

II-3 Mae Klong Pilot Project

II-3.1. Introduction

The Mae Klong pilot project has pilot area No. 1 and pilot area No. 2. The pilot projects are in the Greater Mae Klong Irrigation Project, which commands an area of 507,312 ha. This land is suitable for irrigated agriculture development because of its fertility. Especially after the multipurpose dams of the Qwae Yai and Qwae Noi rivers are completely constructed, plentiful water from those dams will be able to support cultivation throughout the year. The Thai Government has realized the future prosperity of the Greater Mae Klong Irrigation Project area as a great agricultural products resource area for Thailand. The Royal Irrigation Department, a responsible agency, has been assigned to execute the irrigated agriculture development project.

Experts from both Thailand and Japan had come to the idea of establishing a Trial Farm (later changed to Agricultural Demonstration Centre) as a core of demonstration, seed multiplication and distribution, practical experiment and agricultural extension to the farmers in the pilot project and the Greater Mae Klong Irrigation Project after completion of on-farm development work.

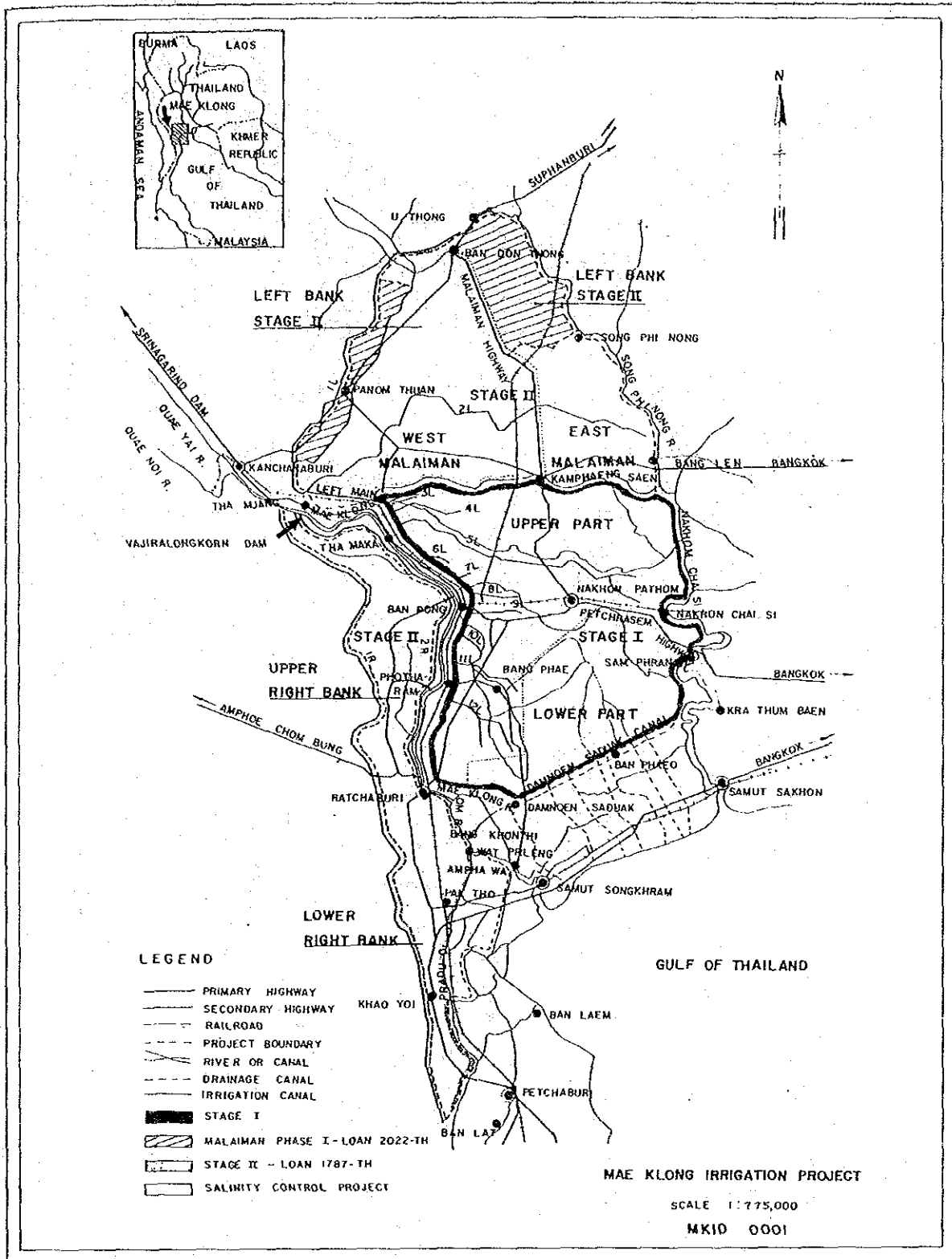
The project aims at promoting on-farm development work in order to increase rice production through increasing yield per unit acreage and expansion of area for rice double cropping, and contributing the improvement and diffusion of appropriate farming techniques together with strengthening farmers organizations.

The pilot area No. 1 is located at Amphur Tha Muang, Kanchanaburi province. The area of 403.6 hectares received the intensive method of on-farm development and was completed by 1981.

Besides, the government of Japan provided the funds for the construction of paddy fields of 6.4 hectares in Trial Farm.

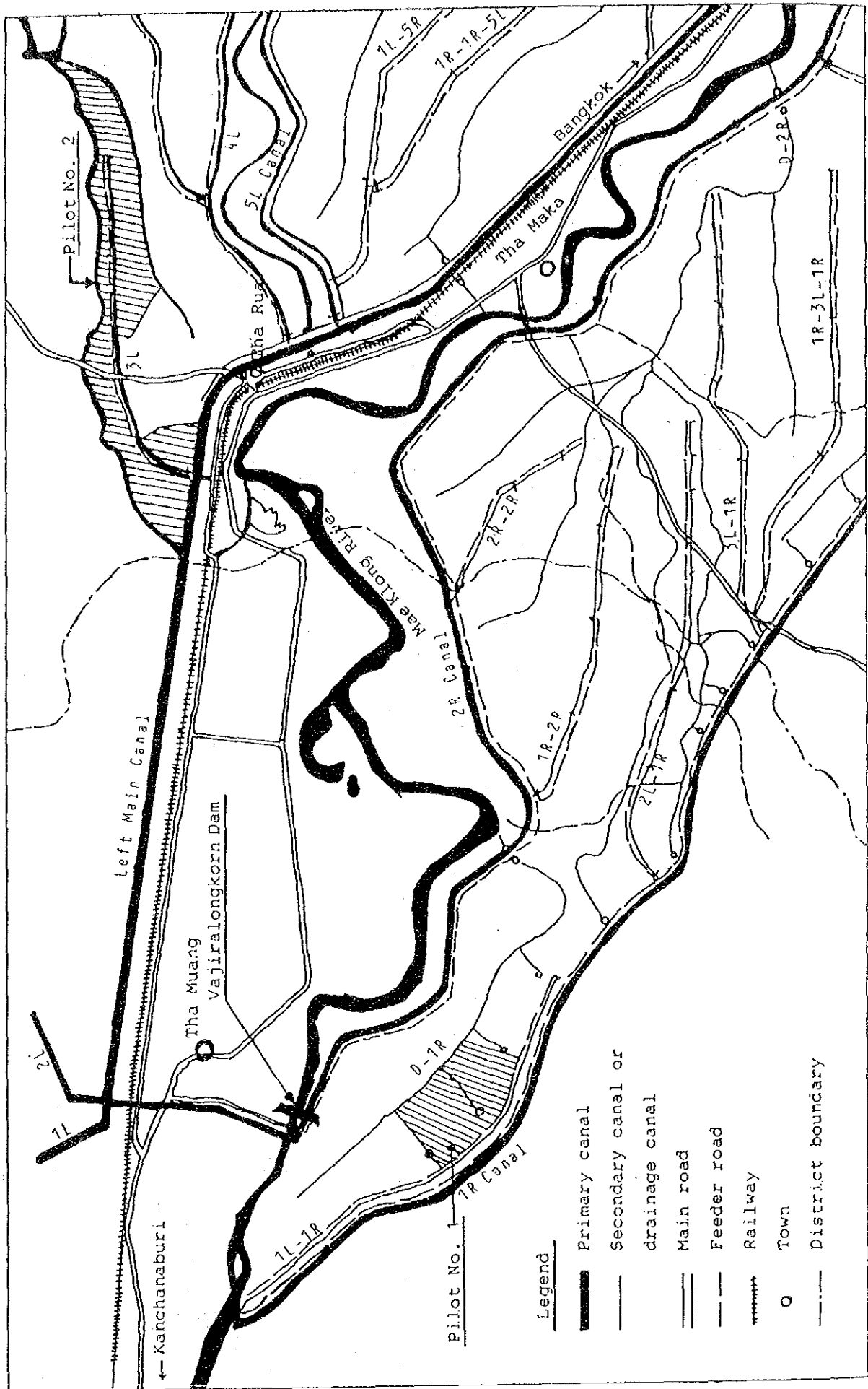
The pilot area No. 2 is located at Amphur Tha maka, Kanchanaburi province. The area of 550.5 hectares received the extensive method of on-farm development and was finished by 1982. Out of the total area, 243.8 hectares was constructed using Japanese funds.

MAE KLONG IRRIGATION PROJECT



	Project area	Irrigation area
Left Bank	2,519,000 rai (403,040 ha)	2,304,300 rai (325,488 ha)
Right Bank	651,700 rai (1204,272 ha)	587,400 rai (93,984 ha)
Total	3,170,700 rai (507,312 ha)	2,621,700 rai (419,472 ha)

Location map of Pilot Project No. 1 and No. 2.



Map of Mae Klong Klong Pilot Project No. 1

Construction Schedule

1979	46.8 ha
1980	116.8 ha
1981	240.0 ha
Total	403.6 ha

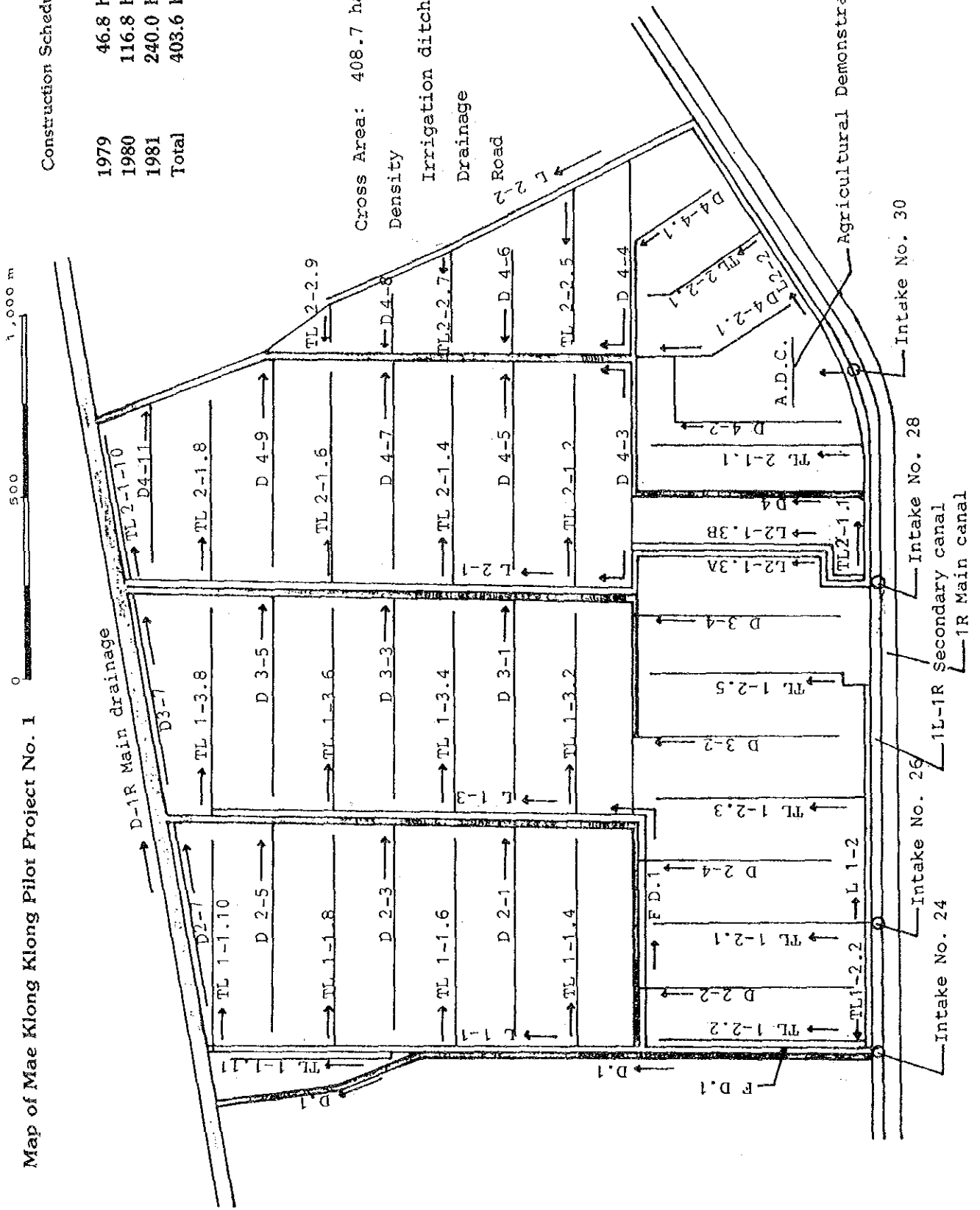
Cross Area: 408.7 ha.

Density

Irrigation ditch 50.0 m/ha

Drainage 44.2 "

Road 71.9 "

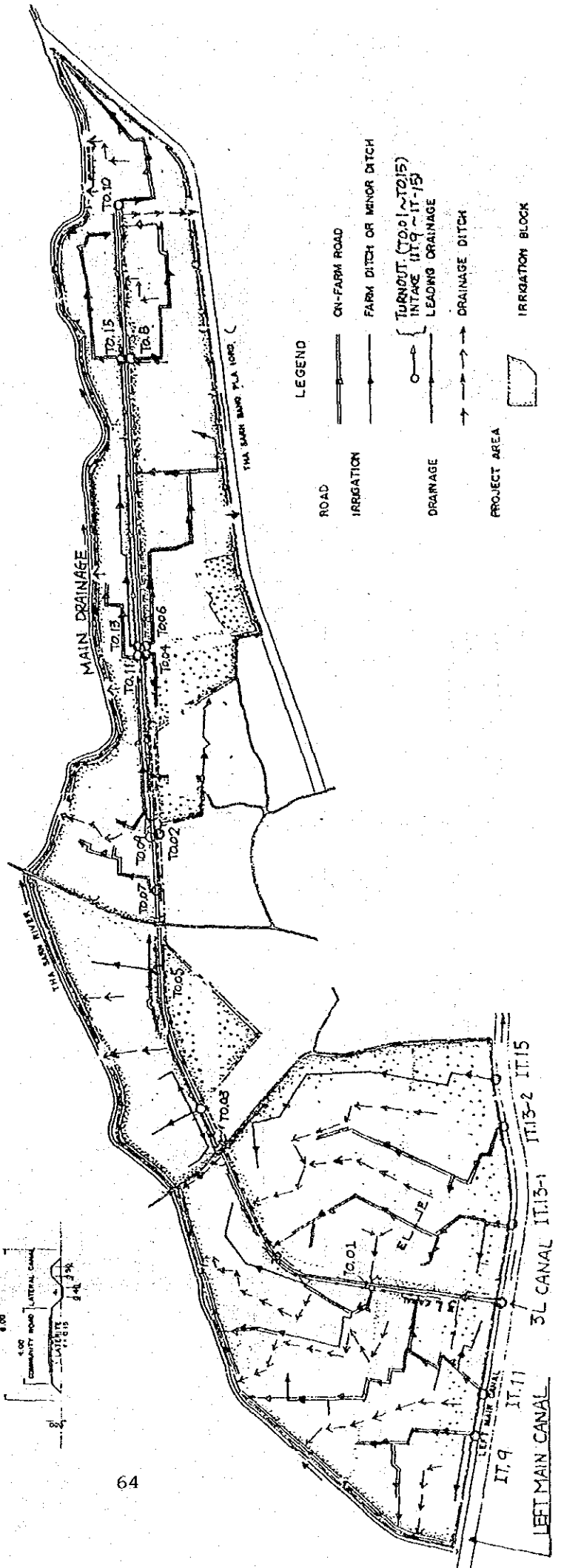
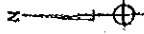
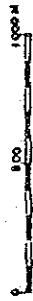
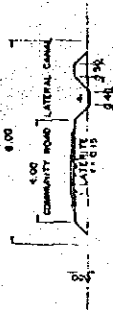


Map of Mae Klong Pilot Project No. 2.

