

Pilot No. 2 (898 Baht to 1,676 Baht and Doncha-em (742 Baht to 1,651 Baht).

The data indicate that the situation of rice farming is greatly influenced by the unit price of the product. Fractuation of the price is the great concern among farmers, and it affects the profit of rice farming other than the yield level or cost of rice cultivation.

## LIVING AND FARMING

### I. Farming Area and Land Use

The farming area and its utilization differ not only from household to household but also from area to area. Table 14 show the average farming area and its utilization of the farmers interviewed. The average farming area is about 25 rai for Pilot No. 1 (ranges 5-55 rai), 36 rai for Thatakor (ranges 14-70 rai), 30 rai for Nongplamor (ranges 7-61 rai), 21 rai for Pilot No. 2 (ranges 4-45 rai), and 39 rai for Doncha-em (ranges 6.25-130 rai). The average farming area of the farmers in Pilot No. 2 is the smallest followed by that of Pilot No. 1.

Every farmer in this study grows rice. The average area of paddy field is about 19 rai for Pilot No. 1 (ranges 5-45 rai), 23 rai for Thatakor (ranges 5-57 rai), 30 rai for Nongplamor (ranges 7-61 rai), 15 rai for Pilot No. 2 (ranges 3-40 rai), and 17 rai for Doncha-em (ranges 3-50 rai). The average rice farming area of Nongplamor is about twice of that of Pilot No. 2.

Almost all of the farming area in Nongplamor is used for rice cultivation, while sugarcane is extensively planted in other study areas. All farmers in Doncha-em have sugarcane fields and the average area is about 22 rai, which is more than the average area of paddy field. About 90 percent of the farmers in Thatakor (17 farmers) have sugarcane fields and the average area is about 12 rai. About 55 percent of the farmers in Pilot No. 2 (23

Table 14 Farming area and its utilization (rai, 1983/84).

	Pilot No. 1 (42)	Thatakor (21)	Nongplamor (21)	Pilot No. 2 (42)	Doncha-em (42)
Total farming area	24.85	36.43	29.62	21.10	39.33
Paddy field					
Total area	19.45	23.29	29.57	15.32	17.30
Planted in wet	19.34	23.00	27.24	14.88	16.64
Planted in dry	15.38 (40)	7.26 (19)	0.00	12.37	11.51 (41)
Sugarcane field					
Total area	8.94 (17)	12.26 (19)	0.00	10.50 (23)	21.98
Harvested in 1983	8.69 (16)	11.33 (18)	0.00	9.27 (23)	22.43 (40)
Other upland and vegetable field					
total area	6.64 (11)	21.50 (2)	1.00 (1)	1.00 (1)	2.00 (1)
Harvested in 1983	3.38 (8)	21.50 (2)	1.00 (1)	1.00 (1)	2.00 (1)

Notes: Figures in brackets are number of farmers reporting.

No brackets indicate the average of all farmers.

farmers) and about 40 percent of the farmers in Pilot No. 1 (17 farmers) also have sugarcane fields, and the average is about 11 rai and 9 rai, respectively.

Percent of the farmers who have upland fields is more in Pilot No. 1 comparing with other 4 areas. In the pilot area, there are 11 farmers who have upland fields and the average area is about 7 rai. However, only 8 farmers harvested upland crops in 1983 and the average area harvested was about 3 rai. Although only 2 farmers have upland fields in Thatakor with the average of about 22 rai, they harvested upland crops from the areas in 1983. There is 1 farmer each in other 3 study areas who have upland of 1 or 2 rai, and the area was fully used in 1983.

## II. Livestock and Poultry

Although crop production is the main agricultural activity in all the areas, some number of farmers raise livestock and poultry. Table 15 shows the average number of heads of respective kind of livestock and poultry, and number of farmers raising them. Cattle in Pilot No. 1 and Thatakor, chickens in Thatakor, Pilot No. 2 and Doncha-em, ducks in Thatakor are more in number of heads and percent of farmers raising.

Table 15 Kind and average number of livestock and poultry.

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-em
Cattle	11.9(22)	11.2(9)	4.3(8)	3.9(12)	6.2(6)
Water buffalo	6.0(4)	7.5(4)	0.0	0.0	0.0
Swine	3.0(4)	2.8(6)	1.2(6)	1.8(17)	3.9(18)
Chicken	14.9(35)	22.8(17)	14.7(17)	20.0(38)	30.0(37)
Duck	9.8(8)	28.9(9)	5.0(3)	2.5(4)	4.2(9)

Note: Figures in brackets are number of farmers reporting.

About 53 percent and 43 percent of the farmers raise cattle with the average of 12 heads and 11 heads in Pilot No. 1 and Thatakor, respectively. More than 80 percent of the farmers in Thatakor, Pilot No. 2 and Doncha-em raise chickens of 20 to 30 heads per farm. About the same percent of farmers raise chickens in other 2 areas with the average of 15 heads. About 43 percent of the farmers in Thatakor raise ducks of 29 heads, while duck raising is not widely practiced in other areas.

Water buffalos, once used for land preparation (and threshing work sometimes), are disappeared in Nongplamor, Pilot No. 2 and Doncha-em. Only 10 percent of the farmers in Pilot No. 1 and 36 percent in Thatakor still keep 6 heads and 8 heads of water buffalos, respectively. Swine is not extensively raised in the study areas, although there are some farmers who raise some number of hogs and pigs.

### III. Type of Land Holding

Table 16 shows the type of land holding. Most of the farmers are either owner farmers or owner-tenant farmers. Proportion of the owner farmers is 45 percent in Pilot No. 1 (19 farmers), 43 percent in Thatakor (9 farmers), 62 percent in Nongplamor (13 farmers), 43 percent in Pilot No. 2 (18 farmers), and 74 percent in Doncha-em (31 farmers). Proportion of the owner-tenant farmers is 50 percent in Pilot No. 1, 52 percent in Thatakor, 19 percent in Nongplamor, 43 percent in Pilot No. 2, and 19 percent in Doncha-em. The rest of the farmers in Pilot No. 1 (2 farmers), Thatakor (1 farmer) and Nongplamor (4 farmers) are full tenants. There are 4 full tenants, 1 each of owner-landlord and owner-landlord-tenant in Pilot No. 2. There are 3 owner-landload farmers but no full tenant in Doncha-em.

Leased in area shares about 5 percent in Doncha-em and 30 percent in other 4 areas. Except Nongplamor where almost all of the farming area is

paddy field, the higher percent of leased in paddy area to the total paddy area is observed in other areas. It is 37 percent for Pilot No. 1 and 44 percent for thatakor, 39 percent for Pilot No. 2, and 9 percent for Doncha-em.

Table 16 Type of land holding (%).

	Full tenant	Partly tenant	Owner farmer	Owner & landlord	Farming area leased in	Paddy area leased in
Pilot No. 1	4.8	50.0	45.2	0.0	29.2	37.1
Thatakor	4.8	52.4	42.9	0.0	30.2	43.5
Nongplamor	19.0	19.0	61.9	0.0	29.6	29.6
Pilot No. 2	9.5	42.9	42.9	4.8 <sup>a</sup>	30.8	38.7
Doncha-em	0.0	19.0	73.8	7.1	4.9	9.1

Note: <sup>a</sup> Include a farmer of owner-landlord-tenant.

Table 17 shows the farming area in different forms of land holding. The average leased in area is about 13 rai for Pilot No. 1 (23 farmers), 19 rai for Thatakor (12 farmers), 23 rai for Nongplamor (8 farmers), 12 rai for Pilot No. 2 (22 farmers), and 10 rai for Doncha-em (8 farmers). The average leased in area of paddy field and number of farming having leased in paddy fields are quite similar to that of the whole farming area. Except Nongplamor, however, the average of own paddy area is quite different from the average of whole own farming area. The data confirm that the paddy field is more subject to land rent than upland fields (including sugarcane).

#### IV. Situations of Land Rent

##### 1. Paddy Field

There are 24 farmers in Pilot No. 1, 11 in Thatakor, 8 in Nongplamor, 20 in Pilot No. 2, and 6 in Doncha-em who have leased in paddy fields, and 1 farmer in Pilot No. 2 and 2 farmers in Doncha-em who have leased out paddy

Table 17 Farming area in different land holding (rai/household).

	Pilot No. 1(42)	Thatakor(21)	Nongplamor(21)	Pilot No. 2(42)	Doncha-em(42)
<b>Farming area</b>					
Total	24.85	36.43	29.62	21.10	39.33
Own	18.49(40)	26.70(20)	25.76(17)	15.72(39)	37.41
Leased in	13.23(23)	19.25(12)	23.00(8)	12.41(22)	10.06(8)
Leased out	0.0	0.0	0.0	11.00(2)	9.33(3)
<b>Paddy field</b>					
Total	19.45	23.29	29.57	15.32	17.30
Own	14.69(35)	15.33(18)	25.71(17)	11.27(35)	16.10(41)
Leased in	13.16(23)	19.36(11)	23.00(8)	11.86(21)	11.09(6)
Leased out	0.0	0.0	0.0	0.0	12.00(2)

Notes: Figures in brackets are number of farmers reporting.

No brackets indicate the average of all farmers.

Table 18 Land rent fee of paddy field.

	Most widely adopted	Other cases
Pilot No. 1	250 kg/rai/year (19): Mostly	150 kg/rai/year (1), 100 kg/rai/season (1),
	150 kg in wet and 100 kg in dry	280 kg/rai/year (1), 2,500 kg/18 rai/year (1),
		1/3 of products in wet and 100 kg/rai in dry (1)
Thatakor	250 kg/rai/year (6): Mostly	190 kg/rai/year (1), 220 kg/rai/year (1), 230 kg/rai/year (1)
	150 kg in wet and 100 kg in dry	150 kg/rai/season (1), 1/4 of products (1)
Nongplamor	100 kg/rai/wet season (4)	90 kg/rai/wet season (1), 130 kg/rai/wet season (1),
		150 kg/rai/wet season (1), 170 kg/rai/wet season (1)
Pilot No. 2	220 kg/rai/year (7): Mostly	200 kg/rai/year (4), 240 kg/rai/year (2), 250 kg/rai/year (1)
	150 kg in wet and 70 kg in dry	150 kg/rai/year (1), 190 kg/rai/year (1), 130 kg/rai/season (1),
		100 kg/rai in wet and free in dry (1), 150 kg/rai in wet and free in dry (1), 500 Baht/rai/year (1), 600 Baht/rai/year (1)
Doncha-em	150 kg/rai/year (4): Mostly	190 kg/rai/year (1), 200 kg/rai/year (1), 100 kg/rai in wet season
	100 kg in wet and 50 kg in dry	and not leased out in dry season (1), 400 Baht/rai/year (1)

Notes: Figures in brackets are number of farmers reporting.

Kg indicates kg of rice.

fields. Situations of the land rent are quite different not only among the study areas but also among the farmers within the certain area.

Table 18 shows the land rent fee of paddy field. The most extensively adopted practice is 250 kg of rice per rai per year in Pilot No. 1 and Thatakor, where they usually pay 150 kg for wet and 100 kg for dry season rice. It is 100 kg of rice per rai for wet season in Nongplamor where only wet season rice is planted at present. It is 220 kg of rice per rai per year in Pilot No. 2, and the farmers usually pay 150 kg for wet and 70 kg for dry season. It is 150 kg in Doncha-em, and they usually pay 100 kg for wet and 50 kg for dry season. As it is shown in the table, however, there are different land rent fees higher or lower than the most widely adopted fee in the respective area.

