4.26
	Rotary+ Levelling Board	2.4 m Board	15 ~25	"	"	2.5	3.3	"	2.88	3.80
		3.5 "	30 ~	"	"	3.0	2.8	"	3.45	3.22
Spreading Manure	Manure Spreader	1.4 m^2	15 ~	Continuous Spreading	"	1.5	4.3	"	1.73	4.95
		2.2 "	25 ~	"	"	2.0	5.0	"	2.30	5.75
Spreading Lime	Lime Sower	Type 6, 400 liters	15 ~	Spread Every Other Operation	"	2.0	4.8	"	2.30	5.52

Continued

Type of Work	Machine		Engine Output (PS)	Nature of Work	Fuel					
					Type	Consumption		Unit Cost	Cost	
	Name	Standards				l/hr.	l/ha	₱/l	₱/hr.	₱/ha
Spreading Lime	Lime Sower	Type 8, 500 liters	25~	Spread Every Other Operation	Light Heavy Oil	2.5	4.6	1.15	2.88	5.29
		Type 9, 550 liters	35~	"	"	3.0	5.1	"	3.45	5.87
Fertilizing	Broad-caster	100 liters	15~	Spreading Out and In	"	1.5	1.4	"	1.73	1.61
		200 "	20~	"		2.0	1.1	"	2.30	1.27
Fertilizing Seeding	Grain Drill	Towing Type	4~5	Continuous Round Trip Method	Gasoline	1.0	9.3	1.42	1.42	13.21
		Driven Type	5~15	"	Light Heavy Oil	1.3	8.8	1.15	1.50	10.12
		7 Rows Series Mounted	15~	"	"	1.5	8.6	"	1.73	9.89
		13 "	30~	"	"	2.0	5.8	"	2.30	6.57
Planting	Planter for Seedling	2 Row Powered	3	Continuous Round Trip	Gasoline	1.5	41.7	1.42	2.13	59.22
		4 "	3.5	"	"	1.5	28.3	"	2.13	40.19
	Mature Seedling Planter	2 "	3	"	"	1.5	40.5	"	2.13	57.51
Pest Control	Knapsack Type Power Duster	Tank Capacity 10	2.0	Multi-nozzle Hose Dusting	Oil Mixture	0.8	0.4	1.68	1.35	0.68
		"	2.0	Single Nozzle Dusting	"	0.8	2.2	"	1.35	3.70
		"	2.0	Dusting	"	0.8	1.1	"	1.35	1.85
		"	2.0	Mist Sprayer	"	0.8	3.9	"	1.35	6.56
	Portable Type Power Sprayer	10 liters/min.	1.5	Horizontal Spray Tank 100 liters/10a						
		15 liters/min.	2.0	"						

Continued

Type of Work	Machine		Engine Output (PS)	Nature of Work	Fuel					
					Type	Consumption		Unit Cost	Cost	
	Name	Standards				l/hr.	l/ha	₱/l	₱/hr.	₱/ha
Pest Control	Portable Type Power Sprayer	20 l/min.	2.7	Horizontal Spray Tank 100 liters/10a						
		30 l/min.	3.0	"						
	Towing Type Power Sprayer	60 l/min.	15~	"	Light Heavy Oil	2.5	1.9	1.15	2.88	2.19
		"	15~	Levee Spraying Nozzle 100 liters/10a	"	2.5	1.7	"	2.88	1.96
		"	15~	Horizontal Spray Tank 100 ltrs/10a	"	2.5	1.9	"	2.88	2.19
		70 l/min.	15~	Levee Spraying Nozzle 100 ltrs/10a	"	2.5	1.7	"	2.88	1.96
	Power Spraying	Manual Push Type	4.5	Multi-nozzle Hose 5 kg/min.	Gasoline	1.5	0.6	1.42	2.13	0.85
		Towing Type	5~	Multi-nozzle Hose 10 kg/min.	Light Heavy Oil	1.5	0.2	1.15	1.73	0.23
		Mounted Type	15~	"	"	3.0	0.2	"	3.45	0.23
Reaping Threshing	Reaper Binder	For 2 Rows	3	Round Cutting	Gasoline	1.0	13.9	1.42	1.42	19.74
	Automatic Threshing Type Combine	For Travelling, 80 cm Width	7~9	Round Cutting	Kerosene	2.5	62.5	1.15	2.88	71.88
	Standard Type Combine	1.5 m Width	20	Round Cutting + Turnaround Cutting	Light Heavy Oil	3.5	35.4	"	4.03	40.71
		2.4 "	40	"	"	5.0	32.9	"	5.75	37.84
		3.0 "	57	"	"	6.5	30.2	"	7.48	34.73
		4.3 "	100	"	"	10.0	28.3	"	11.50	32.55