CONSTRUCTION SCHEDULE

YEAR	AREA
	314.2 Ha
1981	CONTRACT 243.8 Ha FORCED ACCOUNT 70.4 Ha
1982	236.3 Ha
TOTAL	550.5 Ha

SECTION E-E



II-3-2 Irrigation and Drainage

II-3-2-1. Land Consolidation

Two kinds of land consolidation method, called intensive type and extensive type, were demonstrated at the different pilot areas. The pilot No. 1 area received the intensive type, which included the on-farm irrigation and drainage canals, farm roads, land leveling, and re-allocation of fields. Standard size of the terminal irrigation unit 19.2 ha, the length of farm ditch is 600 m, and farm road is constructed along the farm ditch. One irrigation unit consists of 12 pieces of 0.8 ha (50 m x 150 m) respectively along the right and left side of the farm ditch.

The pilot No. 2 area received the extensive type of land consolidation, which included on-farm irrigation and drainage canals and farm roads. The canals and roads are constructed along the border of land owners. There is no standard size of irrigation unit, but about 30 ha is the average size.

(1) Pilot Project No. 1

1) On-farm construction

The on-farm land consolidation work was done by the intensive method during 1979 to 1981. The details are given as below.

Year	Construction area (ha)		Cost (B)
1979	36.9	Force Account	550,000
	9.9 (Trial Farm)	JICA (Model Infra.)	2,648,700
1980	116.8	Force Account	2,336,000
1981	240.0	Force Account	4,992,800
Total	403.6		10,527,500

2) Improvement work

Though all of the land consolidation work was completed by the intensive method during 1979 to 1981, there were some plots which had a shortage of irrigation water in the dry season. In order to find out the reason, the following investigation work has been done.

- Surveying all of the irrigation ditches of 22 kms.
(Cross sectional leveling, profile leveling)
- Surveying the spot-height.
- Irrigation field test.
- Analysis.

According to the result of the investigation work, the main reason for the unirrigable plots in the pilot project No. 1 area was that the irrigation facilities had some functional faults.

Meetings between designers of RID and Japanese experts were held about how to solve the above problems, and countermeasures were discussed. As a result of the discussion, it was decided to accomplish improvement works.

The improvement work of the pilot project No. 1 area was carried out from January to March 1984. The details are given below.

a) Improvement of Lateral Ditch	
Work	Length
Concrete lining	2665.2 m
Embanking and ditch excavation	2492.2 m

b) Improvement of Farm Ditch	
Work	Length
Embanking and ditch excavation	5172.0 m
c) Improvement of Road	
Work	Length
Embanking	8901.0 m
Laterite pavement of the community road (W = 5.0 m, T = 0.15 m)	6830.0 m
Laterite pavement of the farm road (W = 3.5 m, T = 0.10 m)	2071.0 m
d) Improvement of structures	
Work	Unit
New Intake structures	2 items
New gate	2 items
Small wooden-gates	32 items
Increase in height of bottom of ditch	7 items
New pipe culverts	3 items

The improvement work was under the direct management of RID, and the required budget was 1,815,350 Baht.

a) Improvement of Ditches and Roads	
Earth work	494,477 Baht
Concrete work	549,010 Baht
Laterite pavement work	478,925 Baht
Management costs (less than 10%)	152,088 Baht
b) Improvement of Structures	142,850 Baht
Total	1,815,350 Baht

Surveying of all the irrigation ditches right after the above improvement work was carried out.

(2) Pilot Project No. 2

1) On-farm construction

The on-farm land consolidation work was done by the extensive method during 1981 and 1982. The details are given below.

Year	Construction area (ha)		Cost (฿)
1981	70.4	Force Account	966,000
	243.8	JICA (Pilot Infra.)	4,194,059
1982	236.3	Force Account	3,588,000
Total	550.5		8,748,059

2) Maintenance work of the project area

To make a table of the irrigation and drainage ditches in the project area so that the maintenance work could be carried out easily.

To check and maintain the facilities.

To observe and ask for repairs.

To check the design of each facility.

3) Improvement work

Although all of the land consolidation work was completed by the extensive method during 1981 and 1982, some plots had a shortage of water in the dry season. So the counter-measures were examined, and the improvement work was done during January and February, 1983. The details are below.

a) Reconstruction work

Ditch Name	Work	Length
No. 07	Embanking and ditch excavation	300 m
No. 09	Embanking and ditch excavation	180 m
No. 10	Embanking and ditch excavation	200 m

b) Rehabilitation work

Ditch Name	Work	Length
No. 08	Embanking of the road	150 m
No. 06	Concrete lining	some part
No. 010	Concrete lining	some part
No. 013	Concrete lining	some part
No. 015	Concrete lining	some part

The required budget was 265,000 Baht.

II-3-2-2 Making Technical Reports

(1) Collection Data on Mae Klong Pilot Project Areas

Farm plots water management study in the fields was carried out and reports on its results were submitted.

Climatological and water requirement data were collected.

The present situation on the function of the irrigation and drainage facilities were studied.

The following data were collected in order to make technical reports.

a) Design drawing of Pilot Project No. 1 and work.

Design drawing for the land consolidation work.

Design drawing for the improvement work.

Design drawing just after the improvement work.

b) Investigation of cropping pattern.

c) Table of all the irrigation facilities in Pilot Projects No. 1 and No. 2. (Culvert, turnout, division box, irrigation ditches and others.)

d) Rate of unit cost for Large Project Construction Work, Yearly Estimate : 1984.

e) Water user groups' list of Pilot Projects No. 1 and No. 2.

f) Cultivated areas of Pilot Projects No. 1 and No. 2, from the dry season's crops in 1983 to the wet season's crops in 1984.

g) Irrigation water quantity data during the dry season's crops in 1983 and the wet season's crops in 1984.

Operation time of permanent pump in Pilot Project No. 1.

Operation time of temporary pump in Pilot Project No. 1.

Water quantity of 3L canal in Pilot Project No. 2.

h) The others.

(2) Collection Data of Other Land Consolidation Areas.

In order to check and compare the pilot areas with other areas, the data of the following items was collected in the extensive land consolidation area around the pilot project No. 1.

- a) Design drawing.
- b) Table of all irrigation facilities.
- c) Design Report and Typical Section in Right Bank.

(3) Making Technical Reports

Using the above data, the following reports are being made.

- a) Water management (Report during the dry season's crops in 1983 and the wet season's crops in 1984, problems and suggestions).
- b) Design Criteria of Intensive Land Consolidation (Proposal).
- c) Suggestions about the design of the irrigation ditches.

II-3-2-3 Water Management

(1) Making the Water Management Program.

Calculation of irrigation water.

Making the flow chart of the irrigation water.

Making the rotational irrigation schedule.

(Intensive and Extensive methods)

Making rotational irrigation schedule boards for Pilot Project No. 1

Size (m)	Pieces
0.40 × 0.60	20
0.40 × 0.30	3
0.60 × 0.80	4
Total	27

Organization of the water user groups

No. of groups		No. of farmers	
		Gross	Net
Pilot No. 1	5	183	149
Pilot No. 2 (I)	7	244	163
(II)	11	194	150

Setting up the temporary pumps in Pilot No. 1

Year	Season	No. of Pumps		
		Ø 12	Ø 10	Ø 8 (inch)
1983	Dry	—	2	—
	Wet	3	2	—
1984	Dry	5	2	1
	Wet	4	2	—

Cultivated areas in each crop season.

a) Pilot Project No. 1

Year	Season	Paddy field (rai)		
		P/P No. 1	Outside P/P No. 1	Total
1983	Dry	2174	—	2174
	Wet	2284	3848	6132
1984	Dry	2273	3473	5746
	Wet	2273	3473	5746

b) Pilot Project No. 2

Year	Season	Paddy field (rai)		Total
		L.M.	3 L	
1983	Dry	1145	1656	2801
	Wet	1145	1695	2840
1984	Dry	1154	1700	2854
	Wet	1181	1743	2924

Note: Outside P/P No. 1 - Commanding area of the same lateral canal for P/P 1.

L.M. - Left main canal

3 L - 3 L canal

Diversion requirement in depth

Year	Season	P/P	Diversion requirement
			in depth (mm)
1983	Dry	P/P 1	1460
		P/P 2	1651
1983	Wet	P/P 1	755
		P/P 2	949
1984	Dry	P/P 1	1998
		P/P 2	1675

(2) Training Officials and Farmers

A water management meeting about the irrigation plans and the maintenance work was held every month.

Following items were discussed between RID's staff and the Japanese experts.

- a) The irrigation plan.
- b) Methods to control the irrigation water.
(each intake, turnout, division box and farm inlet)
- c) Analysis of the water management plan and system.
- d) Improvement of the water management plan and system.
- e) Establishment of the water management plan and system.

(3) Water Measurement

In order to check whether the irrigation water was the same quantity as in the plan or not, the water measurements were carried out by using the current meter and the constant head orifice (C.H.O.).

II-3-3 Agricultural Demonstration Centre (KAZUTO MISAWA, MOTONORI TOMITAKA)

An agricultural Demonstration Centre (formerly called Trial Farm) had been established in order to improve rice farming practices on the area of on-farm development that had been completed.

II-3-3-1 Main Activities of Agricultural Demonstration Centre

- 1) Multiplication of purified seed of recommended RD-varieties and distribution of those seeds to the farmers.
- 2) Execution of agronomical experiment.
- 3) Collection of technical information and analysis regarding rice farming.
- 4) Demonstration of rice double-cropping, mechanized and intensive rice farming.
- 5) Demonstration of rationalized water management and minimalization of irrigation costs.

- 6) Diffusion of improved farming techniques to the farmers.
- 7) Organizing and strengthening of farmers groups.
- 8) Promotion of on-farm development in the vicinity.
- 9) Making of technical Reports.

II-3-3-2 Construction of Agricultural Demonstration Centre

In order to realize the activities mentioned above, the following buildings and facilities have been implemented in the initial cooperation period.

Description	Quantity	Year	Expenditure
		Completed	Thai or JICA
1) Construction of paddy field	6.4 ha	1979	JICA
2) Reclamation of building lot	3.5 ha	1979	Thai
3) Building construction (I)	14 Bldg.	1981	Thai
Building construction (II)	2 Bldg.	1981, 1983	JICA
4) Electric and water supply system		1981	Thai
5) Temporary pumping station for Pilot No. 1	2 units	1982	JICA
6) Deep well and high leveled water tank	1 unit	1982	JICA
7) Others (campus arrangement etc.)		1982	Thai

Note: Reconstruction of the paddy field of 6.4 hectares was carried out by RID in 1980, because of misconstruction.

Buildings

Item	Quantity
Management office	1
General work shop	1
Milling house (converted to farmer's meeting room)	1
General work house	1
Threshing house (converted seeding house)	1
Agricultural instrument warehouse	1
Rice warehouse	2
Agricultural Machinery shed	2
Repair shop	1
Garage	1
Oil storage and car washing court	1
Canteen	1
Shower - WC	1
Grain drying house	1

II-3-3-3 Organization of Agricultural Demonstration Centre

The Agricultural Demonstration Centre of the Greater Mae Klong Irrigation Project is under the Irrigated Agriculture Section of Operation and Maintenance Division of RID. Number of Staff at the Centre are as follows:

Farm manager (Agronomist)	: 1
Agronomist	: 1
Agronomist (Agricultural Extension)	: 1
Assistant agronomist	: 2 : 2
Permanent employee	
Operator of farm machinery	: 3
Driver	: 3
Guard man	: 9
Agricultural worker	: 37

Temporary employees	
Driver	: 2
Agricultural worker	: 2
Mechanic	: 1

II-3-3-4 Budget (1982-1984)

Item	1982	1983	1984
Managerial expense	42,000	40,000	50,000
Materials	360,200	160,000	200,000
Equipment	15,960	—	—
Construction Fee	—	—	1,733,600
Electrical Bill	24,000	226,200	226,200
Salary	573,360	946,680	1,002,990
Total	1,015,520	1,372,880	3,386,830

Note: 1. Not including the cost of improvement Pilot Project No. 1

II-3-4 Agronomy (KAZUTO MISAWA)

II-3-4-1 Seed Multiplication

Purified seed multiplication of recommended RD Strains and distribution of the seeds to the farmers are indispensably important activities to enable rice double cropping and increment of yield per unit acreage.

From this viewpoint, Agricultural Demonstration Centre has been conducting seed multiplication of rice in the period from the rainy season of 1979 up to the present.

Varieties, area planted, production and yield classified into year and crop season are as follows:

(1) Wet Season Crop

Year	Variety	Planted area (ha)	Production (kg)	Yield (kg/ha)
1979	RD-7	1.52	7,420	4,881
	RD-9	0.64	2,520	3,938
	RD-11	1.28	5,560	4,344
	Total	3.44	15,500	
1980	RD-7	3.86	17,430	4,561
	RD-9	0.92	4,200	4,565
	RD-11	1.10	3,780	3,436
	Total	5.88	25,410	
1981	RD-7	5.35	23,620	4,415
	RD-21, 23, 25	0.53	2,460	4,642
	Total	5.88	26,080	
1982	RD-21	1.23	4,550	3,699
	RD-23	4.08	20,510	5,027
	Total	5.31	25,060	

1983	RD-23 (1)	3.95	15,200	3,848
	RD-23 (2)	1.51	690	457
Total		5.46	15,890	
1984	RD-23	5.41	23,107	4,271

Note: 1. Year 1983 :- RD-23 (2) damaged severely by cold weather in the period from reduction division to flowering.