Contract period of land rent is shown in Table 19. Many farmers do not have contract periods in all the areas. Some farmers have contract periods of every crop season, every year, every 2 years and every 3 years. There is one each farmer who has 7 years and 10 years of land rent, respectively.

Table 19 Contract period of land rent of paddy field.

	Not fixed	Every				Others
		Season	Year	2 years	3 years	
Pilot No. 1	18	1	2	2	1	0
Thatakor	8	0	2	0	1	0
Nongplamor	7	0	1	0	0	0
Pilot No. 2	7	3	5	0	4	2 <sup>a</sup>
Doncha-em	5	1	2	0	0	0

Note: <sup>a</sup> Contract periods of 7 years and 10 years.

Table 20 shows the land rent period of currently using paddy field. It ranges from less than a year to more than 16 years. Farmers in Thatakor



have rather long period of land rent comparing to those in other areas. Some farmers in Pilot No. 1, Nongplamor, Pilot No. 2, and Doncha-em have used their leased in paddy fields less than 3 years.

Table 20 Land rent period of presently using paddy field.

	0-1	2-3	4-5	6-10	11-15	16-
Pilot No. 1	2	4	5	5	5	3
Thatakor	0	0	2	1	1	7
Nongplamor	3	2	0	3	0	0
Pilot No. 2	2	4	0(1)	7	5	3
Doncha-em	1(1)	1	2(1)	0	0	2

Note: Figures in brackets are number of farmers leasing out paddy fields.

As it is shown in Table 21, most farmers pay the land rent fee by fixed amount of rice. Only a few farmers pay the fee in cash in Pilot No. 2 and Doncha-em. There are 2 farmers in Pilot No. 2 that they only pay the land rent fee for wet season and free for dry season. All farmers pay the fee after harvesting rice except a farmer in Doncha-em, who pay the fee in April.

Table 22 shows the position of lessor of paddy field. They are either relatives, neighboring farmers, marchants or other private personals. About one half of the tenants in Nongplamor and Pilot No. 2 have leased in the paddy fields from their relatives, while the neighboring farmers are the main owners of leased in paddy fields in Doncha-em. Marchants and other private personals are the main in Pilot No. 1 and Thatakor.

Address of the lessor of paddy field is in Table 23. Most of the lessors (including 3 lessees) stay within the village (Tambon) or in the district (Amphoe). However, there are some lessors who stay outside of the respective district.

Table 21 Means and time of payment of land rent fee of paddy field.

	Means of payment				Pay after the harvest
	Fixed		Shared	Others	
	Cash	Product	Product		
Pilot No. 1	0	23	0	1 <sup>a</sup>	24
Thatakor	0	10	1	0	11
Nongplamor	0	8	0	0	8
Pilot No. 2	2	16(1)	0	2 <sup>b</sup>	21
Doncha-em	1	5(2)	0	0	7 <sup>c</sup>

Notes: Figures in brankets are number of farmers leasing out paddy fields.

<sup>a</sup> Shared product in wet and fixed product in dry season.

<sup>b</sup> Fixed product in wet and free in dry season.

<sup>c</sup> One farmer pay the fee in April.

Table 22 Position of lessor of paddy field.

	Relative	Neighbor farmer	Merchant	Other private personals
Pilot No. 1	3	1	5	15
Thatakor	2	2	0	7
Nongplamor	4	1	1	2
Pilot No. 2	9(1)	4	1	7
Doncha-em	1	4(1)	0	1(1)

Note: Figures in brankets are number of lessees.

Table 23 Address of lessor of paddy field.

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-em
Within village	7	1	4	6(1)	4(2)
Within district	14	8	2	11	1
Out of district	3	2	2	4	1

Note: Figures in brankets are number of lessees.

## 2. Sugarcane Field

There are 4 farmers each in Thatakor, Pilot No. 2 and Doncha-em, who have leased in sugarcane fields (include leased out of 1 in Pilot No. 2 and 2 in Doncha-em). Table 24 shows the situations of land rent of sugarcane field.

Table 24 Land rent conditions of sugarcane field.

	Thatakor	Pilot No. 2 <sup>a</sup>	Doncha-em <sup>b</sup>
Land rent fee (Baht/rai)	333-450(4)	200-400(4)	200-500(4)
Contract period	Not fixed(4)	Every crop(3)	Every 3 year(3)
Since which year	'59,64,81(2)	'59,79,80,82	'59,80,81,82
Pay by fixed cash	(2) <sup>c</sup>	(4)	(4)
Pay after harvest	(4)	(4)	(2) <sup>d</sup>
Leased in from relative	(2)	(3)	(3)
Address of lessee	District(4)	Village(2) <sup>e</sup>	Village(2) <sup>e</sup>

Notes: Figures in brackets are number of farmers reporting.

<sup>a</sup> Include a leased out field, <sup>b</sup> include 2 leased out field, respectively.

<sup>c</sup> Two farmers pay by the fixed amount of rice (120 kg/rai).

<sup>d</sup> One farmer pays in April, and the other pay once for 6 years.

<sup>e</sup> Two farmers each stay outside the district.

The land rent fee ranges from 200 Baht to 500 Baht per rai per year. Some farmers have cultivated their leased in fields recently (less than 3 years), while some other farmers have used quite a long time (more than 20 years). The land rent fee is usually paid by fixed amount of cash except 2 farmers in Thatakor, where they pay by fixed amount of rice. Relatives are main owners of the lands, and out of 12 lessors (including 3 lessees) 8 stay within the respective district.

There is one farmer in Pilot No. 2 who have leased in upland field of 1 rai. The lessor and conditions of the upland are same as his leased in sugarcane field.

## v. Household

### 1. Size and Labour Force

Information on family and household is given in Table 25. Average size of household is smaller for Nongplamor (4.48 persons) comparing with other areas (ranges 6.00-6.67 persons). Difference between the figures of family size and household size is due to the number of students and other family members staying out of home.

Table 25 Household size and its labour force.

	Size of		Household members work on		Lavour force value for own farm <sup>a</sup>	Pupil or students of family
	Family	Household	Own farm	Off farm		
Pilot No. 1	6.64	6.29	3.43	1.79(14)	3.16	1.65(31)
Thatakor	6.29	6.10	4.14	0.00	4.01	2.21(14)
Nongplamor	4.67	4.48	3.33	1.50(4)	3.09	1.88(15)
Pilot No. 2	7.00	6.17	3.55	1.60(15)	3.34	2.34(29)
Doncha-em	6.90	6.67	4.33	1.00(5)	4.18	1.73(26)

Notes: Figures in brankets are number of farmers reporting.

<sup>a</sup> Based on 1 point for 16-60 years old and 0.8 point for 10-15 and 61-65 years old as long as the person work in farming.

Although all of the households have their own members working on the own farm, the average number of persons working on the own farm differ from the area to area. It is lesser for Nongplamor (3.33); Pilot No. 1 (3.43), and Pilot No. 2 (3.55), but more for Thatakor (4.14) and Doncha-em (4.33). Labour force value in this report is based on that the ages between 16 to 60 are counted 1, while the ages between 10 to 15 and 61 to 65 are counted 0.8 as land as they work in the farm. The labour force value of the respective area is similar to that of number of persons working on the own farm, and

ranges from 3.09 for Nongplamor to 4.18 for Doncha-em.

Some of the households have their members working out of the own farm. Number of households and their average number of persons working out of the own farm are more for Pilot No. 1 where 14 households (33 %) have the average of 1.79 persons working out of the own farm, and for Pilot No. 2 where 15 households (36 %) have the average of 1.60 persons working out of the own farm. There is no household of its member working out of the own farm in Thatakor, and less number of households have their members working out of the own farm in Nongplamor (19 %) and Doncha-em (12 %).

More than 60 percent of the households have children learning at school. Number of children learning at school ranges from 1.64 for Pilot No. 1 (average of 31 families) to 2.34 for Pilot No. 2 (average of 29 families).

## 2. Household Head

As it is shown in Table 26, the average age of household head ranges from 51 for Thatakor to 56 for Nongplamor. More than 90 percent of the household heads are male in Nongplamor, Pilot No. 2 and Doncha-em. It is 81 percent in Pilot No. 1, and 71 percent in Thatakor. The main reason of less male heads in the 2 areas is apparently due to no suitable age of male in the household.

Table 26 Household head.

	Age	% of male	Educational background				
			Primary school		Secondary school		None
			Incomplete	Graduate	Incomplete	Graduate	
Pilot No. 1	51.9	81.0	21.4	71.4	0.0	0.0	7.1
Thatakor	51.0	71.4	28.6	57.1	0.0	0.0	14.3
Nongplamor	56.1	95.2	19.0	76.2	0.0	4.8	0.0
Pilot No. 2	54.1	92.9	23.8	66.7	0.0	2.4	7.1
Doncha-em	53.2	92.9	19.0	61.9	0.0	7.1	11.9

Most of the family heads have experiences of primary education, and about 57 percent (Thatakor) to 76 percent (Nongplamor) have graduated the elementary school. Limited number of farmers have graduated high school in Nongplamor, Pilot No. 2 and Doncha-em, but not at all in Pilot No. 1 and Thatakor. About 14 percent of the farmers in Thatakor, 12 percent in Doncha-em and 7 percent in Pilot No. 1 and No. 2 have not received any public education, but all of the farmers received at least incomplete primary education in Nongplamor.

Table 27 shows the major and minor occupations of household head. Major work, or more than 90 percent, of the household heads is self-farming in all the areas. There are some limited number of household heads who are not working due to their old age. One household head in Doncha-em works out of the own farm, then the self-farming is his minor work (included in others).

Some household heads have minor works. In addition to farm labours and operators of own machines, they also work as off-farm employees such as carpenters, construction labours, drivers, and others. About one half of the household heads in Nongplamor work in bamboo craft at their houses.

## VI. Living Conditions

### 1. Period of Stay

Table 28 show the period of the family staying at present village. Most of the families in Nongplamor have stayed there more than one generation (81 %). It is about one half of them who have stayed more than 30 years in Pilot No. 1 and Thatakor. On the other hand, only quite less number of families moved to the present village recently, except Pilot No. 1 where 10 percent of them (4 families) moved to the area in the last 10 years.

### 2. Source of Living Water

As it is shown in Table 29, main source of living water is well in

Table 27 Occupation of household head.

	Pilot No. 1	Thatakori	Nongplamor	Pilot No. 2	Doncha-em
<b>Major works</b>					
Self-farming	92.9(39)	95.2(20)	95.2(20)	95.2(40)	92.9(39)
Not working	7.1(3)	4.8(1)	4.8(1)	2.4(1)	7.1(3)
Other works	0.0	0.0	0.0	2.4(1) <sup>a</sup>	0.0
<b>Minor works</b>					
Farm labour	(3)	-	(1)	(1)	(2)
Operator of own machine	(1)	(4)	(3)	(2)	(1)
Bamboo craft	-	-	(10)	-	-
Carpenter	(2)	(1)	-	(1)	-
Construction labour	-	-	-	(3)	(1)
Driver	(1)	-	(1)	(1)	-
Commerce	(1)	-	-	-	(1)
Others	(2)	-	(1)	(3)	-

Notes: Figures in brackets are number of farmers reporting.

<sup>a</sup> Work at district office.

all the areas. The deep tube well is extensively used especially in Doncha-em (95 %) and Nongplamor (91 %). In addition to the deep tube well, shallow well is also a common source of living water in Pilot No. 1 (50 % and 41 %, respectively).

Table 28 Period of staying at present village (years).