Note : 1) This data is from the Agricultural Experiment Station of Ministry of Agriculture and Forestry in Japan

2) Fuel consumption is for standard type work efficiency in a paddy field plot of 30 m x 100 m or 30a.

3) The figures in the engine output column indicates that of the tractors or engines used.

4) In relation to fuel consumption, the hourly fuel consumption rates shown in the table below were used as guide lines in addition to actual test results in the case of the diesel tractor while test results and catalog data were used for the other machines.

Tractor HP	10PS Class	15PS Class	20PS Class	30PS Class	40PS Class	50PS Class
Hourly Fuel Consumption	2.0 liters	2.5 "	3.0 "	4.0 "	4.5 "	5.0 "

5) All fuel prices are those in Oriental Mindoro market prices as of April, 1976.

Remarks : Although the above data will be used as reference when fuel costs are included in machine rental fees, calculations should be carried out with a 30% increase in fuel consumption. The reason for this is that the actual fuel fuel consumption is considerably greater than those indicated in the catalogs or obtained from tests. Further, in certain types of machines, it will be necessary to add the cost of lubricating oil.

Technical Collaboration aid
from the Government of Japan
(1969 ~ 1976)

RP-JAPAN pilot farm project
Or. Mindoro

Year	Ex-godown	Insurance fee	Ocean freight	Others	CIF Amount
1969~1970	¥45, 179, 500		9, 943, 081	2, 960, 208	58, 082, 789
1970~1971	15, 525, 132	110, 069	1, 271, 210	322, 140	17, 228, 551
1971~1972	9, 083, 805	83, 688	1, 353, 399	105, 490	10, 626, 382
1972~1973	6, 591, 083	45, 070	2, 075, 553	81, 970	8, 793, 676
1973~1974	2, 517, 120	33, 847	3, 959, 758	65, 582	6, 566, 307
1974~1975	7, 366, 269	40, 134	268, 599	153, 990	7, 829, 992
1975~ 1976					To be received : estimate 6, 000, 000
TOTAL					¥115. 127, 697. 00 (₱2, 878, 192. 40)

Republic of the Philippines
National Food and Agriculture Council
REGIONAL DEMONSTRATION AND TRAINING CENTER
(RP-Japan Pilot Farm Project)
Barcenaga, Naujan, Oriental Mindoro
(1974)

PLAN FOR THE NEW RENTAL FEE OF MACHINERIES
(PRICE LIST OF MAIN MACHINERIES)

Description	Maker	Type	Price, CIF at Manila
Heavy duty and construction equipment			
Bulldozer	KOMATSU	D50A-15	₱ 149,750.00
Bulldozer	KOMATSU	D50P-15'	147,500.00
Doser shovel	KOMATSU	D30S 12	104,885.00
Back hoe	KOMATSU	DHFO30-12	36,850.00
Truck crane	ISUZU	TKD 50	125,000.00
Cargo truck	TOYOTA	DA115-L	38,421.00
Dump truck	TOYOTA	RU121-D	22,238.00
Station wagon	TOYOTA	FJ 55 LV	25,350.00
Concrete mixer	KOYO		3,250.00
Chain block	OSAKA	(3 ton)	513.00
Chain block	OSAKA	(1 ton)	263.00
Belt conveyor			1,375.00
Mechanic tools and equipment for workshop			
Air compressor	IWATA	SU-15B	₱ 2,450.00
Air compressor	IYASAKA	PV-3	2,500.00
Parts cleaner	IYASAKA	PC-3	2,575.00
Trolley chain block	IYASAKA	(2 ton)	1,288.00
Garage jack	IYASAKA	(10 ton)	1,150.00
Garage jack	IYASAKA	(3 ton)	800.00
Engine cleaner	IYASAKA	EC-P3	30.00
Spray gun	IYASAKA	W-61-2 S	245.00
Engine stand	IYASAKA	ES-25	8,750.00
A.C. ARC welder	IYASAKA	DAIDEN-B	7,875.00
Bench drill	IYASAKA	NBD-340	1,775.00
Nozzle tester	IYASAKA	DN-50	325.00
Spray plug	IYASAKA	SPC-VX	668.00