2. Year 1984 :- RD-23 suffered from blast disease after flowering.

(2) Dry Season Crop

Year	Variety	Planted area (ha)	Production (kg)	Yield (kg/ha)
1980	RD-7	2.08	7,280	3,500
	RD-9	1.45	4,480	3,090
Total		3.53	11,760	3,331
1981	RD-7	3.00	13,429	4,464
	RD-9	0.49	2,200	4,435
	RD-11	0.54	2,277	4,429
Total		4.40	17,906	4,432
1982	RD-7	3.75	16,350	4,354
	RD-23	3.53	18,970	5,375
Total		7.28	35,320	4,852
1983	RD-21	1.33	5,688	4,278
	RD-23	3.81	21,252	5,574
	Others	1.2	5,259	
Total		6.34	32,199	
1984	RD-23	7.79	41,911	5,381
	Others	0.88	1,435	
Total		8.67	43,346	

Note: Year 1980 :- Shortage of irrigation water in the period from primordial stage of ripening because of reconstruction of irrigation facility and farming road. Thus production was abnormally low.

II-3-4-2 Agronomical Experiment

During the technical cooperation period, the Agricultural Demonstration Centre conducted a lot of agronomical experiments and field observations in order to improve farming technologies and find out the most appropriate farming practices on the transplanting and direct sowing rice cultivation in both dry and wet seasons.

Moreover, water management experiments and investigations were also conducted at the Centre and on the irrigation unit level in pilot No. 1.

Unfortunately, the Centre couldn't conduct experiments in the former half of the cooperation period from April 1977 to the rainy season crop of 1981.

The reasons were as follows:

- 1) The Japanese agronomist was assigned on December of 1979 about 3 years after the commencement of project cooperation.
- 2) Reconstruction of on-farm development were required in 1980 and 1981, because of misconstruction of irrigation facilities, farming roads and very poor field leveling.
- 3) Soil fertility was not uniform for the conducting of experiments due to poor land consolidation work.

- 4) Necessary farming machinery and equipment were not procured until the year end of 1981.
- 5) Permanent field workers and technical assistants were not assigned.

Accordingly, the Centre commenced regular experiments from the dry season of 1982. Experiments conducted, classified into year and crop season were as follows.

(1) Agronomical Experiment Conducted

Agronomical Experiment Conducted

Method of experiment and investigation

- Design : Mostly, Randomized Completed Block and 4 replication
- Plot size : 40 m² (8 m × 5 m)
- Yield survey : 8 m² (4 m × 2 m) in each plot
- Yield components survey : 20 hills/plot
- Moisture content : Converted to 14%

	Year	Crop season
1) Effect of Application Rate of Nitrogen and RD Varieties for Rice Yield	1980 1981	Wet Dry and Wet
— Nitrogen rate : 6, 8, 10 and 12 kg/rai		
— Variety : RD-7, RD-9 and RD-11		
2) Effect of Application Rate of Nitrogen and RD Varieties Newly Released	1982 1983	Dry and Wet Dry
— Nitrogen rate : 0, 8, 16 and 24 kg/rai		
— Variety : RD-21, RD-23 and RD-7 (control)		
3) Effect of Application Rate of Nitrogen and Photosensitive Local Varieties and RD Varieties for Rice Yield	1983	Wet
— Nitrogen rate : 0, 6 and 12 kg/rai		
— Variety : Khao Dok Mali 105, Khao Pak Mor 148 Luang Pratew 123, Nang Mon S-4 RD-7, RD-23 and RD-27		
4) Effect of Plant Density and Application Rate of Nitrogen on Rice Yield	1982	Dry and Wet
— Planting density: 11.4, 16.0, 22.2 and 40 hills/m ² (35 × 25, 25 × 25, 30 × 15, 25 × 10 cm)		
— Application rate of Nitrogen : 0 and 16 kg/rai		
5) Effect of Preceding Upland Crops as Green Manure on Rice Yield	1980	Wet
— Upland Crop : Muang bean, Sesbania and Crotoloria (Hemp)		
6) Effect of Application Rate and Time of Saturn G. for Establishment Rate of Seedling on Direct Sowing Rice Cultivation	1980	Wet
— Application rate : 5 and 7 kg/rai		
— Application time : 3, 5 and 7 days before Sowing		
7) Effect of Sowing Seed Rate and Application Rate of Nitrogen for Rice Yield on Direct Sowing Rice Cultivation	1982 1983	Dry and Wet Dry
— Seed rate : 8, 16 and 24 kg/rai		
— Nitrogen rate : 0, 8, 16 and 24 kg/rai		

	Year	Crop season
8) Effect of Sowing Seed rate and Application Rate of Nitrogen (cooperation Experiment with Chao Phya and Suphanburi Sub Project)	1983 1984	Wet Dry
— Variety : RD-23		
— Seed rate : 4, 8 and 16 kg/rai		
— Nitrogen : 12 kg/rai (Basal 6, T. Dressing 6 kg/rai)		
9) Effect of P ₂ O ₅ and K ₂ O for Rice Yield	1982 1983	Dry and Wet Dry
— P ₂ O ₅ rate : 0, 8 and 16 kg/rai		
— K ₂ O rate 0, 6 and 12 kg/rai		
10) Effect of Application Method and Time of Basal Fertilizer for Rice Yield	1983 1984	Dry and Wet Dry
— Basal fertilizer : N = 10, P ₂ O ₅ = 6, K ₂ O = 6 kg/rai		
— Application method : Puddling time (deep placement) and 1, 7, 14 and 21 days after transplanting (broadcasting on the surface soil)		
11) Fertilizer Effect of Ami-Ami (by product of Ajinomoto) as Basal Compared with Chemical Fertilizer	1982 1983	Wet Dry
— Basal : Ami Ami (N = 4.6%) 300 L and 210 L/rai Amophos (16:20:0) 60 kg/rai		
— Top dressing : Am. Sulphate 0 or 20 kg/rai		
— Total Nitrogen = 13.8 kg/rai, P ₂ O ₅ = 12 kg/rai		
12) Effect of Application Time of Ami Ami and Triple Super Phosphate	1983 1984	Wet Dry
— Application time of Ami Ami : 1 week and 1 month before transplanting		
— P ₂ O ₅ rate : 0, 6 and 12 kg/rai		
13) Effect of Ami Ami, Urea and T.S. Phosphate on Rice Yield	1984	Dry
— Basal : GML 200 L + TSP 27 kg, GML 200 L + TSP 14 kg, GML 200 L, Urea 20 kg + TSP 27 kg, Urea 20 kg + TSP 14 kg, Urea 20 kg/rai		
— Top dressing : Urea 10 kg/rai respectively		
14) Effect of Seedling Age for Growth Duration and Yield	1984	Dry
— Seedling age : 20, 30, 40 and 50 days		
15) Effect of Unirrigated Period for Growth Duration and Yield	1984	Dry
— Unirrigated period : 3, 5, 7, 9 days after disappearance of water		
16) Effect of Moisture Stress for Rice Yield	1984	Dry
— Moisture stress : rooting, primordial, booting and flowering stage		
— Dry up period : 10 days for respective growing stage		

	Year	Crop season
17) Effect of Sowing Time of Photosensitive Local Variety for Growth Duration and Yield	1984	Wet
— Variety : Khao Pak Mor 148, Luang Pratew 123 and RD-27		
— Nitrogen rate : 0, 6 and 12 kg/rai		
18) Effect of Application Time of Fertilizer on Rice Yield	1984	Wet
— Variety : RD-23 and RD-27		
— Nitrogen : Basal = 0, 6, 6, 6 kg/rai		
1st T.D. = 0, 3, 0, 6 kg/rai		
at 2 weeks after transplanting		
2nd T.D. = 6, 3, 3, 3 kg/rai		
at young panicle formation stage		
3rd T.D. = 0, 0, 3, 3 kg/rai		
at flowering stage		
— Total NPK : N = 12 kg/rai, P ₂ O ₅ and K ₂ O = 6 kg/rai		
(2) Experiment and Investigation for Water Management		
1) Water Requirement for Ploughing and Puddling (at Agricultural Demonstration Centre)	1983	Dry
2) Water Requirement in Depth (at Agricultural Demonstration Centre)	1984	Dry
3) Practical Water Management Experiment at Mae Klong Pilot Project (Cooperation Experiment with Extension and Water Management Section, RID.)	1984	Dry
— Area investigated : 3 terminal irrigation units		
i Intensively controlled area (18.1 ha)		
ii Semi-intensively controlled area (18.3 ha)		
iii Common area (19.1 ha)		
— Main item of investigation		
i Water requirement for field preparation		
ii Water requirement for the period of paddy growing		
iii Water discharge of drainage ditch and main drainage canal		
— Progress of farming work		
— Rice production		
4) Baring Capacity in Paddy Field	1983	Dry
— For use of combine harvester		

II-3-4-3 Summary of Results of Major Experiments

(1) Effect of Application Rates of Nitrogen and RD Varieties Newly Released

RD-7, RD-21 and RD-23 are the typical recommended paddy varieties at the present in the Mae Klong river basin. For these varieties, application quantity of nitrogen changed from 0-24 kg/rai and the yield and yield components respectively were investigated. The results obtained were as follows:

- 1) As to the yield, among the varieties and nitrogen levels, the significant difference was noticeable in 1% level respectively. It denotes that selection of variety and application of appropriate

quantity of nitrogen are most important factors for getting high and steady yields of paddy. In comparison with the yield among the varieties in the last 2 experiments (dry season 1982, 1983) were as follows:

RD-21 > RD-23 > RD-7

According to the investigation, between RD-21 and RD-23, there was not much difference but between these 2 varieties and RD-7, considerable differences were evident.

- 2) If we consider RD-21 variety on its yield alone it seems a most excellent variety but it should be judged by adding the results of growth investigation; it is not quite preferable because it needed about 20 days from commencement of sprouting out head to completion of heading. It is considered that RD-21 as a variety has not been entirely fixed and it is still continued to be segregated.
- 3) Further, RD-7 variety has not only smaller yield potentiality compared with RD-21 and RD-23 but also with the defect of susceptibility to the Rugged Stunt Virus.

Judging from the reasons mentioned above, RD-23 is the most excellent variety for the Mae Klong Irrigation Project area at the present time.

- 4) According to the results of analysis of experiments and data obtained from seed multiplication of paddy cultivation, 90-120 kg of nitrogen quantity per hectare is considered as appropriate in the pilot areas.
- 5) Further, in the case of the irrigation water being sufficiently supplied during the rice cultivation period, a paddy production of approximately 2,500 - 4,300 kg/ha can be obtained though no fertilizer is applied. This yield is far more than the average yield of 1,800 kg/ha in the whole of Thailand. Thus it denotes how important a factor the irrigation water supply is for paddy cultivation. The Table mentioned below shows the yield obtained by no fertilizer application rice cultivation in the dry season, 1982 and 1983.

Variety	Yield (kg/ha)	
	1982	1983
RD-7	3,075	2,519
RD-21	4,362	3,760
RD-23	4,181	3,473

(2) Effect of Planting Density and Application Rate of Nitrogen on Rice Yield

The experiments were conducted in order to find out the proper planting density on the transplanting cultivation.

According to the results of experiments, in the case of nitrogen a quantity of more or less 100 kg/ha (16 kg/rai) applied, the planting density of 22.2 hills/m² (30 cm × 15 cm) is considered as most practical. If the hills/m² is made to over 40 hills, it will not only waste labour for transplanting but also cause lodging in the early stage of maturing thus it will cause a decrease in yield.

Further, when the paddy is cultivated without fertilizer application or with a small quantity of fertilizer with density of under 16 hills/m², it is hard to ensure the necessary panicles for obtaining high yield and this is another cause of yield decrease.

(3) Effect of Sowing Seed Rate and Application Rate of Nitrogen for Rice Yield on Direct Sowing Rice Cultivation

The experiment conducted by RCB in 3 seed rate (8, 16, 24 kg/rai) and 4 levels of nitrogen application (0, 8, 16 and 24 kg/rai)

According to the results of the analysis, for the increasing of quantity of nitrogen application and seed quantity, the yield was increasing but when the quantity of nitrogen application reached 24 kg/rai, the yield of the treatment using the seed quantity of 24 kg/rai was decreased. In the

case of a seed rate of 16 kg/rai, the yield was higher than that of a seed rate of 8 kg/rai and 24 kg/rai but yield in between seed rate 16 kg/rai and 24 kg/rai did not show a significant difference in the statistics. As the conclusion, the optimum quantity of sowing seed and nitrogen for the germinated seed direct sowing rice cultivation in Mae Klong pilot areas are judged to be about 16 kg/rai (100 kg/ha) respectively.

(4) Effect of P_2O_5 and K_2O Application on Rice Yield

The experiments were conducted by RCB method and 4 replications in the 3 levels of application quantity of P_2O_5 (0, 8 and 16 kg/rai) and K_2O (0, 6 and 12 kg/rai).

In the experiment conducted in the dry season of 1983, significant differences among the yield were unnoticeable respectively but for the spikelets/panicle and 1,000 grains weight, the significant difference is noticeable. Further, on the experiment of rainy season crops in 1982, in both yield and yield components, the significant difference is noticeable. Summarizing, for the fertilization effect of P_2O_5 and K_2O and judged as follows :

On the Mae klong river basin, when rice double cropping was conducted continuously in a year and obtain of a yield of more than 4,000 kg/ha/crop, it is considered that from the 3rd year after commencement of rice double cropping, in another words, from the 5th crop, to apply the P_2O_5 and K_2O is recommendable.

(5) Effect of Application Method and Time of Basal Fertilizer on Rice Yield

The test variety was RD-23 and the basal fertilizer applied per rai were N = 10 kg, P_2O_5 = 6 kg, K_2O = 6 kg and the time for application of basal fertilizer were divided into 5, that is to say, at the time of puddling, 1 day, 7 day, 14 days and 21 days after transplanting. The method of basal fertilizer application were that deep placement of fertilizer was made at the puddling time and the others were broadcasted on the soil surface. The yields were investigated on respective application time of basal fertilizer.

According to the results of yield investigation, there were no significant differences among the treatments but the yields in the treatments of fertilizer application at the time of puddling and 1-2 weeks after transplanting were higher than the others.

(6) Fertilizer Effects of Ami-Ami as Basal Compared with Chemical Fertilizer (Ami-Ami: By product of Ajinomoto; Nitrogen Content 4.6%)

The experiments were conducted in the rainy season, 1982 and dry season, 1983.

According to the results of the experiments, the effect of Ami Ami was proved as not inferior to chemical fertilizer in comparison. An additional experiment was conducted in dry season 1983. The result was similar to the last experiment. Among the different fertilizers, a significant difference was unnoticeable but the yield in between Ami Ami application and without fertilizer, a significant difference of 1% was found. As it was mentioned in the report of Seed Production. Rice Culture in the dry season 1983, the cost of using Ami Ami is cheaper by about $\text{฿ } 800$ /ha than using the chemical fertilizer.

(7) Effect of Application Rate of Nitrogen and Photosensitive Local and RD Varieties on Rice Yield

4 Typical local varieties of Khao Dok Mali 105, Nang Mon S-4, Khao Pak Mor 148 and 3 RD Varieties of RD-27, RD-7 and RD-23 (RD-7 and RD-23 are non photosensitive varieties) were used as test varieties. Amount of N application per rai were varied in 3 levels of 0, 6, 12 kg for each variety and, then the yield and yield components respectively were investigated.