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-em
0-10	9.5	4.8	4.8	4.8	2.4
11-30	38.1	47.6	14.3	33.3	26.2
31-	52.4	47.6	81.0	61.9	71.4

Table 29 Source of living water (%).

	Water pipe	Deep tube well	Shallow well	Stream /canal	Others
Pilot No. 1	4.8	50.0	40.5	0.0	4.8 <sup>a</sup>
Thatakor	0.0	61.9	23.8	14.3	0.0
Nongplamor	0.0	90.5	9.5	0.0	0.0
Pilot No. 2	2.4	73.8	21.4	2.4	0.0
Doncha-em	0.0	95.2	4.8	0.0	0.0

Note: <sup>a</sup> Rain (1 household) and pond (1 household).

Other sources of living water are not widely used. Some 14 percent of the households in Thatakor use stream or canal as the sources. Limited number of households in Pilot No. 1 and Pilot No. 2 use water pipe, one in Pilot No. 2 uses canal (or stream), one each in Pilot No. 1 uses rain and pond as the source of living water.

### 3. Electricity

Fig. 9 shows the year of having electricity. Although some farmers in Pilot No. 2 have used electricity since 1972, it is rather recently that



all the areas. The deep tube well is extensively used especially in Doncha-em (95 %) and Nongplamor (91 %). In addition to the deep tube well, shallow well is also a common source of living water in Pilot No. 1 (50 % and 41 %, respectively).

Table 28 Period of staying at present village (years).

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-em
0-10	9.5	4.8	4.8	4.8	2.4
11-30	38.1	47.6	14.3	33.3	26.2
31-	52.4	47.6	81.0	61.9	71.4

Table 29 Source of living water (%).

	Water pipe	Deep tube well	Shallow well	Stream /canal	Others
Pilot No. 1	4.8	50.0	40.5	0.0	4.8 <sup>a</sup>
Thatakor	0.0	61.9	23.8	14.3	0.0
Nongplamor	0.0	90.5	9.5	0.0	0.0
Pilot No. 2	2.4	73.8	21.4	2.4	0.0
Doncha-em	0.0	95.2	4.8	0.0	0.0

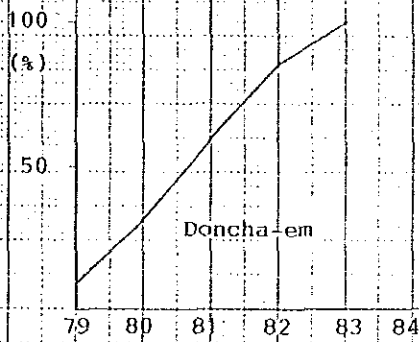
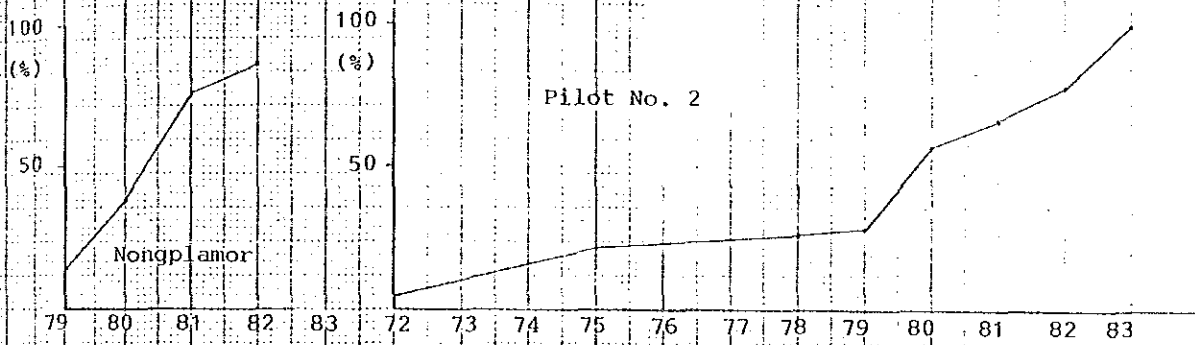
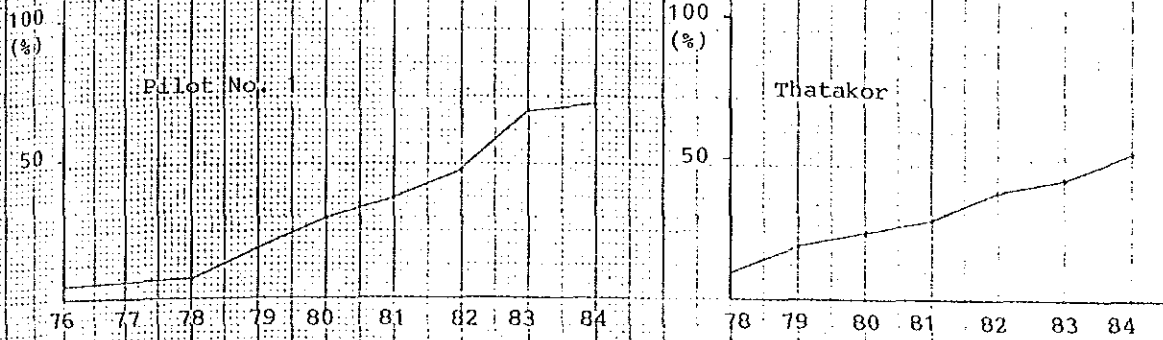
Note: <sup>a</sup> Rain (1 household) and pond (1 household).

Other sources of living water are not widely used. Some 14 percent of the households in Thatakor use stream or canal as the sources. Limited number of households in Pilot No. 1 and Pilot No. 2 use water pipe, one in Pilot No. 2 uses canal (or stream), one each in Pilot No. 1 uses rain and pond as the source of living water.

### 3. Electricity

Fig. 9 shows the year of having electricity. Although some farmers in Pilot No. 2 have used electricity since 1972, it is rather recently that

Fig. 9. First year of having electricity.



many farmers in the study areas had electricity. In other areas, some farmers in Pilot No. 1 have used electricity since 1976, in Thatakor since 1978, and in Nongplamor and Doncha-em since 1979.

At present, all the farmers in Pilot No. 2 and Doncha-em have electrics. It is about one half of them in Thatakor, 69 percent in Pilot No. 1, and 86 percent in Nongplamor. No farmer has telephone at present.

#### 4. Consumer Durables

Consumer durable is one of the indirect methods of knowing the living situation. In this study, 13 items of consumer durables are questions to the farmers, whether they have or not, and if have, how many units respectively. Certain point is given to the respective durable (1-8 points depending on the item). The point is based on price, popularity and feeling of Thai people (after talking some staff at Agricultural Demonstration Center). Table 30 shows the percent of farmers who have the respective consumer durable, average point of the consumer durables holding, and percent of farmers classified into 4 groups of the total points.

Bicycle, radio and motorcycle are most popular 3 items of consumer durables held by the farmers. More than one half to all of them have each of the 3 items in all the study areas. Rice cooker is also widely held by the farmers, followed by electric fan.

In total, farmers in Doncha-em hold more consumer durables than those in other areas especially in cases of rather expensive items. More percent of farmers in Doncha-em have the consumer durables of radio-tape recorder (50 %), black and white TV set (64 %), gas cooking table (38 %), refrigerator (19 %), color TV set (24 %), and pick up truck (38 %) than other areas.

As the result, the average point of consumer durables held is highest for Doncha-em (20.0). Farmers in Pilot No. 2 have the second point (14.2), followed by Thatakor (12.1), Nongplamor (11.0), and Pilot No. 1 (10.6).

Table 30 Percent of farmers who have following consumer durables.

	Pilot No.1	Thatakor	Nongplamor	Pilot No.2	Doncha-em
Bicycle(1)	92.9	85.7	100.0	100.0	66.7
Radio(1)	85.7	76.2	100.0	83.3	83.3
Electric fan(1)	42.5	38.1	57.1	83.3	83.3
Radio-tape recorder(2) <sup>a</sup>	21.4	14.3	28.6	42.9	50.0
Black and white TV(2)	35.7	28.6	19.0	61.9	64.3
Sewing machine(2)	28.6	28.6	19.0	54.8	47.6
Rice cooker(2)	59.5	47.6	66.7	88.1	88.1
Motorcycle(3)	69.0	71.4	57.1	73.8	85.7
Generator(3)	7.1	14.3	4.8	9.5	7.1
Gas table(3)	19.0	23.8	19.0	33.3	38.1
Refrigerator(4)	9.5	4.8	9.5	7.1	19.0
Color TV set(5)	11.9	23.8	19.0	16.7	23.8
Pick-up truck(8)	2.4	23.8	14.3	2.4	38.1
Average point <sup>b</sup>	10.6	12.1	11.0	14.2	20.0
0-4 <sup>c</sup>	19.0	20.0	28.6	7.1	4.8
5-8 <sup>c</sup>	38.1	20.0	28.6	11.9	7.1
9-12 <sup>c</sup>	14.3	15.0	4.8	14.3	14.3
13 and above <sup>c</sup>	28.6	45.0	38.1	66.7	73.8

Notes: Figures in brackets are points given to the consumer durables.

<sup>a</sup> Including stereo set.

<sup>b</sup> Based on the given points of consumer durables.

<sup>c</sup> Percent of farmers classified into respective range of total points.

Percent of the farmers who have 13 points or above of the consumer durables follows the order of the average point. It is 74 percent for Doncha-em, 67 percent for Pilot No. 2, 45 percent for Thatakor, 38 percent for Nongplamor, and 28 percent for Pilot No. 1. On the other hand, those who have less than 8 points of the consumer durables are 57 percent of the farmers in Pilot No. 1 and Nongplamor, 40 percent in Thatakor, 19 percent in Pilot No. 2, and 12 percent in Doncha-em.

## VII. Farm Machinery

### 1. Own Farm Machines

Table 31 shows the percent of farmers who have different kinds of farm machines. No farmer has tractor in Pilot No. 1, Thatakor and Nongplamor. One farmer in Pilot No. 2 and 7 farmers in Doncha-em have tractors. Percent of the farmers who have power tillers is 43 for Nongplamor, 50 for Pilot No. 1 and Pilot No. 2, 52 for Doncha-em, and 57 for Thatakor. Including those who have tractors, farmers who have machines for land preparation raise to 52 percent for Pilot No. 2 and 69 percent for Doncha-em.

About 71 percent of the farmers in Doncha-em and 62 percent in Nongplamor, and more or less 30 percent in other areas have pumps. Farmers who have sprayer are one half in Doncha-em, one fourth in Pilot No. 1, Thatakor and Pilot No. 2, and one tenth in Nongplamor. Only limited number of farmers in Pilot No. 2 (2.4 % or 1 farmer) and Doncha-em (9.5 % or 4 farmers) have threshing machines.

There are only one tenth of farmers who do not have any farm machines in Doncha-em. It raises to 24 percent for Thatakor, 28 percent for Pilot No. 1 and Nongplamor, and 31 percent for Pilot No. 2.

Capital value of farm machines and their annual repair and maintenance cost ranges widely. In this report, the capital value of farm machine means

Table 31 Percent of farmers who have following farm machines, their capital values and maintenance cost.

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-en
Tractor	0.0	0.0	0.0	2.4	16.7
Pick-up truck	2.4	23.8	14.3	2.4	38.1
Power tiller	50.0	57.1	42.9	50.0	52.4
Pump	31.0	33.3	61.9	28.6	71.4
Sprayer	26.2	28.6	9.5	23.8	54.8
Thresher	0.0	0.0	0.0	2.4	9.5
None	28.6	23.8	28.6	31.0	9.5
Capital value (Baht/farm) <sup>a</sup>	18,304.3 (30)	33,600.0 (16)	32,970.0 (15)	28,894.0 (29)	80,422.4 (38)
Maintenance cost (Baht/year)	950.0 (17)	2,604.2 (12)	4,395.5 (11)	1,429.0 (26)	8,315.8 (37)

Notes: Figures in brackets are number of farmers reporting.