Continued

Description	Maker	Type	Price, CIF at Manila
Bench grinder	IYASAKA	BGE-205	₱ 2,600.00
Toe-in gauge	IYASAKA	TG-U	123.00
Generator	KUBOTA	35KVA-3LKE	31,250.00
Generator	KUBOTA	ASK 130	9,568.00
Generator	KUBOTA	ASK 110	6,490.00
Portable drill	HITACHI	BLU-3	800.00
Portable grinder	HITACHI	NU-DH-3	575.00
Gas welder	SHINWA	S6	2,250.00
Battery charger	IYASAKA	Runchar	1,375.00
Current meter			(2, 875.00
			pcs) 1,750.00

Agricultural farm machineries and equipment

Description	Maker	HP	Type	Price
Tractor	KUBOTA	35	L-350	₱ 46,041.00
(Body)	"			27,500.00
(Rotary tiller)	"			6,000.00
(Bottom plow)	"			3,938.00
(Disc plow)	"			3,250.00
(Strake wheel)	"			2,500.00
(Spare parts)	"			2,000.00
(Others)	"			854.00
Tractor	"	27	L-27	23,750.00
(Body)	"			18,750.00
(Rotary tiller)	"			5,000.00
Tooth harrow	"			2,125.00
Disc harrow	"			4,475.00
Power tiller	"	9	KMB 200	4,923.00
"	"	7	KR 850	3,408.00
"	ISEKI	9	KL1100-D	4,923.00
Rice transplanter	"		PC-20	2,675.00
Digging machine*	KUBOTA	9		12,000.00
Pump (main)	EBARA		400SZR	111,750.00
Engine	YANMAR	53	3LDL-F	71,000.00
Pump (small size)	"	6.5	NT65	5,000.00
		7.5	NT75K	8,875.00
Hand duster	KYORITSU			175.00

Continued

Description	Maker	HP	Type	Price
Hand sprayer	MARUYAMA		CsBS	₱ 163.00
Power duster	KUBOTA	3	AIM 30	565.00
Power sprayer	"	8	IIS-2B	9,000.00
"	MARUYAMA	4	CSP-1	6,250.00
"	"	4	MS400E	3,230.00
Hand weeder				48.00
Power weeder	FUJI	3.5	RPC-13	1,338.00
Binder	KUBOTA	3	HC-500	5,775.00
Combine	ISEKI	7	HD-50	12,625.00
Kreis cutter	MARUYAMA	4	BCA-17	1,155.00
Pedal thresher	FUKAZAWA			350.00
Automatic thresher	KUBOTA		JTN 480	2,225.00
Diesel engine	"	3	KND 3	
Trailer	"		(for KR850)	775.00
Husker	"		MH40XKND3	3,100.00
Winnower	KIYA			2,000.00
Dryer	ISEKI	1kw	KEH-48K	1,250.00
"	YAMAMOTO	2 "	VDS-8	3,750.00
"	"	2 "	HCD-12	6,750.00
Cutter	KUBOTA		C-15-1	1,155.00

Rice milling machine and equipment

Motor	HITACHI	11kw	YT-101AB	₱ 5,000.00
Paddy husker & separator	SATAKE		HU-8C	
(with motor)			HA-8C	
	(HITACHI)	(5.5kw)	(1KK)	16,000.00
Hopper	"			1,175.00
Elevator	"		SE-5D	4,270.00
" (2 sets)	"		SE-4	8,000.00
Paddy	"		PC-1B	9,650.00
Aspirator	"		SH-2A	8,020.00
Dust collector	"			2,115.00
Bran collector	"			5,640.00
Transmission	"			5,875.00
Diode (Bearing)	"			49.00
Total				₱ 73,293.00