The result appeared that in the case of N application amount in 0 kt per rai, the yields of varieties per hectare were that the 2 varieties of RD-23 and Nang Mon S-4 was about 3,600 kg, the 3 varieties of Khao Dok Mali 105, Khao Pak Mor 148 and Rd-27 in the level of 3,300 kg and,

then Luang Pratew 123 in 3,000 kg and Rd-7 in 2,600 kg thus the difference of yield between highest and lowest was 1,000 kg.

In the case of N application amount with 12 kg/rai, the yield/ha ranged that the RD-23 in highest of 4,650 kg, next, Nang Mon S-4 in 4,200 kg, RD-27 and RD-7 in the level of 3,800 kg, Khao Dok Mali 105 in 3,600 kg, Khao Pak Mor 148 in 3,500 kg and Luang Pratew 123 in lowest of 3,000 kg.

Further, in the case of N being applied in 12 kg/rai, the rate of yield increase in percentage on the basis of the yield which nitrogen was not applied at all, RD-7 was the highest rate in increase of 46%, and next was RD-23 in 30%, Nang Mon S-4 in 17%, RD-27 in 15%, Khao Dok Mali 105 in 10%, Khao Pak Mor 148 in 5% and Luang Pratew 123 in 3% in comparison. The rate of yield increase of non photosensitive varieties was higher than that of photosensitive varieties. Besides, when nitrogen was applied in 12 kg/rai, rice plant of photosensitive varieties lodged completely during the period of flowering and early ripening stage, while plants of RD-7 and RD-23 lodged only partially

Concluding from the results of the experiments regarding varieties and application quantity of nitrogen, it can be said as follows :

- RD-23 Variety is not only able to get higher production, though it is cultivated without fertilization comparing with other varieties but also the efficiency of fertilization is high and, also, it is able to be cultivated in both rainy and dry seasons so that this variety is considered at the present time as most excellent one for this Mae Klong Project area.

- Most of the photosensitive varieties show low efficiency of fertilization, in the case of cultivation without fertilization or with a small amount of fertilizer applied, a considerably high yield could be expected. The limitation of nitrogen amount applied is considered as under 12 kg/rai.

- As to the RD-7 variety, the yield in the case of cultivation without fertilization is inferior to the local varieties in comparison and the yield potentiality is also low. In addition, RD-7 is one of the most susceptible varieties to Rugged Stunt Virus. So that it ought to be ruled out as a recommended variety for this Mae Klong Pilot Project area.

(8) Effect of Application Time of Ami-Ami and Triple Super Phosphate

The variety used for this experiment, was RD-23 and GML of 300 liters (N = 13.8 kg/rai) applied as basal manure. The time of application of Ami Ami were divided to 1 week and 1 month before transplanting. The triple super phosphate applications were varied in 0 kg, 6 kg, 12 kg/rai and all quantity of fertilizer was applied for the basal manure and nothing was applied as additional fertilizer.

According to the results of the analysis, the significant difference was noticeable between treatments for the application time of Ami Ami. The yield in the treatment of Ami Ami application on 1 month before transplanting reached 4,000 kg/ha and exceeded that of the treatment of Ami Ami on 1 week before transplanting. As for the response of $P_2 O_5$ in between treatments, no significant difference was noticeable.

(9) Effect of Ami Ami, Urea and T.S. Phosphate on Rice Yield

The variety for the experiment was RD-23 and the method of fertilizer application were made to the following 6 kinds and, then the investigation of yield were performed respectively.

Fertilizer	Basal/rai	Treatment	
		Top dressing Urea (kg/rai)	NPK (kg/rai)
1. GML	200 L	10	13.8-12-0
TSP	27 kg		
2. GML	200 L	10	13.8-6-0
TSP	14 kg		

3. GML	200 L	10	13.8-0-0
4. Urea	20 kg	10	13.8-12-0
TSP	27 kg		
5. Urea	20 kg	10	13.8-6-0
TSP	14 kg		
6. Urea	20 kg	10	13.8-0-0

According to the results of yield investigation, a significant difference was not noticeable among those treated.

In considering the results of a series of experiments regarding Ami Ami fertilizer, it will be concluded as follows :

1. Ami Ami possess the fertilization effect not inferior to that of Urea, Ammonium Sulphate or Ammonium Phosphate.
2. The fertilization effect of Ami Ami is high durability in comparison with chemical fertilizer.
3. The production cost using of Ami Ami is cheaper than that of using chemical fertilizer.
4. However, the effect of $P_2 O_5$ is not confirmed yet up to the present time.

(10) Detailed Information and Results of Other Experiments and Investigations

As to the detailed information and result of other experiments and investigations conducted at the Agricultural Demonstration Centre and in the pilot area, you are kindly referred to the reports which are separately bound.

A List of technical reports has been shown in Appendix 2 List of Reports Published.

II-3-4-4 Demonstration

The Agricultural Demonstration Centre conducted many kinds of demonstrations regarding rice cultivation in order to improve the farming practices of the farmers in the project and vicinity areas.

Main demonstrations conducted by the Centre in the Cooperation period from 1980 up to the present are as follows :

- 1) Rice double cropping in one year and intensive farming
- 2) Direct sowing rice cultivation.
- 3) Effective water management for rice farming
- 4) Mechanized farming

As a result, rice double cropping in a year and direct sowing cultivation methods have been popularized and the appropriate rice farming practices have also been widely adopted by the farmers.

As to the mechanization of rice farming, the integrated mechanization system including seed sowing and raising of seedlings, field preparation, disease and insect control, harvesting and threshing and grain drying has been established and introduced to the farmers by the Center.

Besides, farm mechanization by the farmers in the project areas has been progressed rapidly and the field of ploughing, puddling and threshing have nearly been all mechanized.

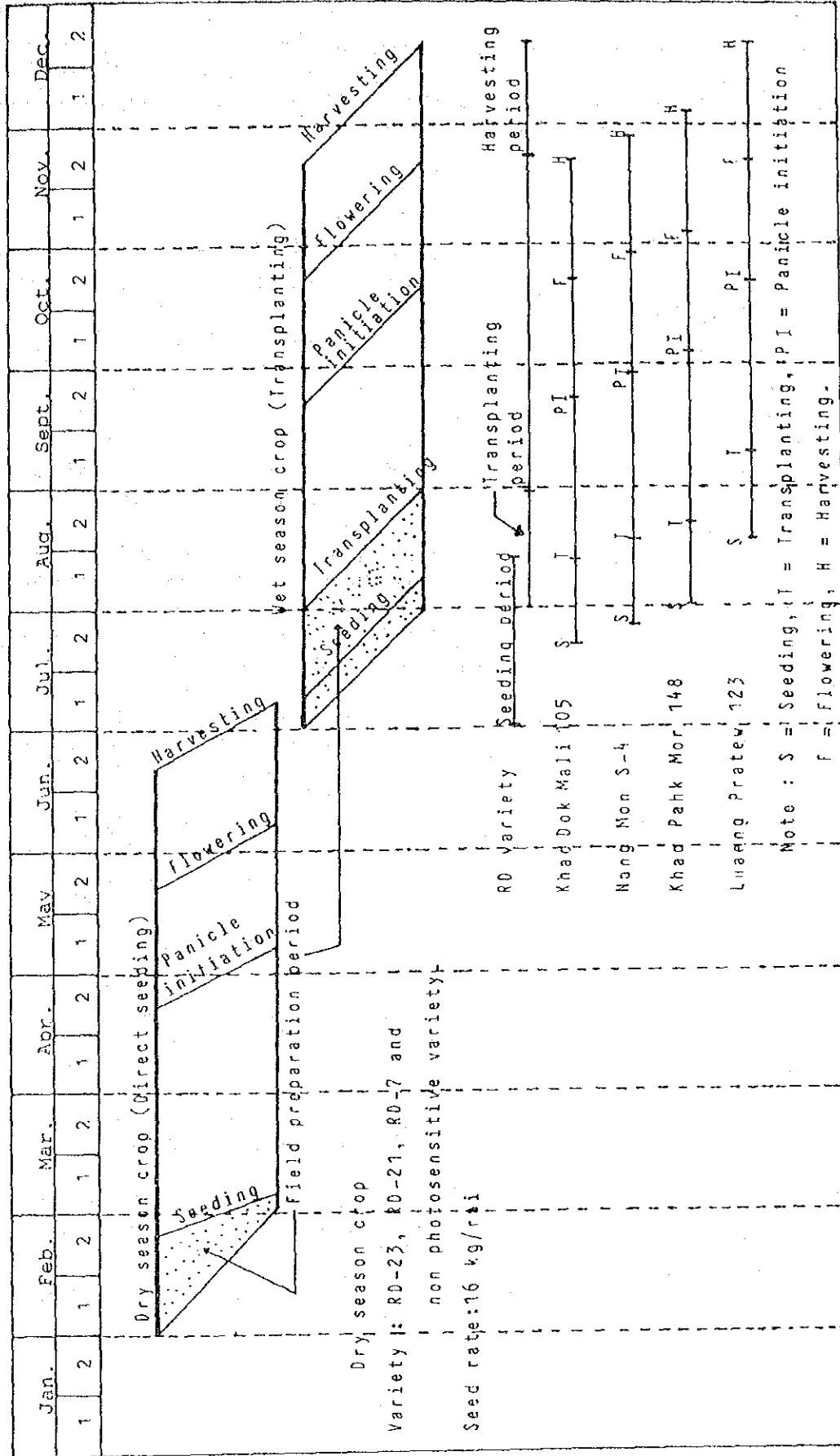
II-3-4-5 Rice Double Cropping Calendar and Appropriate Farming Practices

(1) Rice Cultivation Calendar

Based on the results of experiments, investigations and field observations, the following rice double cropping calendar and appropriate farming practices for the Mae Klong area have been established at the Agricultural Demonstration Centre. They have been recommended and diffused

to the farmers and government agencies concerned through extension activities. Furthermore, they shall be adopted widely in the areas in which the land consolidation has been completed and enabled to conduct rice double cropping such as the Phitsanulok project and many similar conditioned areas in Northern, and North-eastern Thailand.

Rice Cultivation Calendar in Mae Klong Area



Recommendation of appropriate Rice Farming for Dry Season Crop

(2)

Generally, the direct sowing rice cultivation method is recommendable for the dry season crop except in fields which it is difficult to control irrigation water freely. (As to the detailed information for the direct sowing rice cultivation be referred to the report "DIRECT SOWING LOWLAND RICE CULTIVATION AT THE MAE KLONG PROJECT").

Dry Season Rice Crop

Farming Practice	Recommendation
1) Yield target	Above 800 kg/rai (above 5000 kg/ha).
2) Cultivation method	Direct sowing.
3) Variety	RD-23 and other nonphotosensitive varieties.
4) Seed rate	13-16 kg/rai (80-100 kg/ha) in dry conditions.
5) Preparation of seed	About 3 days.
- Soaking	24-36 hours.
- Hastening of germination	Good leveling is required. Difference of undulation in a plot should be within ± 5 cm.
6) Field leveling	
7) Fertilizer application	30-40 kg/rai of Ammophos (16:20:0 or 20:20:0) to be applied at about 2 weeks after sowing.
- Basal	Apply 20-40 kg/rai of Am. Sulphate (21:0:0) at about 60-70 days after sowing (at the time of young panicle formation stage).
- Top dressing	Apply about 5 kg/rai of Saturn G. or Machete at 4-5 days before sowing.
8) Herbicide application	Before conducting ploughing and puddling, check and close holes dug by crabs and rodents in levee to prevent leakage of water.
9) Water management	Supply water to a depth of about 10 cm then apply herbicide. Standing water should be kept for 3-4 days in a stationary condition.
- Herbicide application time	Drainage furrow shall be made at every 8-10 m interval in order to complete the drainage.
- Before sowing time	Drainage shall be conducted just before sowing then conduct sowing as uniform as possible and irrigation water shall not be supplied until the young plants are completely established in about 1-2 weeks. Rice plants require much water in the period from the booting stage to completion of the flowering, on the contrary, the irrigation water supply shall be withheld during the period from maximum tillering stage to 4-5 days after panicle initiation stage. And then, the water supply will not be required any more from 2 weeks
- Sowing and after sowing	
10) Gap filling	Providing small scale nursery to procure seedlings for complimentary transplanting shall be required at about 10 days before direct sowing or additional seeding is necessary at 2-3 days after sowing to the lower puddled places (after surface soil has dried to a certain extent).

11) Rodent and crab control

Adequate control is required for prevention of water loss. Zinc phosphide, Warfarin or Fratol for rodents and Sumithion or Heptachlor for crabs are recommendable. **Rodent control shall be conducted by the cooperative works** before commencement of dry season rice cultivation.

12) Insect control

It is better to apply 5 kg/rai of Furadan or Padan Mipcin at about 2 weeks after sowing.

(3) Recommendation of Appropriate Rice Farming for Rainy Season Crop

The transplanting rice cultivation method is recommended in the rainy season. Because, if the direct sowing method is applied there is a high possibility of the area being visited by heavy rain with strong winds soon after sowing thus uniform establishment of seeding at a high rate will be apt to be hindered.

Rainy Season Rice Crop

Farming Practice	Recommendation
1) Yield target	700 kg/rai (4400 kg/ha).
2) Cultivation method	Transplanting in general.
3) Variety	RD-23, other RD varieties (will be shared about 70%) and photosensitive local varieties viz. Khao Dok Mali 105, Nang Mol S-4, Khao Pak Mor 148, Luang Pratew 123.
4) Nursery size	20 wa ² (500 m ² /ha)
5) Seed rate	0 kg/rai (37.5 kg/ha).
6) Preparation of seed	Soaking and hastening of germination are same as direct sowing.
7) Seedling age at transplanting	18-25 days.
8) Planting density and seedlings/hill	100 hills/wa ² (25 hills/m ²), about 30 cm × 15 cm or 20 cm × 20 cm and 3-4 seedlings/hill.
9) Root depth at transplanting	As shallow as possible.
10) Fertilizer application	
- Basal	30-40 kg/rai of Ammophos (16:20:0 or 20:20:0) for RD varieties and 20 kg/rai for photosensitive local varieties. Apply at puddling time or 1 week after transplanting.
- Top dressing	20-30 kg/rai of Am. Sulphate (21:0:0) for RD varieties and 10-20 kg/rai for local varieties. Apply at young panicle formation stage about 45-50 days after transplanting.
11) Herbicide application	Apply 5 kg/rai of saturn G. or Machete at 4-5 days after transplanting.
12) Water management	Maintain 4-5 cm depth of water or irrigate about 8 cm depth every week until 2 weeks after flowering. However, the paddy fields may be dried after maximum tillering stage for about 10 days.
13) Rodents, crabs and insect control	Same management as direct sowing.

II-3-4-6 Reports

During the cooperation period, numerous technical reports have been written in collaboration with Thai Counterparts.

Main reports published are as follows :

- Author: Kazuto Misawa
- 1) DIRECT SOWING LOWLAND RICE CULTIVATION AT MAE KLONG PILOT PROJECT.
 - 2) CROPPING PATTERN OF RICE DOUBLE CULTIVATION.
 - 3) COLD WEATHER DAMAGE OF LOWLAND RICE.
 - 4) MECHANIZED FARMING OF LOWLAND RICE
 - 4.1) LARGE SCALE OF RAISING OF SEEDLING OF LOWLAND RICE FOR MECHANIZED TRANSPLANTING.
 - 4.2) MECHANIZED HARVESTING OF LOWLAND RICE.
- Authors: Motonori Tomitaka
Kazuto Misawa
- 5) REPORT OF PRACTICAL WATER MANAGEMENT EXPERIMENT ON RICE CULTIVATION AT MAE KLONG PILOT PROJECT IN 1984 DRY SEASON.