<sup>a</sup> At the time of purchase.

the value at the time of purchase. There are 30 farmers who have farm machines in Pilot No. 1, and their average value is 18,304 Baht. Only 17 farmers have reported the annual maintenance cost in the area, and the average cost is 950 Baht. Farmers in Thatakor (16), Nongplamor (15), and Pilot No. 2 (29) have more or less 30,000 Baht of farm machines. However, the repair and maintenance cost ranges widely as 1,429 Baht for Pilot No. 2 (26 farmers), 2,604 Baht for Thatakor (12 farmers), and 4,396 Baht for Nongplamor (11 farmers). Farmers in Doncha-em have more own machines in any kinds, and their average value is 80,422 Baht (38 farmers), which is about 4.5 times higher than that of Pilot No. 1. The average repair and maintenance cost is 8,316 Baht (37 farmers), which is nearly 9 times of that of Pilot No.1.

## 2. Contract Farm Machines

Several kinds of farming works are done in contract in all the areas, and some of them require the help of machines. Those who do not have own farm machines usually request the contract works of land preparation (both lowland and upland) and threshing of rice. The conditions of contract works in rice cultivation will be discussed later. The condition of land preparation for sugarcane or other upland crops ranges widely, and it is about 350 Baht to 450 Baht per rai in most cases or lower than 350 Baht per rai in some cases.

Owners of farm machines, such as power tillers, tractors and threshers, for contract works are given in Table 32. Although relatives and neighboring farmers are main owners to whom farmers requesting the contract works of land preparation of paddy fields in all the areas, rice-mill owners are also one of the main contractors of not only land preparation but also threshing in Pilot No. 1. The main contractors of land preparations of sugarcane and other upland crop fields (usually using tractors) are others, which include quotamen for sugarcane fields. Besides those of rice-mill owners, middlemen

Table 32 Owners of farm machines to whom farmers request contract work.

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-em
Power tillers/Tractors					
Relative	8 -	5 -	5 -	10 (2)	3 (3)
Neighboring farmer	4 (3)	4 (2)	5 -	5 (2)	6 (3)
Friend	3 (3)	- (1)	- -	1 (1)	4 (3)
Land owner	1 -	- -	- -	- -	- -
Rice-mill owner	5 (1)	- (2)	- -	- -	- -
Others <sup>a</sup>	1 (9)	- (7)	2 -	2 (16)	- (8)
Thresher					
Relative	2	1	5	9	4
Neighboring farmer	8	5	5	19	28
Friend	1	2	2	8	4
Rice-mill owner	15	-	-	-	-
Others <sup>b</sup>	16	13	9	5	2

Notes: Figures in brackets are number of farmers request tractors for contract work.

<sup>a</sup> Include quotaman of sugarcane, villege chief, and middle man.

<sup>b</sup> Include middleman.



also extensively do contract work of threshing in Pilot No. 1. Middlemen are the main contractors of threshing in Thatakor and Nongplamor, while neighboring farmers keep the main position of contracted threshing work in Doncha-em and Pilot No. 2.

#### VIII. Labour Exchange

Labour exchange or sharing of the household labours among farm households, so called Ao-raeng or Long-khaek, is widely practiced in all the study areas. Table 33 presents information on labour exchange. More than 90 percent of the farmers in Pilot No. 1 and Thatakor exchange their household labours with neighboring farmers. It is lesser in other areas of Nongplamor (86 %), Pilot No. 2 (69 %), and Doncha-em (60 %).

Table 33 Labour exchange.

	Percent of households practice labour exchange	Exchange with number of	
		Households	Man-day per year
Pilot No. 1	92.9	19.1	84.1(30)
Thatakor	90.5	13.7	79.0(19)
Nongplamor	85.7	21.9	60.3(18)
Pilot No. 2	69.0	13.9	68.8(29)
Doncha-em	59.5	8.4	74.1(25)

Note: Figures in brackets are number of farmers reporting.

Among the farmers who exchange the household labours, the average number of farm households to which exchange the labours ranges from 8 for Doncha-em to 22 for Nongplamor. On the other hand, the accumulated number of household members working as labour exchange are from 60 man-days per year for Nongplamor to 84 man-days per year for Pilot No. 1.

Transplanting (sometimes including uprooting of seedlings) and

harvesting (sometimes including bundling and hauling) are main works they exchange the household labours to meet with the peak labour requirement in rice cultivation. There are some farmers who exchange the family labours for land preparation (2 farmers in Pilot No. 1), direct sowing (2 farmers in Pilot No. 1), and sugarcane cutting (2 farmers in Pilot No. 1 and 1 farmer each in Thatakor and Pilot No. 2) in addition to the transplanting and/or harvesting.

#### IX. Income from Farming

##### 1. Cost and Return of Rice Cultivation

Table 34 shows the cost and return of 1983 wet season rice. Total cost of rice farming per farm (excluding the costs of family labours and exchanged labours) was lowest in Pilot No. 2 (8,696 Baht), and highest in Nongplamor (11,938 Baht). The average gross income per farm ranges from 24,953 Baht for Doncha-em to 42,029 Baht for Nongplamor. The net income per farm was lowest for Doncha-em (15,699 Baht), and highest for Nongplamor (30,092 Baht). The net income per rai was lowest for Doncha-em (943 Baht), followed by Pilot No. 1 (984 Baht), Thatakor and Nongplamor (1,105 Baht each), and Pilot No. 2 (1,447 Baht). The net income per rai excluding land rent and water fees shows the similar trend to that of the net income per rai, and ranged from 980 Baht for Doncha-em to 1,591 Baht for Pilot No. 2. Rather low net income of Doncha-em was partly due to the higher cost of repair and maintenance fees of farm machines. Rather high unit price of rice also partly contributed to the better net income of Nongplamor comparing with the yield level (Table 12).

Table 35 shows the cost and return of 1984 dry season rice. The total cost per farm was lowest for Thatakor (3,676 Baht), and highest for Pilot No. 1 (8,222 Baht). The average gross income per farm ranged from 15,757 Baht for Thatakor to 27,815 Baht for Pilot No. 1. The net income per farm was lowest for Thatakor (12,081 Baht), and highest for Pilot No. 2 (19,727 Baht).

Table 34 Cost and return of rice cultivation in 1983 wet season (Baht).

	Pilot No. 1(42)	Thatakor(21)	Nongplamor(21)	Pilot No. 2(42)	Doncha-em(42)
Land rent	5,849.0(22)	8,445.3(11)	9,077.1(7)	4,764.5(21)	3,728.3(6)
Hired labour	2,212.5(22)	480.7(15)	2,853.1(16)	1,180.6(27)	2,978.7(26)
Machine rental	2,674.6(42)	2,355.4(21)	3,398.0(20)	1,783.8(42)	1,819.1(38)
Fuel and lubricant	932.8(26)	1,193.1(13)	1,067.9(14)	743.6(25)	1,080.4(27)
Repair & maintenance	592.9(7)	1,038.9(9)	450.0(8)	1,244.8(17)	4,826.3(19)
Seed	676.8(42)	800.8(21)	589.3(21)	569.0(42)	641.9(42)
Fertilizer	1,541.8(38)	898.2(11)	1,956.8(20)	1,818.7(41)	2,082.9(29)
Chemical	422.5(38)	293.7(11)	267.9(13)	259.9(27)	324.2(28)
Water	584.1(41)	0.0	0.0	289.4(42)	302.5(8)
Total cost	10,597.8	9,731.4	11,937.8	8,695.5	9,254.1
Gross income	29,630.4	35,137.4	42,029.4	30,230.5	24,952.7
Net income <sup>1</sup>	19,032.6	25,406.0	30,091.6	21,535.0	15,698.6
Net income <sup>2</sup>	984.1	1,104.6	1,104.7	1,447.2	943.4
Net income <sup>3</sup>	1,172.0	1,200.8	1,236.3	1,591.0	979.7

Notes: Figures in brackets are number of farmers reporting.

<sup>1</sup> Net income per farm, <sup>2</sup> Net income per rai, <sup>3</sup> Net income per rai excluding land rent and water fees.

Table 35 Cost and return of rice cultivation in 1984 dry season (Baht).

	Pilot No. 1 (40)	Thatsakor (19)	Nongplamor (0)	Pilot No. 2 (42)	Doncha-em (41)
Land rent	3,187.5 (20)	1,965.0 (6)	-	2,430.3 (18)	1,697.0 (5)
Hired labour	1,115.5 (20)	371.4 (7)	-	781.5 (23)	1,933.6 (22)
Machine rental	2,404.2 (40)	882.0 (19)	-	1,690.1 (42)	1,538.7 (38)
Fuel and lubricant	730.3 (22)	401.0 (12)	-	536.7 (25)	718.0 (27)
Repair & maintenance	0.0	725.0 (4)	-	748.0 (10)	1,853.5 (14)
Seed	673.2 (40)	282.2 (19)	-	565.5 (42)	493.5 (41)
Fertilizer	1,747.8 (40)	1,093.2 (19)	-	1,690.5 (42)	1,683.7 (41)
Chemical	363.4 (37)	346.4 (14)	-	300.2 (30)	355.0 (21)
Water	508.6 (40)	0.0	-	246.7 (42)	225.7 (7)
Total cost	8,222.1	3,675.9	-	6,374.4	6,173.9
Gross income	27,814.6	15,756.8	-	26,101.7	25,041.7
Net income <sup>1</sup>	19,592.5	12,080.9	-	19,727.3	18,867.8
Net income <sup>2</sup>	1,273.9	1,664.0	-	1,594.8	1,639.3
Net income <sup>3</sup>	1,410.6	1,749.5	-	1,698.9	1,660.6

Notes: Figures in brackets are number of farmers reporting.

<sup>1</sup> Net income per farm, <sup>2</sup> Net income per rai, <sup>3</sup> Net income per rai excluding land rent and water fees.

However, the net income per rai was highest for Thatakor (1,664 Baht), followed by Doncha-em (1,639 Baht), Pilot No. 2 (1,595 Baht), and Pilot No. 1 (1,274 Baht). The net income per rai excluding land rent and water fees was 1,750 Baht for Thatakor, 1,699 Baht for Pilot No. 2, 1,661 Baht for Doncha-em, and 1,411 Baht for Pilot No. 1.

## 2. Other Farm Incomes

Although all the farmers in this study grow rice, many of them grow sugarcane except those in Nongplamor. Table 36 shows the income from farming except that of rice. There were 16 farmers in Pilot No. 1, 18 in Thatakor, 23 in Pilot No. 2, and 40 in Doncha-em, who harvested sugarcane in 1983. The average harvested area was 8.69 rai, 11.33 rai, 9.27 rai, and 22.43 rai in the order above mentioned. Net income from the sugarcane growing was highest for Doncha-em (56,481 Baht/farm), followed by Pilot No. 2 (21,539 Baht), Thatakor (16,522 Baht), and Pilot No. 1 (11,755 Baht).