Continued

Experiment apparatus and equipment

Description	Maker	HP	Type	Price
Small threshing machine	KIYA		IKEDA	₱ 1,700.00
Small husking machine	〃		CHIYODA	3,075.00
Small rice cleaning machine	KANRYU		C. NISHIKI	1,443.00
Grain moisture meter	KETTO		PB-1K	1,350.00
Stereo microscope	OLYMPUS		ECB1-11	2,915.00
Precision stereo microscope	〃		X-2	2,175.00
〃	〃		SZ-2	2,475.00
Balance scale	OSA		CZ-5000	9,375.00
Drying oven	YAMATO		DZ-Max-54	1,400.00
Pure water equipment	OKAMOTO		B-5	2,250.00
PH meter	TOA		HM-5A	5,938.00
Recording thermometer	CHINO		ET-2200	7,000.00
Hygrometer	IKEDA		No. 405	465.00
Balance for corn	KIYA		No. 127	608.00
Grain balance	IKEDA			650.00
Preoise balance	〃			360.00
Durometer for earth	〃		YAMANAKA	388.00

Survey Instruments

Transit	TOKYO		AB	₱ 2,950.00
Tilting level	〃		T2	1,375.00
Drawing instrument	TAKEDA		711-0215	188.00
Drafter	TAKEFUJI		MGF-110	729.00
Meter for corn	KIYA		#734	1,600.00
Pole for survey				1,075.00
Concrete tester				2,300.00

Continued

Stationary and extension work equipment

Description	Maker	HP	Type	Price
Transmitter-receiver	OKI		TR-3001	₱ 39,250.00
Antenna machine relay box	"			5,300.00
Electric typewriter				2,500.00
Typewriter		(2 pcs)	Gabriele-25	2,120.00
Calculating machine			HL-21	1,500.00
Copying press	UCHIDA		E-700	4,275.00
Mimeograph	TOHO			1,175.00
Ampere test meter	HIRASAWA			1,000.00
Electric calculator	RICOH		RICOMAC 1200	2,125.00
Interphone	TOA			1,173.00
Loudspeaker net	"			2,518.00
Projector 16 m/m	ELMO		16-SH	6,626.00
Slide projector	"		AS-1000T	1,665.00
Screen				320.00

STANDARD DURABLE PERIOD OF MACHINERIES

Operation	Name of Machine	Durable Period							
		50 hrs.	100	200	300	500	1000	1500	2000
		Years			(B)		(A)	(A)	
Construction equipment	Bulldozer				15	10	7	5	4
	Dozer shovel				15	10	8	6	5
	Back hoe				15	10	8	6	5
	Truck crane				15	10	7	5	4
	Cargo truck				10	8	5	4	3
	Dump truck				10	8	5	4	3
	Concrete mixer				10	8	5	4	3
	Chain block				-	15	8	7	-
	Belt conveyor				6	4	2	1.5	1
Agricultural equipment	Tractor			15	12	10	8	6	5
	Power tiller	14	12	9	7	5			
Plowing and harrowing	Rotavator	14	12	9	7	5			
	Bottom plow	15	15	12	10	7			
	Disc plow	14	12	9	7	5			
	Disc harrow	15	13	10	8	6			
	Tooth harrow	15	15	12	10	7			
Transplanting	Rice planter	14	12	9	7	5			
Weeding	Hand weeder	-	5	4	3	2			
	Power weeder	12	10	7	6	5			
Digging	Ditcher	15	12	9	7	5			
Irrigation	Pump ϕ 400 mm				20	15	10	8	5
	Pump ϕ 70 mm				15	10	7	5	4
Engine	Diesel				14	12	10	8	6
	Gasoline				12	10	8	6	5
	Kerosene				12	10	8	6	5
Plant protection	Hand duster	12	10	8	7	5			
	Hand sprayer	12	10	8	7	5			
	Power duster	12	10	8	7	5			
	Power sprayer	12	10	8	7	5			
Harvesting	Binder	12	10	8	7	5			
	Combine	12	10	8	7	5			
Threshing	Pedal thresher		15	12	10	7			
	Auto thresher	15	14	10	8	6			
Transportation	Trailer		10	8	7	5			

Continued

Operation	Name of Machine	Durable Period							
		50 hrs.	100	200	300	500	1000	1500	2000
					(B)		(A)	(A)	
Drying	Dryer	15	14	10	8	6			
Cutting	Cutter		10	8	7	5			
Winnowing	Winnower	15	14	10	8	6			
Electric power	Generator				15	14	10	8	6
	Motor					15	12	10	8
Others	Rice milling machine unit								
	Air compressor						9	7	6
	Garage jack						12	10	8
	Electric welder						10	8	6
	Battery charger						10	7	5