Authors: Kazuto Misawa
Shirod Prakunhungsit
 - 6) SUMMARY OF AGRONOMICAL EXPERIMENTS CONDUCTED AT AGRICULTURAL DEMONSTRATION CENTRE OF MAE KLONG PILOT PROJECT.
 - 7) REPORT OF THE PADDY CULTIVATION AT THE TRIAL FARM OF MAE KLONG PILOT PROJECT OF IADP.
 - 7.1) DRY SEASON, 1982.
 - 7.2) RAINY SEASON, 1982.
 - 8) REPORT OF THE PADDY CULTIVATION AT AGRICULTURAL DEMONSTRATION CENTRE, MAE KLONG PILOT PROJECT, IADP.
 - 8.1) DRY SEASON, 1983.
 - 8.2) RAINY SEASON, 1983.
 - 8.3) DRY SEASON, 1984.

II-3-5 Extension (MOTONORI TOMITAKA)

Agricultural extension work for the pilot areas had been carried out by the Agricultural Demonstration Centre. The extension work was strengthened after the assignment of an expert on agricultural extension in December, 1981. Main works in the field of agricultural extension were the appointment and guidance of model farmers, training farmers on rice cultivation, organizing water user associations, renewal of rice varieties and seeds, yield surveys, publication of Mae Klong Farming News, and others.

II-3-5-1 Model Farmers

To demonstrate the improved farming practices together with on the farm training, appointment and guidance of model farmers was carried out in cooperation with Tha Muang Agricultural Extension Office (for the pilot No. 1 area) and Tha Maka Agricultural Extension Office (for the pilot No. 2 area). Assistance to the model farmers was started in the 1982 dry season in the pilot No. 1 area, and 1982 wet season in the pilot No. 2 area. The model farmers were changed every year or every crop season. It was considered that the model farmer was in a process of learning the improved rice farming techniques through experience.

The Area of model farmer was either 10 rai or 5 rai, and the number of model farmers depended on the recommendation of the agricultural extension offices. Besides technical advice on rice farming, Agricultural Demonstration Centre subsidized fertilizer (30 kg/rai of ammonium

phosphate for basal application and 20 kg/rai of ammonium sulphate for top dressing) and chemicals (5 kg/rai of Saturn G. for weed control and Sumithion and Furadan for insect control). Rice yields of the model farmers in different crop seasons were as follows :

Rice yields of model farmers

Pilot No. 1 area, 1982 dry season

Name of model farmer	Variety	Yield (kg/ha)	Planting method
La Doknangyam	Apple Tong	5,212	Transplanting
	RD-7	4,297	Direct sowing
Piboon Srisawan	RD-7	4,063	Transplanting
Sompean Boonsiri	RD-7	3,773	Direct sowing
1982 wet season			
La Doknangyam	RD-23	4,687	Direct sowing
	Luang Pratiew	3,860	Transplanting
Piboon Srisawan	RD-23	3,781	Transplanting
Sompean Boonsiri	RD-23	5,512	Direct sowing
1983 dry season			
Jae Sritong	RD-23	4,904	Transplanting
Team Jamsai	RD-23	5,059	Direct sowing
Mant Jaijing	RD-23	4,532	Direct sowing
Chow Modmed	RD-23	5,165	Transplanting
1983 wet season			
Jae Sritong	RD-23, 25	2,944	Transplanting
	Luang Pratiew		
Team Jamsai	RD-23	5,132	Direct sowing
Mant Jaijing	RD-23	4,065	Direct sowing
Chow Modmed	RD-23	3,763	Direct sowing
1984 dry season			
Nop Namdit	RD-23	3,530	Direct sowing
Mol Buaklai	RD-23	3,719	Direct sowing
Sopon Banmai	RD-23	4,888	Direct sowing
1984 wet season			
Pet Tongyam	RD-23	3,918	Direct sowing
Prink Nuch-im	RD-23	3,700	Transplanting
Seksun Wongprasert	RD-23	4,030	Direct sowing
Tawat Tedsana	RD-21, 23	4,117	Transplanting
Sompoch Boonsiri	RD-23	4,120	Direct sowing

Pilot No. 2 area, 1982 wet season

Name of model farmer	Variety	Yield (kg/ha)	Planting method
Samarn sukrom	RD-23	4,715	Transplanting
Sujin Pun-pukdee	RD-23	5,212	Transplanting
Lump kabute	RD-23	4,337	Transplanting
1983 dry season			
Poom Srisamran	RD-23	6,751	Transplanting
Long In-thirat	RD-23	6,484	Transplanting
Samarn Sukrom	RD-23	5,859	Direct sowing
Kun Langma	RD-23	5,782	Direct sowing
1983 wet season			
Poom Srisamran	RD-23	5,172	Transplanting
Long In-thirat	RD-23	5,132	Transplanting
Samarn Sukrom	RD-23	3,447	Direct sowing
Kun Langma	RD-23	4,593	Transplanting
1984 dry season			
Ana Sukaram	RD-23	5,720	Direct sowing
Thaeo Nak-fam	RD-23	4,278	Transplanting
Samruai Orpun	RD-23	5,283	Direct sowing
Chun Tongchot	RD-23	5,296	Transplanting
1984 wet season			
Sroy Sungsa-ad	RD-5	3,591	Transplanting
Somsuk Duangsri	RD-23	4,488	Transplanting
Sert Intasopa	RD-23	3,911	Direct sowing
Chom Hua-lear	RD-23	4,056	Direct sowing
Boon Sungca	RD-23	4,437	Direct sowing
Lek Pu-kong	RD-23	5,250	Transplanting
Cheo Pu-kong	RD-23	5,047	Transplanting
Punta Ku-achirakul	RD-23	5,022	Direct sowing

II-3-5-2 Farmer Training on Rice Cultivation

In order to diffuse the improved rice farming techniques in the pilot areas, farmers' meetings on rice cultivation and water management were held at the pilot No. 1 and No. 2 areas. The Muang Agricultural Extension Office, Tha Maka Agricultural Extension Office, Cooperative Promotion Department's Mae Klong Office, Tha Maka and Kamphaengsan Operation and Maintenance Offices of RID cooperated when holding the meeting. A wide range of topics, such as rice farming techniques, maintenance fees, irrigation schedules, seed exchange, selection of model farmers, cleaning of on-farm irrigation facilities, etc. were discussed at the meeting.

The Agricultural Demonstration Centre shared the part of rice farming techniques. Important points of rice farming were discussed and necessary papers were provided to the farmers and officers attending the meeting. The meeting was also useful to maintain a good relationship among government officers and farmer leaders. The Number of meetings held and the total number of farmers attending in the last 3 years were as follows :

Farmers' meetings in last 3 years

		Number of meetings	Total farmers attending
1982	Pilot No. 1	4	185
	Pilot No. 2	5	120
1983	Pilot No. 1	6	131
	Pilot No. 2	6	149
1984	Pilot No. 1	7	249
	Pilot No. 2	11	465

II-3-5-3 Water User Association

After the completion of land consolidation work in the pilot areas, water user associations were organized under the guidance of The Cooperative Promotion Department's Mae Klong Office. In the pilot No. 1 area, 21 water user associations were organized in 1982, then they were further re-organized into 5 associations in 1984. There are 2 associations and 18 sub-groups in the pilot No. 2 area. These associations cover all of the pilot project areas. The Main purposes of the water user association are to maintain terminal irrigation facilities by the farmers themselves and to distribute irrigation water properly to all the paddy fields of the farm ditch.

Water fees or maintenance fees of on-farm irrigation facilities has been collected since The 1983 dry season. It was 45 Baht and 40 Baht per rai per year for the pilot No. 1 and 2 area respectively in 1983. About 85,900 Baht from the pilot No. 1 and about 102,650 Baht from the pilot No. 2 were collected in 1983. The maintenance fee was increased to 70 Baht per rai per year (or 35 Baht per rai per crop season) for the pilot No. 1 area in 1984. About 161,850 Baht from the pilot No. 1 and about 103,000 Baht from the pilot No. 2 were collected in 1984. They were almost 100 percent of the paddy fields in the pilot areas. Part of the collected money is used to pay-back the farmers who participate in repair and maintenance work of the on-farm irrigation facilities.

II-3-5-4 Renewal of Rice Varieties and Seeds

Before the implementation of land consolidation work, only wet season rice was planted in most of the pilot project areas. Traditional varieties were dominant, and they could not be used for dry season crop because of their photo-sensitive characteristics.

The Agricultural Demonstration Centre had evaluated the recommended high yielding varieties (RD varieties) for The Central Plain, and conducted seed multiplication for the purpose of renewal of rice varieties and seeds. They are non photo-sensitive, and can be planted in dry and wet seasons. Exchange of seeds was done before dry season rice cultivation. RD-7 variety was the most exchanged seed in quantity until 1982, but RD-23 replaced it and became the dominant variety afterwards because of its resistance to the ragged stunt virus and high yield potential. Amount of seeds exchanged with farmers were as follows :

Amount of seed exchanged

- 1980 : 1.0 ton of RD-7, RD-9 and RD-11
- 1981 : 11.5 tons of RD-7 and RD-9
- 1982 : 22.3 tons of RD-7 and RD-23
- 1983 : 18.9 tons of RD-23 and RD-21
- 1984 : 11.1 tons of RD-23
- 1985 : 21.5 tons of Rd-23 (as end of January)

II-3-5-5 Yield Survey

Yield survey of farmer fields has been conducted after the completion of land consolidation. About 100 samples of 4 m² each were harvested in each pilot area, and the average rice yield was calculated at 14 percent of moisture content. Some farmers produce more than 6 tons per hectare in the dry season and more than 5 tons per hectare in the wet season. The average yield at different crop seasons were as follows :

Average yields at different crop seasons (kg/ha)

1. Pilot area No. 1.

	Dry season			Wet season		
	Highest	Lowest	Average	Highest	Lowest	Average
1980	6,100	1,325	4,125	4,625	1,625	3,134
1981	6,250	1,750	3,862	4,825	2,165	3,294
1982	6,042	1,258	3,639	5,728	1,409	3,432
1983	7,703	3,003	5,253	5,675	2,060	3,699
1984	7,026	1,431	4,184	7,388	1,648	3,680

2. Pilot area No. 2.

	Dry season			Wet season		
	Highest	Lowest	Average	Highest	Lowest	Average
1981				4,943	2,270	3,556
1982	5,750	2,062	3,558	5,550	1,289	3,738
1983	6,751	2,078	4,485	5,508	2,101	3,684
1984	6,099	1,894	4,551	6,228	2,673	4,373

Although the average yield was influenced by climate, irrigation schedules, management practices, and other factors, many farmers produced more than 4.5 tons in the dry season and 4 tons in the wet season. However, there were some farmers who harvested less than 2.5 tons per hectare per season because of poor weed control, cold weather damage of late planted rice in the wet season, and other reasons. Before implementation of the land consolidation work, the average yield was 2.2 tons per hectare, and harvested once a year. At present, it is about 4.4 tons per hectare in the dry season and about 3.6 tons per hectare in the wet season.

During the yield survey, expansion of high yielding varieties was also investigated. In the dry season, all farmers plant the high yielding varieties. Even in the wet season, the rate of RD varieties planted area has been expanded year after year. Expansion of RD varieties planted area was as follows :

	Percent of RD varieties planted area			
	Pilot No. 1 area		Pilot No. 2 area	
	Dry season	Wet season	Dry season	Wet season
1981	100	25	100	10
1982	100	49	100	35
1983	100	70	100	60
1984	100	70	100	90

II-3-5-6 Publication of "Mae Klong Farming News"

Publication of Mae Klong Farming News (in Thai) was started January, 1984. It was published 10 times in 1984, and so far 1 time in 1985. About 700 copies of the bulletin are published every time, and distributed to the government officers and farmers concerned. Some of the articles were written by the officers who work together in farmer training on rice cultivation and organizing water user associations. Contents of Mae Klong Farming News were as follows :

Contents of Mae Klong Farming News

- No. 1. (January 3, 1984) : p. 6.
1. Rice cultivation calendar, 1984.
 2. Meeting on rice production.
 3. Seed exchange.
 4. Clean feeder road, canal and levee.
 5. Record farming note.
- No. 2 (February 1) : p. 9.
1. Results of wet season rice, 1983.
 2. Land preparation.
 3. Seed selection and treatment.
 4. Seed rate for transplanting.
 5. Herbicide for weed control.
- No. 3 (March 1) : p. 4.
1. Management of nursery bed and transplanting field (by Mr. Vichai Paduongsab, Thama Agricultural Extension Office).
 2. Punishment for anyone who destroys roads or ditches in the pilot project (by Mr. Chumpon Pansira, Kanchanaburi Land Consolidation Office).
 3. Mineral nutrition and fertilizer of rice.
- No. 4 (April 2) : p. 6.
1. Direct sowing : Seed rate.
 2. Transplanting : Seedling age and planting space.
- No. 5 (May 2) : p. 10.
1. Wet season rice varieties.
 2. Introduction of cooperative (by Mr. Sawhan Plymas, Tha Muang Cooperative).
- No. 6 (June 1) : p. 10.
1. Yield and yield components.
 2. Control blast and insects (by Mr. Avrooth Pisan, Tha Muang Agricultural Extension Office).
 3. To : Members of water user groups in sugarcane pilot project, Tambon Tungtong, Amphur Tha Muang (by Mrs. Charunsri Amphansaeng, Mae Klong Cooperative Promotion Department Office).
- No. 7 (July 2) : p. 5.
1. Important points of wet season rice cultivation.
 2. Herbicide and weed control.
- No. 8 (August 1) : p. 6.
1. Ideal rice variety and varieties at present.
 2. Spreading period of rice diseases (by Mr. Avrooth Pisan, Tha Muang Agricultural Extension Office).
 3. Flag symbol for water supply (by Mrs. Charunsri Amphansaeng, Mae Klong Cooperative Promotion Department Office).
- No. 9 (September 3) : p. 3.
1. Result of yield survey, 1984 dry season rice.
 2. Use fertilizer properly.

No. 10 (October 25) : p. 4.

1. Recommendations on rice farming for Mae Klong area.

No. 11 (January 2, 1985) : p. 3.

1. Important points of dry season rice cultivation.

II-3-5-7 Other Activities

(1) Observation of Planting Methods

The Transplanting method of rice cultivation was widely practiced in the pilot areas before the implementation of land consolidation. However, direct sowing area has expanded rapidly especially in the dry season. In the 1984 dry season, about 90 percent of the rice planted area in the pilot No. 1 and about 60 percent in the pilot No. 2 were planted by the direct sowing method. Expansion of direct sowing area was as follows :

	Percent of Direct Sowing Area			
	Pilot project No. 1		Pilot project No. 2	
	Dry season	Wet season	Dry season	Wet season
1981	5%	10%	2%	5%
1982	10	15	4	10
1983	45	30	30	20
1984	90	55	60	45

The average rice yield of direct sowing field was not inferior to that of transplanting, but the range of the yield was wider in the direct sowing method. The low yields of some of the direct sowing fields were due to poor seedling establishment and weed problems. The farmers still lack experience and knowledge of direct sowing rice cultivation.