There were 8 farmers in Pilot No. 1 (3.38 rai/farm), 2 farmers in Thatakor (21.50 rai/farm), and 1 farmer each in Nongplamor, Pilot No. 2 and Doncha-em (1 rai, 1 rai and 2 rai, respectively), who harvested other upland crops in 1983. Kinds of upland crops harvested were chili (4 farmers in Pilot No. 1, and 1 farmer each in Thatakor and Pilot No. 2), corn (3 farmers in Pilot No. 1 and 1 farmer in Thatakor), ipil-ipil (1 farmer in Pilot No. 1), cucumber (1 farmer in Nongplamor), and taro (1 farmer in Doncha-em). The average net income from other upland crop production ranged from 510 Baht per farm for Pilot No. 1 to 11,590 Baht per farm for Doncha-em.

Number of farmers who sold their livestock and/or poultry were 10 each in Pilot No. 1 and No. 2, and 5 each in Thatakor, Nongplamor and Doncha-em in 1983. Net income from the selling of livestock and poultry was higher for Pilot No. 1 (16,433 Baht/farm), followed by Thatakor (12,100 Baht), Nongplamor (6,750 Baht), Doncha-em (4,364 Baht), and Pilot No. 2 (2,193 Baht).

Table 36 Net income of farm except rice cultivation (Baht/farm)

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-em
Sugarcane	(16)	(18)	(0)	(23)	(40)
Harvesting area (rai)	8.69	11.33	-	9.27	22.43
Gross income	20,327.5	32,448.9	-	32,778.3	93,234.7
Total cost <sup>a</sup>	8,572.8	15,926.7	-	11,239.2	36,753.6
Net income	11,754.7	16,522.2	-	21,539.1	56,481.1
Other upland crops	(8)	(2)	(1)	(1)	(1)
Harvested area (rai)	3.38	21.50	1.00	1.00	2.00
Gross income	4,187.5	16,750.0	5,000.0	1,000.0	18,000.0
Total cost <sup>a</sup>	1,115.0	6,550.0	815.0	490.0	6,410.0
Net income	3,072.5	10,200.0	4,185.0	510.0	11,590.0
Livestock and poultry	(10)	(5)	(5)	(10)	(5)
Net income	16,433.0	12,100.0	6,750.0	2,193.0	4,364.0
Farm income except rice	(28)	(19)	(6)	(26)	(40)
Net income	13,463.8	19,910.5	6,322.5	19,916.8	57,316.4

Notes: Figures in brackets are number of farmers reporting.

<sup>a</sup> Total cost includes land rent fee, machine rent fee, fuel and lubricant cost, machine repair cost, fertilizer cost, chemical cost, hired labour cost, and other costs.

There were 28 farmers in Pilot No. 1, 19 in Thatakor, 6 in Nongplamor, 26 in Pilot No. 2 and 40 in Doncha-em, who got incomes from sugarcane, other upland crops, livestock and poultry, or their combinations in 1983. No farmer reported the income from inland fish culture. The average net income from the farm except rice cultivation was 13,464 Baht for Pilot No. 1, 19,911 Baht for Thatakor, 6,323 Baht for Nongplamor, 19,917 Baht for Pilot No. 2, and 57,316 Baht for Doncha-em.

### 3. Type of Farming

Based on the income sources in farming, Table 37 presents the types of farming and percent of farmers in respective type. For livestock and poultry, only those who have more than 1,000 Baht of net income are considered as who are engaging livestock and poultry in this report.

Table 37 Type of farming (%).

	Paddy	Paddy & sugarcane	Paddy & uplands	Paddy & Livestock <sup>a</sup>	Paddy Sugarcane Uplands	Paddy Sugarcane Livestock <sup>a</sup>
Pilot No. 1	35.7	23.8	16.7	9.5	2.4	11.9
Thatakor	9.5	61.9	4.8	0.0	4.8	19.0
Nongplamor	81.0	0.0	4.8	14.3	0.0	0.0
Pilot No. 2	38.1	35.7	0.0	7.1	2.4	16.7
Doncha-em	4.8	81.0	0.0	0.0	2.4	11.9

Note: <sup>a</sup> Include poultry, and those more than 1,000 Baht of net income are counted.

The table shows that the farmers in Nongplamor are rice growing farmers, where 81 percent of the farmers have farm income solely from the rice cultivation. Percent of the farmers who grow only rice is quite less in Doncha-em (5 %) and Thatakor (10 %). Although there are differences between

the farmings in Doncha-em and Thatakor, the farmers in the 2 areas can be grouped as sugarcane and rice growing farmers. Most farmers in Pilot No. 2 are either rice growing or rice and sugarcane growing farmers. Farming in Pilot No. 1 is most diversified among the areas.

#### 4. Wage Earned from Farming Work

Many farmers reported wage income from and expense for farming work. Wage earned through farming work may be classified into those of farm labour, operator of own farm machines, and hired operator of farm machines. Table 38 shows the wage earned through farming work.

Table 38 Wage earned through farming work (Baht/household/year).

	Farm labour	Operator of own machine	Hired machine operator	Total
Pilot No. 1	1,772(18)	3,800(10)	3,150(2)	3,313(23)
Thatakor	3,025(6)	3,150(6)	0	3,368(11)
Nongplamor	1,600(1)	3,429(7)	0	3,657(7)
Pilot No. 2	5,410(13)	4,386(11)	2,340(5)	6,106(21)
Doncha-em	1,288(8)	7,621(14)	0	5,386(22)

Note: Figures in brackets are number of farmers reporting.

More number of farmers got incomes as farm labours in Pilot No. 1 (43 % of households), while the wage earned as farm labour per household was more for Pilot No. 2 (5,410 Baht; average of 13 households). Only one farmer reported the wage earned through farm labour in Nongplamor, and the least average wage through farm labour was reported in Doncha-em (1,288 Baht, average of 8 households).

Percent of the households got incomes as operator of own farm machines was more for Nongplamor and Doncha-em (33 % each), and the average income from the work was highest for Doncha-em (7,621 Baht, average of 14 farmers). It



contrasted to the least amount of farm labour wages obtained by the farmers in the area. The least average income as the operator was for Thatakor (3,150 Baht, average of 6 farmers). Only limited number of farmers reported the income as hired operator of farm machines (2 in Pilot No. 1 and 5 in Pilot No. 2).

In 1983, about one half of the households got incomes through farming works except those in Nongplamor where it was one third. However, the amount of income obtained from farming works was different from the farmer to farmer and the area to area. The average amount obtained from farming works was high for Pilot No. 2 (about 6,100 Baht, average of 21 households) and Doncha-em (about 5,400 Baht, average of 22 households), comparing with other areas (about 3,300-3,650 Baht).

#### X. Income Source

##### 1. Income Sources and Their Amounts

Table 39 shows the income sources and their amounts. Although net income from the wet season rice was highest and many farmers earned additional incomes through non-farm enterprise (mostly bamboo craft), the total income was lowest for Nongplamor (39,117 Baht/household). There were many farmers who got incomes through farm employment, off-farm employment and remittance in Pilot No. 1, and the total income of the area became 54,518 Baht per household. Despite the facts of better rice yield per rai in the dry season (1984) and its rather wide farming area, because of small area planted in the dry season, less opportunities of off-farm employment and non-farm enterprise, the farmers in Thatakor got the total income of 56,577 Baht per household, or almost same as the income of the farmers in Pilot No. 1. The farmers in Pilot No. 2 got rather high total income of 64,617 Baht per household. The smaller farming size was partly compensated with the rather high profit per unit farming area

Table 39 Income sources and their amounts (Baht/farm)

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-em
Wet season rice	19,032.6 (42)	25,406.0 (21)	30,091.6 (21)	21,535.0 (42)	15,698.6 (42)
Dry season rice	19,592.5 (40)	12,080.9 (19)	0.0	19,727.3 (42)	18,867.8 (41)
Sugarcane	11,754.7 (16)	16,522.2 (18)	0.0	21,539.1 (23)	56,481.1 (40)
Other upland crops	3,072.5 (8)	10,200.0 (2)	4,185.0 (1)	510.0 (1)	11,590.0 (1)
Livestock and poultry	16,433.0 (10)	12,100.0 (5)	6,750.0 (5)	2,193.0 (10)	4,364.0 (5)
Farm employment	3,313.0 (23)	3,368.2 (11)	3,657.1 (7)	6,203.6 (21)	5,571.4 (21)
Off-farm employment	6,590.0 (20)	4,000.0 (1)	6,700.0 (5)	10,513.3 (15)	11,666.7 (9)
Non-farm enterprise	9,428.6 (7)	2,500.0 (1)	6,535.7 (14)	9,161.5 (13)	16,750.0 (4)
Remittance	5,450.0 (10)	1,600.0 (2)	1,000.0 (1)	5,133.3 (6)	4,500.0 (2)
Others	1,200.0 (1)	0.0	0.0	8,400.0 (3)	10,000.0 (1)
Total	54,517.9 (42)	56,576.8 (21)	39,117.1 (21)	64,617.4 (42)	96,037.5 (42)
% from rice farming	69.1	64.2	76.9	63.9	35.5
% from sugarcane	8.2	25.0	0.0	18.3	56.0
% of farm income <sup>a</sup>	85.6	96.1	81.5	82.9	92.4

Notes: Figures in brackets are number of farmers reporting.

<sup>a</sup> Include wet season rice, dry season rice, sugarcane, other upland crops, and livestock and poultry.

comparing with the above mentioned 3 areas. Furthermore, incomes from farm employment, off-farm employment, and non-farm enterprise contributed to the income increase. Total income of the farmers in Doncha-em was 96,038 Baht per household, which was about 2.5 times higher than that of Nongplamor.

Farmers in Nongplamor got 77 percent of the total income through rice farming, while it was 69 percent for Pilot No. 1, 64 percent for Thatakor and Pilot No. 2, and only 36 percent for Doncha-em. About 56 percent of the total income was derived from sugarcane farming in Doncha-em, it was 25 percent for Thatakor, 18 percent for Pilot No. 2, and 8 percent for Pilot No. 1. Proportion of the income from farming to the total was highest for Thatakor (96 %), followed by Doncha-em (92 %), Pilot No. 1 (86 %), Pilot No. 2 (83 %), and Nongplamor (81 %).

#### 2. Type of Income Source

Table 40 shows the types of income sources based on the data of those more than 1,000 Baht of net income in respective source. The table shows the quite different patterns of income sources among the study areas.

Table 40 Type of income source (%).

	Self-farming	Self-farming & farm employed	Self-farming & off-farm work	Self-farming farm employed off-farm work
Pilot No. 1	23.8	16.7	31.0	28.6
Thatakor	52.4	33.3	4.8	9.5
Nongplamor	19.0	0.0	47.6	33.3
Pilot No. 2	26.2	11.9	31.0	31.0
Doncha-em	38.1	23.8	19.0	19.0

Note: Those more than 1,000 Baht of net income in respective source are counted.

About 52 percent of the farmers in Thatakor work solely self-farming. In other areas, the proportion is reduced to 38 percent for Doncha-em, 26 percent for Pilot No. 2, 24 percent for Pilot No. 1, and 19 percent for Nongplamor. The combination of income sources of self-farming and farm employment is more for Thatakor (33 %) and Doncha-em (24 %), while that of self-farming and off-farm work is more for Nongplamor (48 %) and the pilot areas (31 % each). The combination of self-farming, farm employment and off-farm work is more for Nongplamor (33 %), Pilot No. 2 (31 %), and Pilot No. 1 (29 %).

#### XI. Farmers' Organization and Extension

##### 1. Membership of Farmers' Organization

Table 41 show the percent of farmers who are member of different kinds of farmers' organizations, and main reason of those who are not member of any organizations.

Table 41 Membership of farmers' organization (%).