Standard cost of repair coefficient of construction machineries

Name of Machine	Durable Period		Cost of maintenance coefficient (%)			
	Years	Hours	Repair	Management	Total	Ave. /hr.
Bulldozer	7	7,000	25	30	55	0.079
Dozer shovel	8	8,000	20	30	50	0.063
Back hoe	8	8,000	16	30	46	0.058
Truck crane	7	7,000	20	30	50	0.071
Cargo truck	5	5,000	23	40	63	0.126
Dump truck	5	5,000	18	40	58	0.116
Concrete mixer	5	5,000	14	23	37	0.074
Chain block	8	8,000	20	23	43	0.054
Belt conveyor	2	2,000	86	23	109	0.545

Data : Provisions of rental fee for the construction equipments by the Ministry of Agriculture and Forestry of the Government of Japan.

Standard cost of repair coefficient of agricultural machineries in operation in the paddy field

Operation	Name of Machine	Durable period		Cost of repair coefficient	
		Years	Hours	Ave. /year(%)	Ave. /hr. (%)
	Tractor	8	8,000	7.00	0.007
	Power tiller	7	2,100	8.33	0.028
Plowing	Rotavator	7	2,100	6.25	0.021
	Bottom plow	10	3,000	4.00	0.014
	Disc plow	7	2,100	4.00	0.013
	Disc harrow	8	2,400	4.00	0.013
	Tooth harrow	10	3,000	2.67	0.009
	Scraper	10	10,000	2.00	0.002
Transplanting	Rice planter	7	2,100	8.33	0.028
Weeding	Hand weeder	3	900	7.00	0.023
	Power weeder	6	1,800	8.00	0.027
Digging	Ditcher	7	2,100	8.00	0.027
Irrigation	Pump ϕ 400 mm	10	10,000	7.00	0.007
	Pump ϕ 70 mm	7	7,000	7.00	0.007
Engine	Diesel	10	10,000	5.00	0.005
	Gasoline	8	8,000	7.00	0.007
	Kerosene	8	8,000	7.00	0.007
Plant protection	Hand duster	7	2,100	2.00	0.007
	Hand sprayer	7	2,100	2.00	0.007
	Power duster	7	2,100	2.00	0.007
	Power prayer	7	2,100	4.00	0.013
Harvesting	Binder	7	2,100	5.00	0.017
	Combine	7	2,100	5.00	0.017
Threshing	Pedal thresher	10	3,000	2.00	0.007
	Auto thresher	8	2,400	2.50	0.008

Continued

Operation	Name of Machine	Durable period		Cost of repair coefficient	
		Years	Hours	Ave. /year(%)	Ave. /hr. (%)
Others	Cutter	7	2,100	5.00	0.017
	Winnower	8	2,400	2.50	0.008
	Dryer	8	2,400	1.50	0.005
	Trailer	7	2,100	2.50	0.008
	Generator	7	10,500	7.00	0.004
	Motor	10	15,000	1.00	0.001
	Rice milling machine unit	10	15,000	5.00	0.003
	Air compressor	7	10,500	2.00	0.002
	Garage jack	10	15,000	2.00	0.002
	Electric welder	8	12,000	2.50	0.002
	Battery charger	7	10,500	2.00	0.002

Data : Agriculture Institute of the Ministry of Agriculture and Forestry of the Government of Japan.

NOTE : ( ) - Presumption

Rental fee considering the perfect maintenance
(cost of depreciation, etc.) of machineries