(2) Practical Water Management Experiment

On farm level water management experiment on rice cultivation was conducted at 2 terminal irrigation units (36.4 ha) in the pilot project No. 1 of the Greater Mae Klong Irrigation Project in the 1984 dry season (March 3 to August 1). Additional data was collected in a common terminal irrigation unit (19.1 ha), a controlled field (0.8 ha), and a main drainage canal.

One irrigation unit (intensive area, 18.1 ha) was divided into 6 blocks, then preparation water for ploughing and puddling was separately supplied. Weekly rotational irrigation was introduced after seedling establishment. The other irrigation unit (semi-intensive area, 18.3 ha) was divided into 4 blocks, then weekly rotational irrigation was introduced since the beginning of the preparation of the water supply. Water management in the common area depended on farmers practices.

The amount of preparation water was 270.3 mm and 281.7 mm in 23 days (549.5 hours) to the intensive and semi-intensive area, respectively. It was 174.6 mm for ploughing and 95.7 mm for puddling in the intensive area. It was estimated that 180.8 mm for ploughing and 100.9 mm for puddling in the semi-intensive area. Average water depth at ploughing was 55.5 mm and 66.1 mm. and that of at 2 days after puddling was 83.2 mm and 86.6 mm in the intensive and semi-intensive area, respectively. Although the amount of preparation water was not obtained from the common area, water depth at ploughing (72.7 mm) and at 2 days after puddling (104 mm), and period of preparation water supply (27 days) indicated that more preparation water should be supplied to the area.

The period from starting irrigation water supply to finishing puddling was 27 days for the experimental area and 30 days for the common area. The period from starting irrigation to finishing

sowing was 27 days for the semi-intensive, 30 days for the intensive, and 31 days for the common area. Period of ploughing work was 14 days for the intensive, 21 days for the semi-intensive, and 26 days for the common area. Period of puddling work was 11 days for the intensive, 17 days for the semi-intensive, and 25 days for the common area. Period of direct sowing was 9 days for the intensive, 12 days for the semi-intensive, and 22 days for the common area.

It indicates that a land preparation period of 30 days is enough for dry season rice cultivation in The Mae Klong area, if farmers apply direct sowing and irrigation water of 300 mm to 330 mm is properly distributed. Farmers have enough farm machines to finish land preparation within 30 days.

After the preparation of water supply, 800.5 mm and 926.4 mm of irrigation water was supplied in 104.625 days to the intensive and semi-intensive area, respectively. Amount of rainfall during the period (March 26 to July 8) was 144.5 mm. Total amount of water supplied was 9.03 mm per day and 10.24 mm per day on average to the intensive and semi-intensive area, respectively. Approximate water requirement in depth obtained at different fields was 9.26 mm per day on average (ranged 5.31-15.02 mm/day) in the intensive area, and 11.31 mm per day (ranged 6.00--19.33 mm/day) in the semi-intensive area. Field to field irrigation practice (1 inlet covered about 6 paddy fields) made it difficult to obtain the daily water requirement. Based on the amount of water supplied to and drained from the experimental area, approximate water requirement in depth was 6.96 mm per day excluding lateral seepage water, then field efficiency of water was 77 percent for the intensive and 68 percent for the semi-intensive area.

Average rice yield was 4,372 kg per ha in the intensive area and 4,189 kg per ha in the semi-intensive area. These yield levels were not inferior to the average yield of outside the experimental area (pilot project No. 1) in the same cropping season (4,184 kg/ha). It indicated that the amount of water supplied to the experimental area was enough to obtain the average yield of the pilot project No. 1 in the 1984 dry season.

Excluding seepage water, the average water requirement in depth in the controlled field was 6.45 mm per day during the period from May 22 to June 11. It was 8.43 mm per day on sunny days (May 22-29), and 6.31 mm per day on rainy days (June 6-10, including rainfall of 7.5 mm in 4 days). However, there was observed at most 10 mm per day of water requirement on some sunny days.

About 4.91 mm per day of water on average was drained out from 944 ha of rice planted area. Water discharge fluctuated from almost 0 mm per day in early March to 8.44 mm per day in late May. Compared with the amount of water drained from the experimental area (2.07 mm/day from the intensive, and 3.28 mm/day from the semi-intensive area), water was not properly managed in the wide irrigation area.

(3) Publication of "Rice Cultivation Calendar in Mae Klong Area"

A Rice Cultivation Calendar in Mae Klong Area (in Thai) is prepared and is to be distributed to the farmers and government offices concerned at the end of cooperation. The rice cultivation calendar contains all the important points of rice farming in one paper, and hopefully can be a reference work of rice cultivation in the area.

(4) Seed Farm

To increase the amount of seeds exchanging with farmers, one seed farm of 10 rai was established in 1984 wet season in the pilot No. 2. RD-23 variety was planted and the yield was 8,196 kg (5,122.5 kg/ha).

(5) Machine Demonstration Farm

Farm machines were demonstrated in farmer fields in both of the pilot areas in the 1984 dry season. The machine demonstration farm was 5 rai in the pilot No. 1, and 10 rai in the pilot

No. 2. Farm machines demonstrated were tractors with attachments, transplanters, and combine harvesters.

(6) Farm Survey

To know the farming situations, especially on rice farming, farm surveys were conducted inside and outside the pilot areas on 1981/2 and 1983/4 crops. Although the results are being analyzed, the living situations of the farmers improved after the land consolidation work. Most of the farmers feel their livelihoods are better than 5 years ago. Dry season rice planted area have expanded, where land consolidation work has been completed. All farmers use farm machines for land preparation and threshing at present.

(7) Training

Several kinds of short and long term trainings were conducted at The Agricultural Demonstration Centre. Staff of the Centre were directly or indirectly conducted or cooperated with the training. Some of the examples of the training were zone men trained in water management, young farmers trained in rice production and farm machinery, recruits trained in farming, training of C.P. Company staff in mechanized rice farming. There were some students of RID's Irrigation School and Kasetsart University who used the equipment of the Centre and pilot areas for their training and research.

(8) Visitors

There were about 500 to 700 visitors to the Agricultural Demonstration Centre every year. The Nationality and professions of the visitors ranged widely. There were many Japanese who were members of Agricultural Cooperatives, students, government officers, and professors of agronomy or civil engineering. In addition to all ASEAN and South Asian countries, there were even some visitors from African countries. Among Thai visitors, they were students of agricultural colleges or teachers colleges, government officers, and farmer leaders outside the pilot areas.

11-3-6 Effects of the MKPP

There may be direct and indirect effects of the cooperation project. Since the beginning of the pilot project, a lot of experience and knowledge has been accumulated in the fields of agricultural civil engineering, agronomy, agricultural extension, and their related fields. Process of the on-farm development, such as land consolidation work, developing the appropriate rice farming technologies, and training farmers on rice cultivation and water management are shared with Japanese experts and Thai staff. The experience of The Mae Klong Pilot Project is utilized in the area where received or receiving land consolidation work under Greater Mae Klong Irrigation Project.

11-3-6-1 *Improving Rice Farming Technology*

As mentioned in the previous chapters, appropriate rice farming technologies have been developed at the Agricultural Demonstration Centre, and diffused to the farmers in the pilot areas. The rice farming technologies can be utilized in most parts of the area where received land consolidation in Greater Mae Klong Irrigation Project. Yield levels of 4.5 ton per hectare in the dry season and 4 ton per hectare in the wet season are not difficult to obtain, provided the farmers follow the recommendations and irrigation water is properly supplied and distributed.

II-3-6-2 Organizing Water User Associations

Organizing farmers for the development of the community is a difficult task for any country in the world. Water user associations, organized in the pilot areas, faced a lot of troubles, such as collection of maintenance fees, maintenance work of on-farm irrigation facilities, and distribution of irrigation water to the farm ditch and to the paddy fields. At present, however, almost all of the farmers in the pilot areas pay the maintenance fee, and at least they maintain the irrigation facilities at a satisfactory level.

Success or failure of water user associations will greatly affect the maintenance of on-farm irrigation facilities. RID shoulders the repair and maintenance of the main lateral canals, and controls the irrigation period and the amount of water discharge to the on-farm irrigation canals. On-farm irrigation facilities and water management depend on the farmers in the area.

Water user associations are being organized outside the pilot project areas by a Cooperative Promotion Department. The department expects the associations as the core of agricultural cooperatives in the land consolidated area in the future. Water user associations of the pilot No. 1 area are already under the control of Tha Muang Agricultural Cooperative since 1985.

II-3-6-3 Upgrading Water Management

Until a few years ago, it was difficult for the farmers to control water. Then, the farmers were still not accustomed to the on-farm irrigation facilities or its proper utilization. Although a weekly rotational irrigation schedule has been introduced by RID, it is the common practice that the farmers near the head of farm ditch take more than necessary water and drain out to the drainage. More attention should be paid to water distribution from the farm ditch to the paddy fields. Because, the main reason of not paying the maintenance fee is not getting water from the farm ditch but pumping water from the drainage ditch or canal.

On-farm water management experiments confirmed that if farmers were properly oriented and water supply was ensured, they followed the irrigation schedule. Without farmers participation on on-farm water management, field loss of water cannot be minimized. Development of mutual understanding about the importance of water management is essential for the maximum utilization of limited water resources.

II-4 Suphan Buri Experiment and Training Center

II-4-1 Introduction

The Suphan Buri Experiment and Training Center is located about 120 km from Bangkok and belongs to the Tambol Ruayai, Amphur Muang, Changwat Suphan Buri.

The Suphan Buri Experiment and Training Center under the Department of Agriculture, is one of the 3 sub-projects of IADP. The Center aims at contributing to the promotion of the technical capacities of the expertise belonging to the various departments under MOAC.

The main building of the Suphan Buri Experiment and Training Center was granted by the Japanese government. The official opening ceremony of this Center was held on March 10th, 1979.

The purpose of the Suphan Buri Training Center project is to train the related government officials and to carry on the research work for solving the problems in the irrigated and pilot project area.

The training program is planned by the working committee which was set up by the Department of Agriculture.

The joint sub-projects co-ordination committee was also set up at the ministerial level.

Suphan Buri Experiment and Training Center has as its responsibilities:

(1) Training

For the officers in charge from different government agencies such as : Royal Irrigation Department, Agricultural Land Reform Office, Department of Agriculture Extension, Department of Agriculture Co-operative Promotion, Accelerated Rural Development Office, Department of Community Development, Department of Public Welfare and Agricultural Economic Office, etc.

(2) Research

To carry on the research work for the purpose of solving the problems involving the project areas in the field of cropping systems, land and water utilization, farm mechanization etc.

(3) Technical co-operation

To offer support and technical advice to the Chao Phya and Mae Klong Pilot Projects and the organizations concerned with agriculture.

The buildings of the SBTC are as follows,

- | | |
|--|------|
| 1) Training Center Office | 1978 |
| (Granted Aid by the Japanese government, cost 120,000,000 yen) | |
| 2) Dormitory | 1980 |
| (Thai government budget) | |
| 2) Expert house | 1980 |
| (Thai government budget) | |
| (Cost 2,200,000 baht including a dormitory) | |

II-4-2. Training activities

The first batch of 40 trainees was started on a two week training course on "Rice cultivation techniques in irrigated areas from July 16th, 1979. Since then different courses of training have been given by the Center up to the end of March 1985 viz. five long term courses, 53 week long courses, 14 special courses and 16 seminars etc. The number of trainees are 2401 and 680 were participants in the seminar.

Long term and weeklong training courses

No.	Curriculum	Duration	Participants
1st	Rice cultivation techniques in irrigated areas	Jul 16-27	40
2nd	Cropping systems in irrigated areas	Dec 17-28	39
3rd	Integrated farming in irrigated areas	Jan 14-25	32
4th	Experimental design and computer analysis	Feb 5-6	15
5th	Modern agriculture in irrigated areas	Mar 18-20	46
6th	Rice cultivation techniques in irrigated areas	Apr 14-25	40
7th	Rice cultivation techniques in irrigated areas	May 12-23	33
8th	Computer programing and utilization	Jun 16-17	12
9th	Advance of computer programing and utilization	Jul 23-24	9
10th	Cropping system data analysis	Oct 6-10	10
11th	Cropping system data analysis	Oct 20-24	10
12th	Experimental design and computer analysis	Nov 19-20	29
13th	Integrated farming in irrigated areas	Dec 15-26	45
1979-1990 Sub total			360
14th	Introduction to computer programing and utilization	Jan 21-22	12
15th	Introduction to computer programing and utilization	Jan 27-28	15
16th	Rice cultivation techniques in irrigated areas	Mar 9-20	31
17th	Advance of computer programing and utilization	Apr 22-23	11
18th	Advance of computer programing and utilization	Apr 28-29	11
19th	Rice cultivation techniques in irrigated areas	Jun 8-19	36
20th	* Crop cultivation techniques and integrated farming in irrigated areas	Aug 3-Nov-27	33
1981 sub total			149
21st	Integrated farming in irrigated areas	Jan 11-22	19
22nd	Integrated farming in irrigated areas	Feb 9-19	27
23rd	Cropping systems in irrigated areas	Feb 22-Mar 12	35
24th	Introduction to computer programing and utilization	Mar 22-26	7
25th	Student training course	Mar 15-Apr 9	14
26th	Cropping systems in irrigated areas	May 10-28	31
27th	Introduction to computer programing and utilization	Jun 12-16	9
28th	* Rice cultivation techniques in irrigated areas	Jul 27-Nov 25	19
29th	Student training course	Oct 4-9	32
30th	Modern agriculture in irrigated areas	Nov 9-11	51
31st	Modern agriculture in irrigated areas	Nov 16-18	66
32nd	Introduction to computer programing and utilization	Dec 20-24	9
1982 Sub total			319

33rd	Cropping system for the central region	Jan 6-8	61	
34th	Introduction to computer programing and utilization	Jan 17-21	11	
35th	Introduction to computer programing and utilization	Jan 24-28	8	
36th	**Preparation for training in Japan	Feb 14-Mar 15	10	
37th	Key-site selection	Mar 8-11	30	
38th	Data analysis and research planning for Suphan Buri key-site	Mar 2-25	50	
39th	Seminar on Agriculture Extension Technicians in Western Region	Apr 14-15	30	
40th	Meeting of working group and farmers of Suphan Buri key-site	Jun 10	27	
41st	Administration and activities of provincial livestock	Jul 18-27	28	
42nd	Activities of young farmers for district extension officers	Aug 1-6	42	
43rd	**Rice cultivation techniques in irrigated areas	Sep 5-Dec 23	19	
44th	Student training course	Oct 10-14	19	
45th	Volunteer for Suphan Buri Livestock Development Program	Nov 14-18	45	
		1983	Sub total	380
46th	Computer programing and utilization	Jan 23-27	12	
47th	Computer programing and utilization	Feb 6-10	8	
48th	Rain-fed rice improvement project group I	Feb 27-Mar 2	40	
49th	Seminar on Farming system research group	Mar 7-9	61	
50th	Irrigated water management for rice cultivation	Mar 12-16	33	
51st	**Integrated farming in irrigated areas	Mar 19-Mar 12	27	
52nd	Rain-fed rice improvement project group II	Apr 23-27	33	
53rd	Integrated farming in irrigated areas	Jun 25-29	26	
54th	**Rice cultivation techniques and integrated farming in irrigated areas	Sep 10-Dec 25	30	
55th	Computer programing and utilization NEC machine	Feb 4-8	9	
56th	Computer programing and utilization NEC machine	Feb 11-15	8	
57th	**Integrated farming in irrigated areas	Feb 11-Mar 8	37	
58th	Modern germinated broadcasting rice cultivation	Mar 18-22	40	
		1984-1985	Sub total	364
		Total		1572