	Cooperative	Water user association	Farmer group	BAAC <sup>a</sup>	No membership
Pilot No. 1	54.8	97.6	9.5	9.5	2.4
Thatakor	23.8	61.9	19.0	19.0	19.0
Nongplamor	14.3	0.0	38.1	19.0	38.1
Pilot No. 2	59.5	100.0	0.0	0.0	0.0
Doncha-em	47.6	50.0	33.3	4.8	21.4

Reasons of not members of farmers' organizations: No profit (8 farmers in Nongplamor and 1 farmer in Doncha-em); no farmers' group organized in the hamlet (4 in Doncha-em and 2 in Thatakor); no interest (1 each in Thatakor and Doncha-em); others (additional cost, many meeting, no time, etc.)

Note: <sup>a</sup> Member for Bank for Agriculture and Agricultural Cooperative.

Percent of the farmers who are member of Cooperative are more for the pilot areas (55 % for No. 1 and 60 % for No. 2) comparing with Doncha-em (48 %), Thatakor (24 %), and Nongplamor (15 %). Membership on Water User Association shows the quite distinct features among the study areas. All the farmers in Pilot No. 2 and except 1 farmer in Pilot No. 1 are member of the association. It is about one half of them in Thatakor and Doncha-em, and not at all in Nongplamor. The data indicate that organizing of farmers to the association (done under the guidance of Cooperative Promotion Department) is going on even outside of the pilot areas where land consolidation work has been completed.

Member of Farmer Group (organized by Agricultural Extension Office) and BAAC (Bank for Agriculture and Agricultural Cooperative) are more in outside of the pilot areas, especially in Nongplamor (38 % and 19 %, respectively) and for the farmer group in Doncha-em (33 %). It is quite contrasting to the membership of the farmers in Pilot No. 2, where no farmer is a member of the farmer group or BAAC.

All farmers in Pilot No. 2 and except 1 farmer in Pilot No. 1 are at least member of certain farmers' organization. Rather high percent of the farmers in Nongplamor (38 %), Doncha-em and Thatakor (more or less 20 %) are not members of any farmers' organizations.

Some farmers have mentioned that there is no profit even they become member of the organizations, while some others have reported that there is no organization in their hamlet (Muban). Minor opinions of the non-membership are no interest, additional cost, many meeting, no time, no information regarding the farmers' organizations, and so on.

## 2. Familiarity of Government Personals and Farmer Leaders

Government personals who are mainly concerned with diffusion of the improved farming techniques, organizing the water user association and

the management of irrigation system are those of Agricultural Extension Office, Cooperative Promotion Office and RID's Operation and Maintenance Office.

Among farmer leaders, President of Water User Association is concerned with the maintenance of on-farm irrigation facilities, and President of District Agricultural Cooperative is concerned with agricultural loan. Both of the farmer leaders are concerned with the organizing farmers for rural development. Familiarity of the government personals and farmer leaders is shown in Table 42.

Table 42 Percent of farmers know government personals and farmer leaders working in/for the area.

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Dóncha-em
AEO <sup>a</sup>	59.5	42.9	61.9	88.1	59.5
CPD <sup>b</sup>	59.5	23.8	14.3	66.7	33.3
ZM <sup>c</sup>	100.0	81.0	66.7	95.2	83.3
WUA <sup>d</sup>	100.0	57.1	0.0	100.0	59.5
DAC <sup>e</sup>	45.2	14.3	4.8	50.0	31.0

- Notes:
- <sup>a</sup> Agricultural extension worker working in the area.
  - <sup>b</sup> Cooperative promotion personal working in the area.
  - <sup>c</sup> Zone man working in the area.
  - <sup>d</sup> President of water user association of the area.
  - <sup>e</sup> President of the district agricultural cooperative.

Among the government personals, Zoneman, who controls the amount and duration of irrigation water supply to the area, is well known in all the study areas. All of the farmers in Pilot No. 1 and 95 percent of the farmers in Pilot No. 2 know their respective zoneman. The zoneman is least known in Nongplamor where only wet season rice is planted at present. About 88 percent of the farmers in Pilot No. 2 and 62 percent in Nongplamor know the agricultural extension worker who work in the respective area. The extension worker is least known in Thatakor. Personals of Cooperative Promotion Department, who

organize farmers into the water user association, are less known by the farmers outside of the pilot areas.

Every farmer knows the president of water users association in the pilot areas, and 57 percent in Thatakor and 60 percent in Doncha-em know their respective president of the association. Since the water user association is organized after the completion of land consolidation work, it is not organized yet in Nongplamor. About half of the farmers in the pilot areas know the president of the district agricultural cooperative. Familiarity of the president is low in Doncha-em (31 %), and only 3 farmers in Thatakor (14 %) and a farmer in Nongplamor (4.8 %) know the president.

The results show that the farmers in the pilot areas knows the government personals and farmer leaders more than those outside of the areas. Except agricultural extension worker, the farmers in Nongplamor are least familiar with the government personals and farmer leaders.

### 3. Information Source on Farming

Several kinds of information sources on farming have been asked to the farmers. Table 43 shows the percent of farmers who get information on farming from different sources.

More than one half of the farmers have attended meetings and/or seminars on farming in all the areas. Percent of the farmers who attend the meeting are higher for the pilot areas (86 % for Pilot No. 1 and 98 % for Pilot No. 2). Although frequency of attendance to the meeting ranges widely among farmers, it indicates that there are more kinds or number of meetings and seminars on farming in the pilot areas.

Percent of the farmers who watch TV programs on farming is the most for Doncha-em (74 %), followed by Pilot No. 2 (60 %), and Thatakor (48 %). Contrastingly, percent of the farmers who listen radio programs on farming is the most for Pilot No. 1 (43 %), followed by Nongplamor (33 %).

Table 43 Information source on farming (%).

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-en
Attend meeting/seminor	85.7	57.1	57.1	97.6	69.0
Watch TV program on farming	31.0	47.6	28.6	59.5	73.8
Listen radio program on farming	42.9	19.0	33.3	11.9	23.8
Receive agricultural journal	66.7	42.9	28.6	45.2	21.4
That from ADC <sup>a</sup>	47.6 (20)	9.5 (2)	0.0	35.7 (15)	4.8 (2)
Visitors from government office	57.1	47.6	42.9	59.5	42.9
AEO <sup>b</sup>	28.6 (12)	33.3 (7)	38.1 (8)	33.3 (14)	33.3 (14)
ADC	23.8 (10)	0.0	0.0	14.3 (6)	2.4 (1)
Zoneman <sup>c</sup>	4.8 (2)	4.8 (1)	0.0	9.5 (4)	7.1 (3)
Others <sup>d</sup>	0.0	9.5 (2)	4.8 (1)	7.1 (3)	0.0
Ask advice at changing farming	42.9	14.3	4.8	33.3	23.8
From AEO	16.7 (7)	14.3 (3)	4.8 (1)	26.2 (11)	23.8 (10)
From ADC	31.0 (13)	0.0	0.0	7.1 (3)	0.0

Notes: Figures in brackets are number of farmers reporting.

<sup>a</sup> Agricultural Demonstration Center of Greater Mae Klong Irrigation Project, <sup>b</sup> Agricultural Extension Office,

<sup>c</sup> Who is responsible for irrigation water supply, <sup>d</sup> Include Land Consolidation Office and Agricultural Economic Office for Thatakor, Community Development Office for Nongplamor, and Cooperative Promotion Office for Pilot No. 2 (3 farmers).



Percent of the farmers receiving agricultural journals and/or pamphlets is the most for Pilot No. 1 (67 %), followed by Pilot No. 2 (45 %), and Thatakor (43 %), while it is lower for Nongplamor (29 %) and Doncha-em (21 %). Some farmers get 2 or more journals (or pamphlets) on farming. There are 20 farmers in Pilot No. 1 and 15 farmers in Pilot No. 2 who get "Mae Klong Farming News" published by the Agricultural Demonstration Center. There are also 2 farmers each in Thatakor and Doncha-em who receive the bulletin.

Although frequency of the visit ranges widely, about one half of the farmers have visitors of government personals to the house or the field. Percent of the farmers having the visitors is rather higher for Pilot No.1 (57%) and No. 2 (60 %) comparing with other areas (less than 50 %). Among the visitors, the agricultural extension worker is the main visitor to all the study areas. Personals of the Agricultural Demonstration Center visit mainly the pilot areas, and the zoneman visit all the areas except Nongplamor.

More percent of the farmers in the pilot areas ask advice from government agencies when they change the farming methods (43 % for No. 1 and 33 % for No. 2). The Agricultural Demonstration Center is the main agency with which the farmers in Pilot No. 1 (31 %) consult about the farming, and the Agricultural Extension Office for Pilot No. 2 (26 %). Outside of the pilot areas, rather high percent of the farmers in Doncha-em ask advice from the Agricultural Extension Office (24 %).

## XII. Savings and Credit

### 1. Savings

Table 44 shows the savings of farmers. Although it is rather difficult to obtain relevant information on savings, percent of the farmers having savings are 52 for Doncha-em, 38 for Nongplamor and Pilot No. 2, 36 for Pilot

No. 1, and 10 for Thatakor. Amount of savings ranges widely among farmers.

There are some farmers who have savings of less than 1,000 Baht, while some farmers have the savings of 100,000 Baht or over. Except Thatakor where only 2 farmers have reported about the savings, the average amount of savings is about 24,000 Baht for Doncha-em, 19,000 Baht for Pilot No. 1, 12,000 Baht for Pilot No. 2, and 11,000 Baht for Nongplamor.

Table 44 Savings.

	% of farmers have savings	Amount of savings (Baht)	
		Average	Range
Pilot No. 1	35.7(15)	18,640	600-120,000
Thatakor	9.5(2)	151,000	2,000-300,000
Nongplamor	38.1(8)	11,063	500-45,000
Pilot No. 2	38.1(16)	11,719	500-50,000
Doncha-em	52.4(22)	23,945	500-100,000

Note: Figures in brackets are number of farmers reporting.