Name of equipment	Cost of equipment	(1) Cost of depreciation/hour	(2) Cost of maintenance per hour	Rate of rental per hour
Bulldozer	₱ 149,750	₱ 21.40	₱ 11.90	₱ 33.30
Dozer shovel	104,885	13.20	6.70	19.90
Back hoe	36,850	4.70	2.10	6.80
Truck crane	125,000	17.90	6.30	24.20
Cargo truck	38,421	7.70	4.90	12.60
Dump truck	22,238	4.50	2.60	7.10
Chain block	513	0.07	0.03	0.10
Concrete mixer	3,250	0.65	0.25	0.90
Belt conveyor	1,375	0.70	0.80	1.50
Air compressor	2,500	0.25	0.03	0.28
Tractor L350	27,500	3.50	2.00	5.50
Rotavator	6,000	2.90	1.30	4.20
Tractor L27	23,750	3.00	1.70	4.70
Rotavator	5,000	2.40	1.50	3.90
Bottom plow*	3,938	1.40	0.60	2.00
Disc plow*	3,250	1.60	0.50	2.10
Disc harrow*	4,475	1.90	0.60	2.50
Tooth harrow*	2,125	0.70	0.30	1.00
Scraper**	800	0.08	0.02	0.10
Power tiller 9HP	4,923	2.40	1.20	3.60
" 7HP	3,403	1.70	0.90	2.60
Trailer*	775	0.40	0.07	0.47
Rice planter	2,675	1.30	0.75	2.05
Hand weeder	48	0.04	0.01	0.05
Power weeder	1,338	0.75	0.40	1.15
Ditcher	12,000	5.80	3.30	9.10
Pump ϕ 70 mm	8,875	1.30	0.70	2.00
" ϕ 50 mm	5,000	0.80	0.40	1.20
Hand duster	175	0.09	0.02	0.11
Hand sprayer	163	0.08	0.02	0.10
Power duster	565	0.30	0.08	0.38
Power sprayer I	9,000	4.30	1.20	5.50

Continued

Name of equipment	Cost of equipment	(1) Cost of depreciation per hr.	(2) Cost of maintenance per hr.	Rate of rental per hour
Power sprayer II	₱ 6,250	₱ 3.00	₱ 0.90	₱ 3.90
" III	3,230	1.60	0.50	2.10
Binder	5,775	2.80	1.00	3.80
Combine	12,625	6.20	2.20	8.40
Pedal thresher	350	0.12	0.03	0.15
Auto thresher	2,225	1.00	0.20	1.20
Cutter	1,155	0.60	0.20	0.80
Winnower	2,000	0.80	0.20	1.00
Dryer I	1,250	0.60	0.10	0.70
" II	3,750	1.60	0.20	1.80
" III	6,750	2.80	0.40	3.20
Generator 35 kw	31,250	3.00	1.30	4.30
" 3 kw	9,568	1.00	0.40	1.40
" 1 kw	6,490	0.70	0.30	1.00
Garage jack	1,150	0.08	0.03	0.11
Electric welder	7,875	0.70	0.20	0.90
Battery charger	1,375	0.20	0.03	0.23

NOTE : * Attachment of tractor

** New made attachment (made in Calapan)

Fundamental and ideal rental fee of machineries

Name of equipment	Basic Rental fee	Coefficient of prices and cost regulation	Proposed Rental fee
I Construction equipment			
Bulldozer	₱ 33.30	+ 30%	₱ 43.30
Dozer shovel	19.90	"	25.90
Back hoe	6.80	"	8.90
Truck crane	24.20	"	31.50
Cargo truck	12.60	"	16.40
Dump truck	7.10	"	9.30
Chain block	0.10	"	0.13
Concrete mixer	0.90	"	1.20
Belt conveyor	1.50	"	2.00
Air compressor	0.28	"	0.37
II Farm machineries			
Tractor L350	5.50	+ 30%	7.20
Rotavator	4.20	"	5.50
Tractor L27	4.70	"	6.20
Rotavator	3.90	"	5.10
Bottom plow*	2.00	"	2.60
Disc plow*	2.10	"	2.70
Disc harrow*	2.50	"	3.30
Tooth harrow	1.00	"	1.30
Scraper**	0.10	"	0.13
Power tiller 9HP	3.60	"	4.70
" 7HP	2.60	"	3.40
Trailer*	0.47	"	0.62
Rice planter	2.05	"	2.70
Hand weeder	0.05	"	0.07
Power weeder	1.15	"	1.50
Ditcher	9.10	"	12.90
Pump ϕ 70 mm	2.00	"	2.60
" ϕ 50 mm	1.20	"	1.60
Hand duster	0.11	"	0.15