* Long term course

** Budgets were supported by Japanese government

Special course

No.	Curriculum	Duration	Participants
1st	Modern germinated broadcasting rice cultivation	Dec 3	97
2nd	Modern germinated broadcasting rice cultivation	Dec 8-9	66
1980		Sub total	163
3rd	Modern germinated broadcasting rice cultivation	Jan 5-6	68
4th	Modern germinated broadcasting rice cultivation	Jan 7-8	60
5th	Modern germinated broadcasting rice cultivation	Jan 12-13	74
6th	Modern germinated broadcasting rice cultivation	Jan 14-15	67
7th	Modern germinated broadcasting rice cultivation	Feb 12-13	48
1981		Sub total	317
8th	Modern germinated broadcasting rice cultivation	Mar 16-17	60
9th	Modern germinated broadcasting rice cultivation	Mar 19	120
10th	Modern agriculture in irrigated areas	Jun 2-4	4
11th	Modern agriculture in irrigated areas	Nov 9-12	51
12th	Modern agriculture in irrigated areas	Nov 16-18	66
1982		Sub total	301
13th	Fertilization technique in paddy fields	Mar 28	24
14th	Rice pest and its control	Jun 20	24
1984		Sub total	48
Total			829

Technical meeting and seminar

No.	Curriculum	Duration	Participants
1st	Research coordination and promotion of water in agriculture utilization sub-committee	Oct 25-26	45
2nd	Sensitive rice variety selection among Experiment Station in central region	May 26-27	35
3rd	Agriculture officials of Modern germinated broadcasting rice cultivation project	Jun 4	45
4th	Modern germinated seed demonstration pilot	Jun 9	50
5th	Department of Agricultural Extension	Oct 28-29	71
1979-1980		Sub total	246
6th	Agricultural Land Reform Office for lawyer	Mar 2-6	40
7th	Technical Division for irrigation	Mar 23-27	25
8th	Azolla utilization in paddy fields	Dec 8	60
1981		Sub total	125
9th	Low land rice variety selection for the north	Apr 2-3	42
10th	Low land rice variety selection for the central	May 3-4	30
11th	Annual meeting for Suphan Buri Extension	Sep 9	110
12th	Reinforced teaching for students	Sep 18	35
1982		Sub total	217
13th	Working committee of Suphan Buri key-site	May 7-9	20

14th	Working committee of Suphan Buri key-site	Jul 18	17
15th	Contact farmers of Suphan Buri key-site	Aug 17	25
16th	Workshop on Research of Cantaloupe in Thailand	Jan 10	30
		1984-1985	Sub total
			92
			Total
			680
Total trainees = 2401 Seminar etc. = 680 Grand total			3081

II-4-3 Experimental Activities

II-4-3-1 Outline of Experiments

Many experimental works were carried out for several years concerning the technical improvement to increase rice yield including method of planting, fertilizer rate and time of application, spacing, seed rate and calper coating and integrated farming etc.

1979

- Exp 1 Experiment of different mat soil & fertilizer for box seedling
- Exp 2 Effect on different planting time on growth and yield of RD 7
- Exp 3 Comparison of yield of different planting date by transplanter

1980

- Exp 1 Effect of under drainage on the growth and yield of rice
- Exp 2 Intensive cultivation techniques for increasing rice yield

1981 Dry

- Exp 1 Effect of seedling and split application of nitrogen for yield
- Exp 2 Effect of different nurseries and space for rice yield
- Exp 3 Different density pre-trial on rice
- Exp 4 Study of multiple cropping systems for paddy fields

1981 Wat

- Exp 1 Effect of Potassium fertilizer and fertilizer application time on germinated direct broadcasted rice
- Exp 2 Effect of seedling densities and nitrogenous fertilizer rate on the growth and yield of transplanted rice
- Exp 3 Different rates and split application of nitrogen fertilizer on the yield of transplanted rice
- Exp 4 The comparison of rice yield on rates and times of nitrogen fertilizer which refers to different cultivation methods

1982 Dry

- Exp 1 Effect of different transplanting to rice yield 1981
- Exp 2 Density and nitrogen rate trial on transplanting rice
- Exp 3 Fundamental test for germinated direct broadcasted rice
- Exp 4 General discussion of density and nitrogen rate and recommendation of intensive cultivation technique of transplanting rice
- Exp 5 Recommendation of intensive transplanting cultivation technique of rice
- Exp 6 Recommendation of intensive transplanting cultivation technique of rice at Chao Phya and Mae Klong Pilot Project areas

1982 Wet

- Exp 1 Organic manure, nitrogen rate and density trial of transplanting rice

- Exp 2 Experiment of lodging avoidance on germinated direct sowing rice
- 1983 Dry
- Exp 1 Effect of seed rate and nitrogen fertilizer on yield of germinated direct broadcasting rice
- Exp 2 Effect of seedling take off for space-line on yield and its yield components for germinated direct broadcasting rice
- Exp 3 Different quantities of Calper coating on rice seed for germinated direct broadcasting rice under submerged condition field
- Exp 4 Different quantities of Calper coating on rice seed for germinated direct broadcasting rice under general condition field
- Exp 5 Effect of weed control and seedling take off on the Calper dust seed coating and non coated seed for germinated direct broadcasting rice
- 1983 Wet
- Exp 1 Effect of different seed rates and nitrogen fertilizer to the growth and yield of germinated broadcasting rice
- Exp 2 Effect of seed rates, times and rates of nitrogen application, coated and uncoated seed with Calper (Calcium peroxide) on yield of germinated broadcasting rice
- Exp 3 Effect of the rice yield of different methods in cultivation of germinated direct sowing
- Exp 4 Comparison of different methods of cultivation on the yield of rice
- 1984 Dry
- Exp 1 Effect of different seed rates and nitrogen fertilization on the growth and yield of germinated broadcasting rice
- Exp 2 Effect of seed rates and nitrogen fertilizer quantities for yield on germinated direct sowing rice
- Exp 3 Effect of Calper coating quantities of rice seed to the amount of survival seedling in germinated broadcasting rice
- Exp 4 Effect of different seed rates in germinated direct sowing
- 1984-1985
- Exp 1 Development of Cantaloupe cultivation technique

II-4-3-2 The comparison of treatment data in 1980-1984

(1) Outlines

The series of experiments were continuously carried out between 1980 and 1984 at the fields of the Suphan Buri Experiment Station. The yearly and subject-wide experimental results together with the statistical analysis were reported every year.

The following results are compared by taking the mean in every subject through the years. The results from the transplanting were derived from the 60 treatments from 1980 to 1982 and those from direct-sowing were derived from the 110 ones from 1982 to 1984.

The analytical subjects were divided into transplanting direct-sowing, wet and dry season, plant densities, grain yields, nitrogen applications and etc.

The data is as follows:

- 1) the paddy yield from the crop-cutting of 8 m²
- 2) the yield components data sampling from 50 cm × 50 cm area
- 3) the number of panicles and spikelets per panicle
- 4) the percentages of reaped grains defined by specific gravity 1.06

- 5) the 1,000 grain weights
- 6) the calculation yield and number of spikelets per m²

(2) Results

1. Comparison between transplanting and direct-sowing

The crop-cutting yield from the direct-sowing method is 5,474 kg/ha and from the transplanting method is 5,333 kg/ha. The former one exceeds the latter by 140 kg. The opposite way is more common for ordinary farmers' fields.

2. Comparison between dry and wet seasons

As far as the crop-cutting survey result is concerned, the dry season crops show better results than the wet season ones in both of transplanting and direct-sowing. The transplanting and direct-sowing in the dry season are 845 kg and 285 kg respectively bigger than in the wet season.

According to the yield component of the respective data, in terms of grain quantities, the dry season's is greater than the wet season's. Consequently, the grain quantities per unit acreage, which significantly affects the yield, is considered as the most important factor.

The Suphan Buri Experiment Station, defines March to July as the dry season and August to December as the wet season.

3. Comparison between plant densities and sowing rates

In transplanting, the plant density of 25 hills per m² (20 cm × 20 cm) gained the most yield. The second most is 32 hills per m².

In direct-sowing, 8 kg of seed per rai (1,600 m²) gained the most yield. The larger amounts tend to get less yields.

These results were obtained from the well-managed field like the Station but it is required that further research should be made at the farmers' fields.

4. Comparisons among nitrogen application

In transplanting, 18 kg per rai of the nitrogen application gained the most yield, but 24 kg got less. The lesser the amount of the applications under 18 kg tend to correspondingly lose the yields.

In direct-sowing, 14 to 16 kg per rai gained the most yield.

The more applications tend to accelerate the lodging and to reduce the percentage of the ripened grains.

Applications less than 14 kg per rai significantly reduce the yields. If the comparisons between the transplanting and direct-sowing at the same level of application are made, the efficiency of the fertilizer absorption is better for the direct-sowing. Namely in the transplanting 12 kg gained 5,083 kg per ha of rice grains, 16 kg did 5,279, and 18 kg did 6,257 kg but in the direct-sowing, 10 to 12 kg did 5,545 kg and 14 to 16 kg did 6,256 kg.

Secondly the economical optimum level of the nitrogen application. The control with 3 plots in both the dry and wet seasons were allocated and the average yield was 4,089 kg per ha.

The different levels of the application on the condition of the same cost other than the nitrogen fertilizer cost. If the control level is 100, the application of 6 kg, 11 kg, 15 kg and 21 kg per rai are 125, 128, 143 and 101 respectively. Therefore, 15 kg application gained the most yield.

5. Correlation between yields and yield components

The correlation matrixes concerning transplanting and direct-sowing respectively. The most correlated factor with the yield is the grain quantity per unit area, i.e. the correlation ratio in transplanting is 0.983 and in direct-sowing is 0.846.

This data was analyzed by T value of multiple regressions with the factors related to the yield.

The most significant factors to increase the yield are the number of panicles per m² and next is the number of spikelets per panicle in transplanting but at direct-sowing the number of panicles and spikelets of per panicle, both are equally important.

(3) Conclusion

The above-mentioned analysis may conclude the following items as the instructions for farming in the Central Zone around Suphan Buri.

In transplanting;

- 1) The plant density is 25 hills per m² (20 cm × 20 cm)
- 2) The nitrogen application amount 18 kg per rai is recommended. For basal and top dressing, half is applied respectively, and the top dressing should be applied at the panicle initiation stage.

In direct-sowing;

- 1) The seed rate is good, 8 kg per rai in experiment but usually 10 to 12 kg should be recommended for farmers.
- 2) Best quantities 14 to 16 kg per rai of nitrogen applied. The half for basal is recommended to be applied 15 to 20 days after sowing and for top dressing at the panicle initiation stage. Wherever lodging is an ordinary problem, the application for top dressing is divided twice, once at the panicle initiation stage and once at the booting stage.

II-4-4 Service works

1. Translate, publication and distributed papers for reference data
2. Cooperative to sub-project for experiment data analysis by computer
3. Introduction of new techniques for crops and vegetables
4. Recording video cassette tapes for training
5. Seed supplying to sub-projects
6. Availability of computer programing and guidance computers

III Future Plans

III Future Plans

Following eight-years of technical cooperation, the three sub-projects are now going to be managed by the Thai staff themselves. At the last Joint Committee Meeting, each representative from the sub-project explained the future plans of their respective sub-projects.

It is hoped that the three projects will continue in their activities in the same way as they have been executed up to now and in addition to this that they will enlarge their capacities as the centers of their respective areas.

In the following chapters each future plan is discussed.

III - 1. Future Plans of Chao Phya Pilot Project

The project will continue to carry on all activities related to the development of farming technology and the improvement of the economic conditions of farmers. At present, even though farmers have been much improved in their farming techniques, most of them still face the problem of previous debts. It is necessary to guide them in using profitable methods of cultivation and to encourage them to make use of their cooperatives so as to get more income and be discharged from their financial obligations. Furthermore, the improvement of the following activities must be considered.

1. Farmers' organization

- a. Procurement and distribution of input materials
- b. Production selling
- c. Water management
- d. Operation and maintenance of on-farm facilities

2. Technical extension

- a. Technological services
- b. Demonstrations
- c. Training
- d. Plant protection
- e. Crop cutting surveys

3. Coordination with the authorities concerned

4. Farm machinery

- a. Adaptability and efficiency trials
- b. Field management
- c. General work in trial farm
- d. Repair and maintenance
- e. Leasing farm machinery and rice mills to cooperatives
- f. Supporting services to farmers as needed.

5. Trial farm

Even though having been provided with data and information concerning agricultural technology by the Department of Agriculture, the following activities are still essential for the effectiveness of the projects' operation.

- a. Seed multiplication
- b. Location tests
- c. Trials for problems that arise
- d. Demonstrations

6. Land Reform Training Center

It is expected that the Land Reform Training Center will be established at the Chao Phya Pilot Project. The center will provide technical services to the farmers and officials concerned. Besides, it will serve as a place for the exchange of experience and information on land reform implementation and also work as a model center for other regions.

III-2 Future plans of Mae Klong Pilot Project

The aim of the Centre is to upgrade the living standard of farmers in the Greater Mae Klong Irrigation Project that covers an area of 507,312 hectares. Applicability trials on rice double croppings and extension work of the improved rice farming to the farmers are the main tasks for the Centre. Until recently, the Centre worked on the development of the pilot areas, but at present, it becomes one of the cores of agricultural development of the said project area.

1. Objectives

Objectives of the Agricultural Demonstration Centre are to stabilize rice double croppings in the area, to increase average rice yield per unit acreage, and to expand the area for rice double croppings. Through these efforts, the Centre will contribute to the betterment of farm income and development of the community.

2. Duration

First phase : April 1, 1985 - September 30, 1986.

Second phase : October 1, 1986 - September 30, 1991.

3. Action Programs

3 - 1 Conduct applicability trials

The Centre will continuously conduct applicability trials for improving the paddy cultivation techniques. The trials cover,

- Evaluation of varieties
- Fertilizer application on local varieties and high yielding varieties
- Mechanized farming of direct sowing and transplanting
- Introduction of green manure
- Improvement of cropping patterns

3 - 2 Seed multiplication of recommended varieties and its distribution to farmer groups.

The Centre will multiply the purified paddy seeds of recommended varieties. The seeds of about 30 tons in dry season and 25 tons in wet season are to be produced at the Centre. They will be distributed to the farmer groups in the Greater Mae Klong Irrigation Project.

3 - 3 Distribution of information on farming to the farmers and agencies concerned.

The Centre will prepare technical bulletins on farming especially that of paddy double cropping and distribute them to the farmers and agencies concerned.

3 - 4 Organize farmer groups and conduct training on rice farming.

The Centre will cooperate with the Cooperative Promotion Department on organizing farmer groups in the Greater Mae Klong Irrigation Project and cooperate with the Agricultural Extension Department in conducting the following trainings advice.