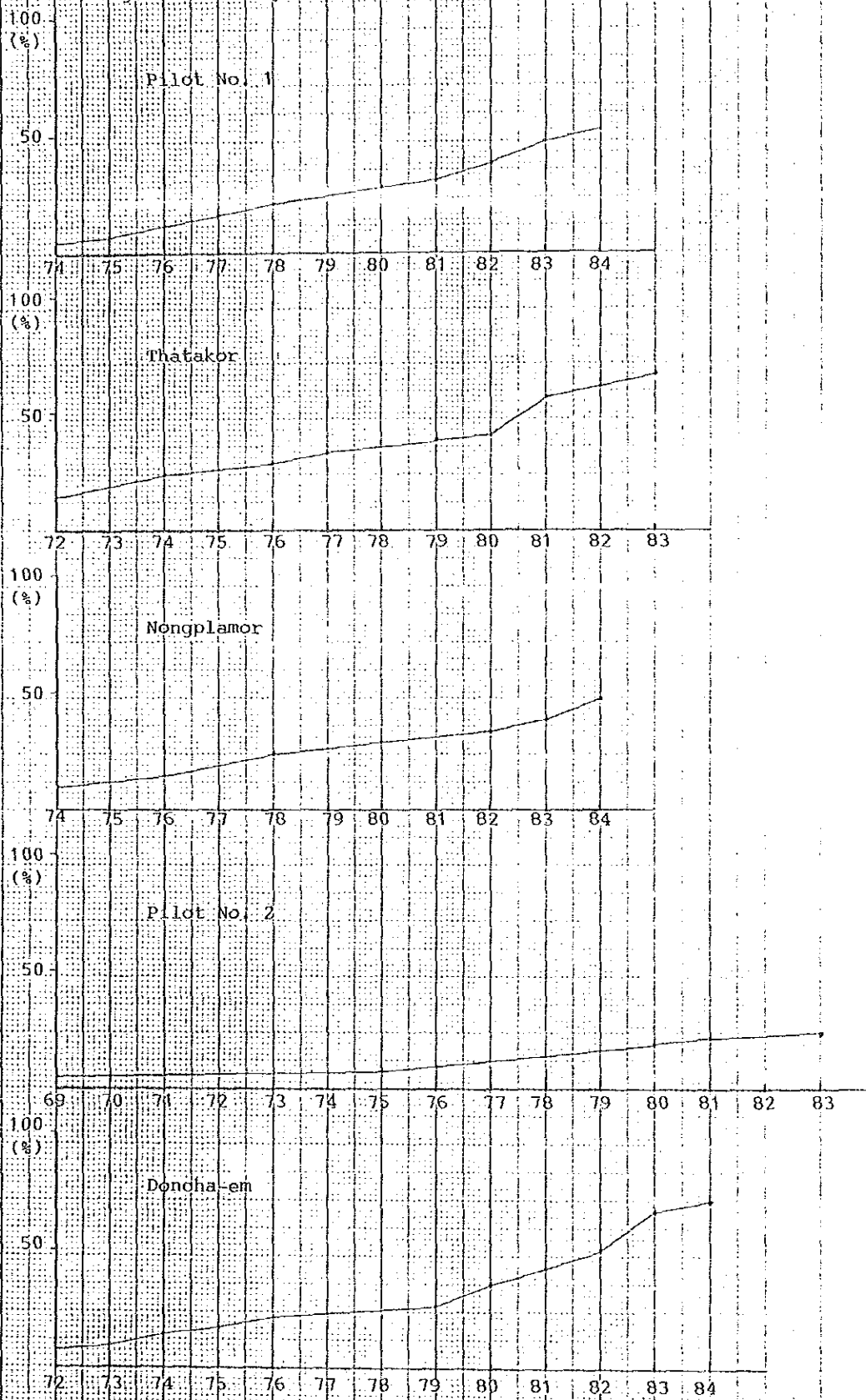
## 2. Introduction of Public Credit

Public credit, such as that of bank or cooperative, is quite important source for the investment on farming (or living expenses) because of its low interest (usually 14 %/year). Although there are some farmers who use the public credit of 2 or 3 year term, they usually borrow money early in the year and repay at the end of the year (sometimes early following year) in the areas.

Fig. 10 shows the first year of using credit. Some farmers in Pilot No. 2 first used the public credit in 1969, Thatakor and Doncha-em in 1972, and Pilot No. 1 and Nongplamor in 1974.

More percent of the farmers in Doncha-em have experiences of using the public credit so far (71 %), followed by Thatakor (67 %), Pilot No. 1

Fig. 10 First year of using credit from bank or cooperative.



(52 %), Nongplamor (50 %), and Pilot No. 2 (24 %). Of course, not all of these farmers use the credit every year, but some farmers have mentioned that they have used the credit in 1983 and 1984 continuously or repaid the one for 1983 and borrowed again in 1984.

### 3. Credit

Information on credit is given in Table 45, Table 46, and Table 47. Percent of the farmers who have used credit in 1983/84 are 57 for Pilot No. 1, 81 for Thatakor, 52 for Nongplamor, 38 for Pilot No. 2, and 64 for Doncha-em. The average amount of credit in 1983 was 13,500 Baht for Pilot No. 1 (19 farmers), 25,600 Baht for Thatakor (15 farmers), 13,000 Baht for Nongplamor (7 farmers) and Pilot No. 2 (10 farmers), and 54,000 Baht for Doncha-em (21 farmers). Some farmers repaid all the capital and interest, some farmers repaid part of the credit, and some other farmers still did not repay yet by the time of conducting the interview (August, 1984). Number of farmers who have not repaid the credit (all or part) are 9 in Pilot No. 1 (average 11,000 Baht), 3 in Thatakor (average 5,800 Baht), 3 in Nongplamor (average 15,600 Baht), 4 in Pilot No. 2 (average 20,000 Baht), and 14 in Doncha-em (average 51,300 Baht).

Purpose of the credit is mainly either for farm investment or farm investment and living expenses in all the areas. Rather high percent of the farmers in Doncha-em (63 %) have mentioned that the farm investment is the main purpose of the credit.

Cooperative and bank are the main sources of the credit for the farmers in Pilot No. 1, while bank is the main source in other areas especially in Thatakor and Doncha-em where 75 percent of the farmers use the credit from banks (among those used credits). Relatives and neighboring farmers are minor sources of the credit in all the areas. The credit sources are rather diversified for the farmers in the pilot areas, such as rice-mill

Table 45 Amount of credit, its repayment and purpose.

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-em
Used in 1983/1984 (%)	57.1 (24)	81.0 (17)	52.3 (12)	38.1 (16)	64.3 (27)
Credit in 1983 (Baht)	13,500.0 (19)	25,600.0 (15)	12,928.6 (7)	13,150.0 (10)	53,714.3 (21)
Amount repaid (Baht) <sup>a</sup>	10,915.0 (19)	22,562.7 (15)	12,004.0 (5)	16,762.9 (7)	36,596.3 (16)
Amount remaining (Baht) <sup>a</sup>	11,055.6 (9)	5,833.3 (3)	15,583.3 (3)	19,920.0 (4)	51,285.7 (14)
Purpose of credit (%)					
1. Living expenses	0.0	0.0	0.0	0.0	7.4 (2)
2. Farm investment	45.8 (11)	35.3 (6)	50.0 (6)	43.8 (7)	63.0 (17)
3. Repayment of debts	0.0	0.0	0.0	0.0	0.0
4. Both 1 and 2	54.2 (13)	64.7 (11)	41.7 (5)	43.8 (7)	29.6 (8)
5. Both 1 and 3	0.0	0.0	0.0	0.0	0.0
6. Both 2 and 3	0.0	0.0	0.0	0.0	0.0
7. All 1, 2 and 3	0.0	0.0	0.0	12.5 (2)	0.0
8. Others	0.0	0.0	8.3 (1) <sup>b</sup>	0.0	0.0

Notes: Figures in brackets are number of farmers reporting.

<sup>a</sup>Amounts repaid and remaind are those for 1983 credit (no farmer reported old debt), and not include those for 1984 credit.

<sup>b</sup>For wedding ceremony.

Table 46 Credit source.

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-em
Bank	29.2 (7)	76.5 (13)	58.3 (7)	37.5 (6)	74.1 (20)
Cooperative	33.3 (8)	0.0	8.3 (1)	6.3 (1)	14.8 (4)
Relative	12.5 (3)	5.9 (1)	8.3 (1)	18.3 (3)	0.0
Neighboring farmer	0.0	0.0	0.0	12.5 (2)	3.7 (1)
Friend	0.0	11.8	8.3 (1)	0.0	0.0
Land owner	0.0	0.0	8.3 (1)	12.5 (2)	0.0
Rice-mill owner	12.5 (3)	5.9 (1)	0.0	0.0	0.0
Community Association	0.0	0.0	0.0	6.3 (1)	0.0
Bank and cooperative	4.2 (1)	0.0	0.0	0.0	0.0
Bank and private	0.0	0.0	8.3 (1)	0.0	3.7 (1)
Cooperative and private	8.3 (2)	0.0	0.0	0.0	0.0
All private	0.0	0.0	0.0	0.0	0.0
Others	0.0	0.0	0.0	6.3 (1) <sup>a</sup>	3.7 (1) <sup>b</sup>
Total	100.0 (24)	100.0 (17)	100.0 (12)	100.0 (16)	100.0 (27)

Notes: Figures in brackets are number of farmers reporting.

<sup>a</sup> Sugarcane farmer, and <sup>b</sup> Quotaman of sugarcane, respectively.

Table 47 Types of credit and repayment, and interest of credit.

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-em
Credit type: Cash (%)	100.0 (24)	100.0 (17)	100.0 (12)	100.0 (16)	100.0 (27)
Type of repayment (%)					
Cash	75.0 (18)	76.5 (13)	91.7 (11)	87.5 (14)	100.0 (27)
Product	12.5 (3)	23.5 (4)	8.3 (1)	6.3 (1)	0.0
Cash and product	12.5 (3)	0.0	0.0	6.3 (1)	0.0
Interest					
Bank (%/year)	14 % (6/8) <sup>a</sup>	14 % (12/13) <sup>b</sup>	14 % (5/7) <sup>c</sup>	14 % (6)	14 % (15/17) <sup>d</sup>
Cooperative (%/year)	14 % (9/11) <sup>f</sup>	~	14 % (1)	13 % (1)	14 % (3/4) <sup>g</sup>
Private (%/year) <sup>h</sup>	30 % (3)	30 % (2)	24 % (1)	12 % (1)	15 % (1)
	36 % (2)	45 % (2)	30 % (2)	30 % (2)	36 % (3)
	45 % (2)			36 % (4)	
	60 % (1)			48 % (1)	
				60 % (1)	

Notes: Figures in brackets are number of farmers reporting

<sup>a</sup> One farmer each 12% and 13%, <sup>b</sup> One farmer 10%, <sup>c</sup> 2 farmers 13%, <sup>d</sup> One farmer each 16% and 17%,

<sup>f</sup> 2 farmers 10%, <sup>g</sup> One farmer 16%, respectively

<sup>h</sup> Some farmers pay with product, all values are converted into cash based on a rice price of 3 Baht/kg.

owners for Pilot No. 1 and land owners for Pilot No. 2 (13 percent each). Most farmers use single credit source, and only limited number of farmers have mentioned 2 sources (2 farmers in Pilot No. 1 and 1 each in Nongplamor and Doncha-em).

All the farmers have mentioned that cash is the means of credit. Although cash is also the main means of repayment, some farmers have mentioned that product (rice) or cash for the capital and the product for the interest are means of repayment especially those for private sources. Interest rate is usually 14 percent per year for bank and cooperative. Cash equivalent of interest for the private credits ranges from 12 percent to 60 percent per year. Some farmers have mentioned the monthly interest, such as 2, 3, or 4 percent per month.

According to some farmers, there are farmers who borrow 1,000 Baht and repay 1,000 Baht (capital) and 2 times of 150 kg of rice in a year (interest, approximately 90%/year) in Pilot No. 1. However, this high rate of interest was not reported by the farmers in this survey.

### XIII. Problems in Farming

Table 48 shows the problems in farming. Percent of the farmers having the problems are more in the pilot areas (91 % each) than outside of the pilot areas (about 62 %). Main problems in farming in the pilot areas are insect and disease (17 farmers in No. 1 and 13 farmers in No. 2), water shortage (16 in No. 1 and 9 in No. 2), and rats (9 in No. 1 and 23 in No. 2).

Considerably many farmers have the problem on the price of product in Doncha-em (13 farmers). Most of them mentioned that the sugarcane price became low in last years. Other problems mentioned by the farmers are crab, weeds, and flood. Limited number of farmers have mentioned lack of cooperation among farmers and poor farming techniques as the problems.



Table 48 Problems in farming.

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-em
Have (%)	90.5(38)	61.9(13)	61.9(13)	90.5(38)	64.3(27)
Insect/disease	(17)	(4)	(4)	(13)	(4)
Water shortage	(16)	(3)	(3)	(9)	(4)
Rat	(9)	(5)	(2)	(23)	(6)
Price of product	(2)	(5)	(2)	(4)	(13)
Crab	(3)	(2)	(5)	(2)	(2)
Weed	(2)	(0)	(1)	(3)	(2)
Flood	(1)	(0)	(0)	(2)	(2)
Others	(2)	(2)	(1)	(2)	(1)

Note: Figures in brackets are number of farmers reporting.