Continued

Name of equipment	Basic Rental fee	Coefficient of prices and cost regulation	Proposed Rental fee
Hand sprayer	₱ 0.10	+ 30%	₱ 0.13
Power duster	0.38	"	0.50
Power sprayer I	5.50	"	7.20
" II	3.90	"	5.10
" III	2.10	"	2.80
Binder	3.90	"	4.00
Combine	8.40	"	11.00
Pedal thresher	0.15	"	0.20
Auto thresher	1.20	"	1.60
Cutter	0.80	"	1.10
Winnower	1.00	"	1.30
Dryer I	0.70	"	1.00
" II	1.89	"	2.40
" III	3.20	"	4.20
Others			
Generator 35 kw	₱ 4.30	+ 30%	₱ 5.60
" 3 kw	1.40	"	1.90
" 1 kw	1.00	"	1.30
Garage jack	0.11	"	0.15
Electric welder	0.90	"	1.20
Battery charger	0.23	"	0.40

NOTE : * Attachment of tractor

** New made attachment (made in Calapan)

Ideal rental fee of machineries

I Construction equipment

Name of equipment	Proposed rental fee per hour	Operator fee per hour	Total rental fee per hour
Bulldozer	₱ 43.30	₱ 3.00	₱ 46.30
Dozer shovel	25.90	"	28.90
Back hoe	8.90	"	11.90
Truck crane	31.50	"	34.50
Cargo truck	16.40	"	19.40
Dump truck	9.30	"	12.30
Chain block	0.13	-	* 1.00
Concrete mixer	1.20	-	* 9.60
Belt conveyor	2.00	-	* 16.00
Air compressor	0.37	-	* 3.00

NOTE : * Rate of rental per day instead of per hour

Continued

II Farm machineries

Name of Machine	Proposed rental fee per hour	Final rental fee/hour	
Tractor L350	7.20		₱ 7.20
Rotavator	5.50	with tractor	12.70
Tractor L27	6.20		6.20
Rotavator	5.10	with tractor	11.30
Bottom plow	2.60	plus tractor	2.60
Disc plow	2.70	"	2.70
Disc harrow	3.30	"	3.30
Tooth harrow	1.30	"	1.30
Scraper	0.13	* "	2.00
Power tiller 9HP	4.70		4.70
" 7HP	3.40		3.40
Trailer	0.62	* plus power tiller	5.00
Rice planter	2.70		2.70
Hand weeder	0.07	*	0.60
Power weeder	1.50		1.50
Ditcher	12.90		12.90
Pump ϕ 70 mm	2.60		2.60
" ϕ 50 mm	1.60		1.60
Hand duster	0.15	*	1.20
Hand sprayer	0.13	*	1.00
Power duster	0.50	*	4.00
Power sprayer I	7.20		7.20
" II	5.10		5.10
" III	2.80		2.80
Binder	4.00		4.00
Combine	11.00		11.00
Pedal thresher	0.20	*	1.60
Auto thresher	1.60		1.60
Cutter	1.10	*	8.80
Winnower	1.30	*	10.00

* Rate of rental is per day instead of per hour

NOTE : Additional ₱2.00 per hour if lessee needs operator.

Continued

III Rice mill and dryer

1. Rice milling fee -- ₱2.00/cavan of cleaned rice
(same as local ricemill owners' charge)

2. Dryer

Type of Dryer	Charge for 1st 2 hours (hr)	Charge for next 3 hours (hr)	Charge after 5th hour (hr)
KEH-48K	₱ 4.00	₱ 3.00	₱ 2.00
VDS-8	3.00	2.00	1.00
NCD-12	4.00	3.00	2.00

NOTE : Volume and moisture content of paddy has no connection

Remarks : For example. dryer has 1% rate of drying and paddy has 22% moisture content and this moisture content is to be reduced to 14% then calculation is shown below :

Total operation hours required 8 hours

A. Type KEH-48K and NCD-12

(2 hrs. x ₱4.00) + (3 hrs. x ₱3.00) + (3 hrs. x ₱2.00)
= ₱23.00

B. Type VDS-8

(2 x 3) + (3 x 2) + (3 x 1) = ₱15.00

IV OTHERS

Name of machine	Proposed rental fee per hour	Final rental fee per hour
Generator 35 kw	₱ 4.30	₱ 5.60
" 3 "	1.40	12.00
" 1 "	1.00	8.00
Garage jack	0.11	1.00
Electric welder	0.90	7.20
Battery charger	0.25	2.00

* Rate of rental is per day instead of per hour.