- Rice double croppings
- Improvement of cultivation methods and farm mechanization
- Improvement of soil fertility

3 - 5 Appoint model farmers as demonstration of improved rice farming techniques to other farmers.

The Centre, in cooperation with the Agricultural Extension Department, will appoint model farmers to demonstrate intensive and mechanized rice farming in farmer fields.

3 - 6 Coordinate with other government agencies concerned with rural development

The Centre will coordinate with other government agencies on rural development to upgrade the living standards of farmers in the Greater Mae Klong Project.

4 Water Management Training Program

One year course of Water Management Training Program will be conducted in the future following the yearly short-course training on water management at present. The Agricultural Demonstration Centre will be continuously used as a temporary centre of the water management training until establishment of Water Management Training Centre.

III - 3 Future Plans for Suphan Buri Experiment and Training Centre

1. Training

The Center itself will continue to operate in passing on new agricultural technology by the training of government officers from the different agencies concerned and also contract farmers in key-sites for farming system research and development projects by Thai budget.

2. Experiment

For research works, the Center will continue on-farm research which is needed to formulate and simplify the technologies available in the research center or experiment station to the level which can be followed and is practicable for stable yield and a reasonable income.

3. Cooperation

The Suphan Buri Experiment and Training Center will need to work in close cooperation with other government agencies and universities both in providing training facilities and in joint research work.

Appendix

- 1. Thai staff related to the Project**
- 2. Reports and Papers published**

1. Thai staff related to the Project (as of March, 1985)

Name	Position	Assigned date	Speciality	Original Position
Mr. Paitoon Palayasoot	Project Director	Nov. 10, 1983	Irrigation & Drainage	Inspector General MOAC
Mr. Prateep Soampong	Project Coordinator	Nov. 10, 1983	Irrigation & Drainage	Chief Technical and Planning Section CLCO
(Chao Phya P/P) Mr. Pinit Savanajata	Project Director	—	—	Secretary General ALRO
Dr. Tiravee Supanit	Manager	Nov. 10, 1983	Agro-Economy	ALRO
Mr. Krisadawut Wongpaiboonwatana	Counterpart	Oct. 1, 1980	Animal husbandry	ALRO
Mr. Somyot Punyaban	Counterpart	Dec. 1, 1983	Agro-Machinery	ALRO
Mr. Prathan Rijana	Counterpart	Dec. 1, 1983	Agronomy	ALRO
Mr. Jakri Ramana	Counterpart	July 1, 1980	Agronomy	ALRO
Mr. Chanchai Atiwanawat	Counterpart	Dec. 1, 1983	Irrigation & Drainage	ALRO
(MaeKlong P/P) Mr. Roongrueng Chulachart	Manager	—	Irrigation & Drainage	Manager, Greater MaeKlong Project
Mr. Surasak Srikirind	Assist. Manager	Nov. 10, 1983	Irrigation & Drainage	Chief engineer Region 10, RID
Mr. Osot Charnvoj	Chief, Trial Farm	—	Agronomist	O&M Div. RID
Mr. Sirod Prakunhungsit	Counterpart	June, 1979	Agronomist	RID
Mr. Supachai Kaewlumyai	Counterpart	Dec., 1981	Plant Protection	RID
Mr. Bunjerd Peungudom	Counterpart	Nov., 1982	Construction	RID (water master)
(Suphanburi T/C) Dr. Damkhoeng Chandrapanya	Manager	Nov. 10, 1983	Agronomy	Director, Farming System Research
Mr. Vichien Sasiprapa	Assist. Manager	Dec. 1, 1977	Agronomy	Agricultural Technician, DA
Mr. Opart Chantasuk	Counterpart	June 15, 1979	Agronomy	DA
Mr. Pairat Duangpiboon	Counterpart	June 2, 1980	Agronomy	DA

List of Technical Reports and Other Papers Published

I. Project Center

Description	Author	Written	Page	Year
1. Outline of IADP	J. Nakajima	English	17	1987
2. Progress Report of IADP (phase-1)	J. Nakajima	English	65	1982
3. Fundamental Survey for water management	J. Nakajima	English	60	1983
4. Study Matters on Land Consolidation in Thailand	J. Nakajima	English	57	1982
5. A questionnaire as to On-farm Development in Thailand	J. Nakajima	English	8	1983
6. Irrigation and Land Consolidation in Thailand and Outline of Thai Agriculture	J. Nakajima	English	77	1983
7. Thailand and Japan : a comparison	J. Nakajima	English	51	1984
8. Runoff Analysis for the Resettlement Project of KHAO LAEM DAM	J. Nakajima	English	94	1987
9. Some Comments on Irrigation Planning at the Chao Phya Pilot Project	J. Nakajima	English	15	1983
10. On Research for farm Water Management	J. Nakajima	English	10	1984
11. Experimental Water Management at the Mae Klong Pilot Project	J. Nakajima	English	61	1983
12. Study on Slope failure while Constructing the main pumping station at the Chao Phya Pilot Project	J. Nakajima	English	7	1987
13. Explanation of Automatic Control system of the Main Pumps for the Chao Phya Pilot Project	J. Nakajima	English	38	1982
14. Curriculum of Water Management Training	J. Nakajima	English	26	1984
15. Progress Report on IADP in the Extended Period	J. Nakajima	English & Thai	95	1984
16. My Experiences with Land Consolidation and water Management in Thailand	J. Nakajima	English	394	1985
17. Simulation on farm income under uncertainties of rice price and yield.	H. Takama	English	4	1984
18. Economical optimum point of application of GLM for rice cultivation	H. Takama	English	4	1983
19. Optimum point of application of fertilizer for rice cultivation	H. Takama	English	4	1983

II Chao Phya Pilot Project

Description	Author	Written	Page	Year
1. Irrigation and Drainage				
1. Observation of Irrigation from No. 2 Pump at Chao Phya Pilot Project	M. Fukuda	English	12	1983
2. Agronomy				
2. Summary of the Agronomic Trials in Wet Season 1983, Conducted at Trial Farm of Chao Phya Pilot Project	T. Shibata	English	33	1983
3. Summary of the Agronomic Trials and Seed multiplication program in Dry Season 1983-1984, Conducted at Trial Farm of Chao Phya Pilot Project	T. Shibata	English & Thai		1983-1984
4. Program for Dry Rice Cultivation in pilot project area	N. Iguchi	English	6	1980
5. Study Report, Preparatory Survey for the First Dry Season Rice Cultivation in the Irrigated Agricultural Development Project. The Pilot Project, Lad Bua Luang District, Ayutthaya Province	N. Iguchi	English	8	1981
6. Study Report of Ragged Stunt Virus Control	N. Iguchi	English & Thai	11&13	1981
7. Report of Extension works for Dry Season in CPPP	N. Iguchi	English	9	1981
8. Farmer's Management Survey Report of Chao Phya Pilot Project	N. Iguchi	English	95	1982
9. Direct Sowing Cultivation Plan for Wet Season Rice 1982	N. Iguchi	English & Thai	5&6	1982
10. Crop Cutting Survey Report of Dry Rice Cultivation in Chao Phya Pilot Project	N. Iguchi	English	8	1983
11. Extension Report of Dry Season Rice Cultivation 1984	N. Iguchi	English	9	1984

Description	Author	Written	Page	Year
3. Farm Machinery				
12. Mechanics' and Drivers' handbook	M. Numata	English & Thai	15 & 23	1983
13. Proper handling and maintenance manual for Battery	M. Numata	English & Thai	11 & 13	1983
14. Adjustment of the number of seedling and maintenance manual of Transplanter	M. Numata	Thai	7	1983
15. Guide line for maintenance and trouble shooting of Agricultural machinery	M. Numata	English & Thai	30 & 34	1983
16. How to handle Tractor for good soil preparation on rice cultivation	M. Numata	Thai	1	1983
17. Proper handling and maintenance manual for Transplanter	M. Numata	English & Thai	38 & 36	1984
18. Operation manual for Combine Harvester	M. Numata	Thai	71	1984
19. Tentative Judgement of trafficability of Soil	M. Numata	English & Thai	7 & 6	1984
20. Relation between the time of drainage and the trafficability of soil for using Combine Harvester	M. Numata	English	2	1984

III Mae Klong Pilot Project

1. Agricultural Civil Engineering

Description	Author	Written in	Page	Year
1. Report of agriculture engineering activities, Jan. 1981-Jan.1983.	Mr. Y. Matsuya	English	200	1983
2. Summary of Irrigation and Drainage, The Mae Klong P/P	Mr. K. Hisamoto	English	11	1983
3. Mae Klong Pilot Project No. 1	Mr. K. Hisamoto	Japanese	96	1983
4. The Experimental Water Management at Mae Klong Pilot Project	Mr. K. Hisamoto	English, Thai	35	1983
5. The Investigation about the Reason for Un-irrigable area	Mr. K. Hisamoto	English	34	1983
6. The Mae Klong Pilot Project, Summary (Irrigation and Drainage)	Mr. K. Hisamoto	English	16	1984
7. The Improvement Plan of Mae Klong P/P No. 1 (Lining Q 0.048 m ³ /sec, Earth ditch Q 0.048 m ³ /sec)	Mr. K. Hisamoto	English	68	1983
8. The Improvement Plan of Mae Klong P/P No. 1 (Earth Ditch)	Mr. K. Hisamoto	English	70	1983
9. The Improvement Plan of Mae Klong P/P No. 1 (The final plan)	Mr. K. Hisamoto	English	70	1983
10. The Improvement work of Mae Klong P/P No. 1 (The result of improvement, cost of improvement work, construction progress report, others)	Mr. K. Hisamoto	English	110	1984
11. Pumping Data of Mae Klong Pilot Project No. 1	Mr. K. Hisamoto	English	—	1983-84
12. Water Measure Data at Mae Klong Pilot Project No. 2	Mr. K. Hisamoto	English	—	1983-84
13. Rotational Irrigation Schedule in Mae Klong P/P No. 2	Mr. K. Hisamoto	English	—	1984
14. Rotational Irrigation Schedule in Mae Klong P/P No. 1	Mr. K. Hisamoto	English	—	1985
15. Suggestions on Design Method of Irrigation Ditch	Mr. K. Hisamoto	English	—	1985
16. Report on Planning and Design Standards On-farm Works	Mr. T. Miyatsu	English	45	1981
17. The Basic Design on the Basis for Actual Survey	Mr. T. Okubo	English	51	1980

2. Agronomy (Agricultural Demonstration Centre)					
18.	Direct Sowing Lowland Rice Cultivation at Mae Klong Pilot Project	Mr. K. Misawa	English	78	1985
19.	Cold Weather Damage of Lowland Rice	Mr. K. Misawa	English		
20.	Mechanized Farming of Lowland Rice	Mr. K. Misawa	English	41	1985
21.	Cropping Pattern of Rice Double Cultivation	Mr. K. Misawa	English		
22.	Summary of Agronomical Experiments Conducted at Agricultural Demonstration Centre of Mae Klong Pilot Project	Mr. K. Misawa	English	18	1985
23.	Report of the Paddy Cultivation in the Dry Season, 1982.	Mr. K. Misawa Mr. Shirot Prakunhungsit	English	51	1982
24.	Report of the Paddy Cultivation in the Rainy Season, 1982.	Mr. K. Misawa	English	84	1983
25.	Report of the Paddy Cultivation in the Dry Season, 1983.	Mr. K. Misawa Mr. Shirot Prakunhungsit	English	93	1983
26.	Report of the paddy Cultivation in the Wet Season, 1983.	Mr. K. Misawa Mr. Shirot Prakunhungsit	English	69	1984
27.	Report of Paddy Cultivation in the Dry Season, 1984.	Mr. K. Misawa	English	50	1984
28.	Report on Agriculture Development Program for Resettlement of Khao Laen Dam	Mr. K. Misawa	English	14	1982
29.	Summary of Agricultural Statistics of Thailand, Crop year 1981/82.	Mr. K. Misawa	English	41	1984
Source : 1. Center of Agricultural Statistics Office of Agricultural Economics, MOAC. 2. Agricultural Demonstration Centre, Mae Klong P/P, IADP.					
30.	Conclusion of Water Requirement	Mr. K. Misawa	English	15	1984
32.	Farm Management Program for the Wet Season Crop, 1982	Mr. K. Misawa Mr. Shirot Prakunhungsit	English	25	1982
33.	Farm Management Program for Dry Season Crop, 1983.	Mr. K. Misawa Mr. Shirot Prakunhungsit	28	1983	
34.	Farming Program, Wet season, 1983.	Mr. K. Misawa Mr. Shirot Prakunhungsit	English	33	1983
35.	Farming Program Dry Season, 1984.	Mr. K. Misawa Mr. Shirot Prakunhungsit	English	41	1984
36.	Farming Program, Wet Season, 1984.	Mr. K. Misawa	English	32	1984

3. Agricultural Extension					
37. Annual Report on Agricultural Extension Activities 1982, 1983.	Mr. T. Tsutsumi	English	23	1983	
38. Report of Practical Water management on Rice Production at Mae Klong Pilot Project in 1984 Dry Season	Mr. M. Tomitaka Mr. K. Misawa	English	107	1984	
39. Mae Klong Farming News No. 1-11	Mr. M. Tomitaka Mr. Sapachai Kwaelayai	English	66	1984-85	
40. Mr. Extension Effect Research Program Report: Historical change and present situation of rice farming in Mae Klong area.		English	1985		
41. Rice Cultivation Calendar in Mae Klong Area	Mr. M. Tomitaka Mr. Supachai Kwaelayai	Thai	1	1985	
4. Others					
42. Progress Report on water Management Study.	Mr. S. Murao	English	17	1984	
43. Interim Report on Maintenance and Repair of Machine in Mae Klong Pilot Project.	Mr. M. Hatada	English	31	1983	
44. Mae Klong Irrigation Project	RID and JICA	English	15	1983	
45. Irrigated Agriculture Development Mae Klong Pilot Project.	RID and JICA	English, Thai	-	1983	
IV Suphan Experiment and Training Center					
1. Experiment report 1979-1983	T. Sugahara	English	167	1984	
2. Experiment report 1981	V. Sasiprapa	Thai	69	1982	
3. Practical report 1981	T. Sugahara V. Sasiprapa	English Thai	38 51	1982 1982	
4. Works of 1981	T. Sugahara V. Sasiprapa	English Thai	43 73	1982 1982	
5. Works of 1982	T. Sugahara V. Sasiprapa	English Thai	37 57	1983 1983	
6. Works of 1983	V. Sasiprapa	Thai	68	1984	
7. Micro computer programing	T. Sugahara	English	33	1982	
8. Computer training paper	T. Sugahara	English	23	1982	
9. Computer programing and utilizing	P. Duangpiboon	Thai	68	1984	
10. Rat knowledge in Thailand	Translated from "Kwam roo ruang nai pra thed Thai" written by Prajong Sutto				
		English	67	1982	
		English	14	1983	
11. Carbofuran (Furadan) application		English	14	1983	
12. techniques in rice paddy field (D.O.A.) Rice handbook Diseases and its control	(JICA and D.O.A.)	Thai	38	1983	
13. Insect handbook	(JICA and D.O.A.)		46	1983	
14. Vegetable report	written by trainees	Thai	43	1983	