Comparison of our rental fee with those of
outside organizations and private owners of machineries

Name of machine		HP or ability	Outside rental fee	our rental fee per hour	
				Present	Revised
Bulldozer		90 HP		₱28.00	₱43.30
"		130	₱693.00 (per day)		
Dozer shovel		50		21.70	25.90
"		95	₱395.00 (per day)		
Truck crane		7 ton		20.60	31.50
"		25 "	₱1245.00 (per day)		
Dump truck		2 "		4.35	9.30
"		5 "	₱157.00 (per day)		
Cargo truck		6 "		5.90	16.40
Plowing (Disc plow)	Tractor	35 HP		4.50	9.90
	"	27 "		4.50	8.90
	" (Private owner)	42 "	₱ 80.00 (per ha.)		
	Power tiller	9 "		1.80	4.70
	"	7 "		1.75	3.40
	" (Private owner)	7 "	₱120.00 (1 ha. ready for transplanting)		including operator and cost of fuel
Puddling (Rotavator)	Tractor	35 "		4.50	12.70
	"	27 "		4.50	11.30
	" (Private owner)	42 "	25.00 (per hr.)		
Tractor (Private owner)		42 "	200.00 (1 ha. ready for transplanting)		including operator and cost of fuel

NOTE : 1. Outside organization -- Bureau of Public Highway (B. P. H.)
2. Rental rate per day may be calculated for eight (8) operational hours a day.

Comparison of the present rental fee with
the revised rental fee

Name of machine	Rate of rental per hour		
	Present	Operator	Revised
I Construction equipment			
Bulldozer	₱28.00	₱3.00	₱46.30 *
Dozer shovel	21.70	"	28.90 *
Back hoe	6.20	"	11.90 *
Truck crane	20.60	"	34.50 *
Cargo truck	5.90	"	19.40 *
Dump truck	4.35	"	12.30 *
Chain block	0.10		1.00 **
Concrete mixer	0.80		9.60 **
Belt conveyor	-		16.00 **
Air compressor	0.40		3.00 **
II Farm machineries			
Tractor L350		(2.00)	7.20
Rotavator	4.50		5.50
Tractor L27		(2.00)	6.20
Rotavator	4.50		5.10
Bottom plow ****	-		2.60
Disc plow ****	-		2.70
Disc harrow ****	-		3.30
Tooth harrow ****	-		1.30
Scraper ****	-		2.00 **
Power tiller 9HP	1.80	(2.00)	4.70
" 7HP	1.75	(2.00)	3.40
Trailer ****	0.60		5.00
Rice planter	-	(2.00)	2.70
Hand weeder	-		0.60 **
Power weeder	1.00	(2.00)	1.50
Ditcher	-	(2.00)	12.90
Pump ϕ 70 mm	2.00		2.60
" ϕ 50 "	1.00		1.60
Hand duster	0.20		1.20 **
Hand sprayer	0.50		1.00 **

Continued

Name of machine	Rate of rental per hour		
	Present	Operator	Revised
Power duster	₱0.25	(2.00)	₱ 4.00 **
Power sprayer I	1.90	(2.00)	7.20
" II	4.50	(2.00)	5.10
" III	-	(2.00)	2.80
Binder	1.75	(2.00)	4.00
Combine	3.45	(2.00)	11.00
Pedal thresher	-		1.60 **
Auto thresher	0.80	"	1.60
Cutter	-	"	8.80 **
Winnower	-	"	10.00 **
Dryer I	0.30/cav.		23.00 ***
" II	0.10/cav.		15.00 ***
" III	0.20/cav.		23.00 ***
Kreis cutter	0.35		6.40 **
III Others			
Generator 35 kw			5.60
" 3 kw			12.00 **
" 1 kw			8.00 **
Garage jack			1.00 **
Electric welder		(₱3.00)	7.20 **
Battery charger			2.00 **

NOTE : 1. * - Including operator's fee
2. ** - Charge per day
3. *** - In case of eight (8) hours operation
4. **** - Attachment of tractor
5. Power sprayer I - HS-23 KUBOTA
" II - CSP-1 MARUYAMA
" III - MS400E MARUYAMA
6. Dryer I - KEH-48K ISEKI
" II - VDS-8 YAMAMOTO
" III - NCD-12 YAMAMOTO
7. ( ) - charge for operator if in case the lessee needs

REMARKS : 20% discount of this rental rate of machineries for farmers inside the Pilot Farm area.