It is probably risky to compare the areas based on the problems, because the farmers in the pilot areas have deeper relationships with the Agricultural Demonstration Center which has conducted this survey. Even though, water shortage mentioned by many farmers in Pilot No. 1 is the surprising one, because the area apparently has better irrigation and drainage systems. In most cases, the main reason of water shortage is due to the troubles of pumps which supply water from the main canal to the lateral canal.

#### XIV. Change of Livelihood

Table 49 shows the feeling of livelihood comparing with 5 years ago. Most farmers think that their livelihoods are better than 5 years ago. Those who think the betterment of livelihoods are 98 percent of the farmers in Pilot No. 2, 95 percent of Nongplamor, 86 percent of Pilot No. 1, 79 percent of Doncha-em, and 71 percent of Thatakor. Rather high percent of farmers in Thatakor think that the livelihood is same as 5 years ago (24 %). About 17

Table 49 Feeling of livelihood comparing with 5 years ago.

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-em
Better	85.7	71.4	95.2	97.6	78.6
Worse	9.5	4.8	0.0	2.4	16.7
Same	4.8	23.8	4.8	0.0	4.8
Factors contributed the better livelihood (mentioned at most 3 factors per farmer)					
Increased rice production	76.2	47.6	90.5	76.2	61.9
Irrigation facilities	50.5	52.4	90.5	73.8	61.9
Rice price	54.8	33.3	57.1	61.9	59.5
Improved farming method	61.9	42.9	14.3	28.9	4.8
Transportation	2.4	0.0	4.8	11.9	4.8
Farm mechanization	0.0	9.5	9.5	4.8	14.3
Agricultural extension work	0.0	0.0	0.0	11.9	4.8
Others	0.0	19.4	14.3	21.4	26.3
Factors contributed the worse livelihood (mentioned at most 3 factors per farmer)					
Debt	4.8	4.8	0.0	0.0	7.1
Cost of daily necessities	4.8	4.8	0.0	0.0	9.5
Rice price	2.4	0.0	0.0	2.4	4.8
Others	16.6	0.0	0.0	4.8	23.8

percent of the farmers in Doncha-em and 10 percent in Pilot No. 1 think that the livelihood become worse in the last 5 years, while it is only 5 percent in Thatakor, 2 percent in Pilot No. 2, and not at all in Nongplamor.

Farmers were requested to mentioned at most 3 out of 25 factors which contributed the change of livelihood. Main 4 factors contributing the betterment of livelihood in Pilot No. 1 are increased rice production (76 %), improved farming methods (62 %), rice price (55 %), and irrigation facilities (51 %). Farmers in Thatakor think that the irrigation facilities (52 %), increased rice production (48 %), and improved farming methods (43 %) have contributed the betterment. The increased rice production, irrigation facilities, and rice price are 3 main factors contributing to the better living standard of the farmers in Nongplamor (91 %, 91 %, and 57 %, respectively), Pilot No. 2 (76 %, 74 %, and 62 %), and Doncha-em (62 %, 62 %, and 60 %). Among other factors, farm mechanization has rather strongly contributed to the betterment in Doncha-em (14 %), and transportation and agricultural extension work also have contributed to the better livelihood in Pilot No. 2 to some extent (12 % each).

Responses of the farmers are quite interesting. Irrigation facilities is one of the top 2 factors contributing to the better livelihood in Nongplamor, where only the supplementary irrigation to wet season rice is available at present. On the other hand, the irrigation facilities is only the forth factor in Pilot No. 1, or the lowest among the study areas, where an intensive type of land consolidation has completed in 1981, and the density and distribution of irrigation and drainage ditches are best among the study areas. Farmers in Pilot No. 2 have mentioned more external factors which contributing to the betterment of livelihood other than the improved farming methods (29 %), despite the fact that they produce rather high yield of rice.

Since the limited number of farmers have answered that the livelihood become worse comparing with 5 years ago, no distinct factors are observed. Cost of daily necessities is mentioned by about 10 percent of the farmers in Doncha-em. Debt is a factor to some farmers in Doncha-em (7 %), Pilot No. 1 and Thatakor (5 % each). Among others, some farmers have mentioned that the low price of sugarcane is the main factor contributing to the worth livelihood.

Table 50 shows the percent of farmers using credit and their amount. Although it is rather difficult to obtain trustful information on credit or debt, percent of the farmers using credit has decreased in all the areas of Pilot No. 1 (86 % to 57 %), Thatakor (91 % to 81 %), Nongplamor (71% to 52 %), Pilot No. 2 (64 % to 38 %), and Doncha-em (74 % to 64 %).

Table 50 Percent of farmers using credit and their amount.

		% fo farmers used <sup>a</sup>	Amount of credit (Baht/farm) <sup>b</sup>
Pilot No. 1	1981/82	85.7	19,620.7(36)
	1983/84	57.1	13,500.0(19)
Thatakor	1981/82	90.5	28,368.4(19)
	1983/84	81.0	25,600.0(15)
Nongplamor	1981/82	71.4	14,000.0(15)
	1983/84	52.3	12,928.6(7)
Pilot No. 2	1981/82	64.3	11,137.0(27)
	1983/84	38.1	13,150.0(10)
Doncha-em	1981/82	73.8	34,371.0(31)
	1983/84	64.3	53,714.3(21)

Notes: <sup>a</sup> For those 1981/82 are those who had in 1982.

<sup>b</sup> Amount of credit for 1981/82 is the initial capital of credit remaining in 1982, while that of 1983/94 is that of used for 1983.

The average amount of credit has decreased for Pilot No. 1 (19,621

Baht to 13,500 Baht), Thatakor (28,368 Baht to 25,600 Baht), and Nongplamor (14,000 Baht to 12,929 Baht), but increased for Pilot No. 2 (11,137 Baht to 13,150 Baht) and Doncha-em (34,371 Baht to 53,714 Baht). However, no farmer has reported the old debt, and that of borrowed in 1982 has been repaid by the time of interview in 1984.

As it is shown in Table 51, most farmers have mentioned that they want to increase the income through self-farming. Some farmers have mentioned that they want to expand the farming size.

Table 51 Means of increasing income (%).

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-em
Self-farming	73.8	85.8	76.2	78.5	85.8
Off-farm work	4.8	9.5	4.8	7.1	4.8
Both of above	11.9	4.8	14.3	11.9	9.5
Others	9.5	0.0	4.8	2.4	0.0

## SITUATIONS OF RICE CULTIVATION

### I. Variety and Seed

#### 1. Variety

Number of varieties planted, name of widely adopted varieties, and percent of HYVs planted area are given in Table 52. The average number of varieties planted in 1983 wet season ranged from 1.29 for Thatakor and Doncha-em to 1.81 for Pilot No. 2. In 1984 dry season, it ranged from 1.12 for Pilot No. 2 and Doncha-em to 1.26 for Thatakor.

The most widely planted variety was RD-23 in the pilot areas in both of the crop seasons, and in Thatakor and Doncha-em in the dry season. However, traditional varieties were only the rice varieties planted in

Table 52 Number of varieties planted, extensively planted varieties, and percent of HYV planted area.

	Number of varieties planted				Average	Name of varieties extensively adopted	% of HYV planted area
	1	2	3	4			
1983 wet season							
Pilot No. 1	(22)	(14)	(6)	(0)	1.62	RD-23 (22), Luang pratiu (19)	46.5
Thatakor	(15)	(6)	(0)	(0)	1.29	Luang pratiu (15)	6.7
Nongplamor	(7)	(14)	(0)	(0)	1.67	Khao hom mali (21), Luang pratiu (14)	0.0
Pilot No. 2	(16)	(19)	(6)	(1)	1.81	RD-23 (23), Luang pratiu (14)	62.4
Doncha-em	(30)	(12)	(0)	(0)	1.29	Luang yai (15)	12.4
1984 dry season							
Pilot No. 1	(36)	(3)	(1)	(0)	1.13	RD-23 (38)	100.0
Thatakor	(14)	(5)	(0)	(0)	1.26	RD-23 (16)	100.0
Nongplamor	-	-	-	-	-	-	-
Pilot No. 2	(37)	(5)	(0)	(0)	1.12	RD-23 (42)	100.0
Doncha-em	(37)	(3)	(1)	(0)	1.12	RD-23 (21), RD-7 (5)	100.0

Nongplamor in 1983 wet season, and they were also widely planted in other areas in the wet season. Among the traditional varieties, Luangpratiu was widely adopted by the farmers in the pilot areas and Thatakor, while Khao hom mali and Luangpratiu were only the varieties planted in Nongplamor, and Luang yai was widely adopted in Doncha-em.

Percent of HYVs planted area was most for Pilot No. 2 (62 %), followed by Pilot No. 1 (47 %) in 1983 wet season. Small areas were planted by HYVs in Doncha-em (12 %) and in Thatakor (7 %), and not at all in Nongplamor in the season. Because of its photo-sensitive characteristics of traditional varieties, only non photo-sensitive HYVs are planted to all of the rice planted area in dry season.

## 2. Seed Renewal

Table 53 shows the data on seed renewal. All farmers in the pilot areas and Thatakor have renewed seeds in last 5 years, while it is 81 percent of them in Nongplamor and 91 percent in Doncha-em. The average number of times renewed seeds in last 5 years is more for Pilot No. 1 and Thatakor (2.2) comparing with other areas (ranges 1.6-1.9). The farmers in Pilot No. 1 have renewed the seeds more in quantity (261 kg/farm), followed by those in Thatakor (242 kg/farm). On the other hand, the farmers in Nongplamor have renewed the seeds least in quantity (88 kg/farm). In 1983, however, percent of the farmers renewed the seeds and the average quantity renewed were highest for Thatakor (76 % and 167 kg/farm, respectively). It was probably due to the expansion of dry season rice planted area in Thatakor in 1984.

RD-23 variety was introduced by many farmers in the study areas except Nongplamor, where only wet season rice is planted, and where traditional varieties of Khao hom mali and Luangpratiu were introduced or renewed. Other main varieties introduced by the farmers were RD-7 for Pilot No. 1 and Doncha-em, and Luangpratiu for Thatakor.

Table 53 Seed renewal in last 5 years.

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-en
% of farmers renewed seeds	100.0 (42)	100.0 (21)	81.0 (17)	100.0 (42)	90.5 (38)
Average number of times	2.2	2.2	1.6	1.7	1.9
Quantity in last 5 years (kg/farm)	260.5	241.7	88.2	140.0	189.2
Quantity in 1983 (kg/farm)	134.6 (22)	167.2 (16)	70.0 (3)	82.0 (15)	114.1 (15)
Popular varieties introduced	RD-23(35), RD-7(18)	RD-23(16)	Khao hom mali(14) RD-23(41)	RD-23(41)	RD-23(21)
Source of seeds		Luang pratiu(10) Luang pratiu(10)			RD-7(15)
Agricultural Extension Office	(6)	(3)	(9)	(6)	(10)
Agricultural Demonstration Center	(27)	-	-	(26)	(4)
Relative	(6)	(8)	(2)	(3)	(10)
Neighboring farmer	(8)	(3)	(8)	(16)	(18)
Friend	(6)	(2)	(1)	(6)	-
Rice mill owner	(9)	(12)	(1)	(1)	(2)
Others	-	(1)	-	(1)	(4)
Quantity of seeds purchased (kg/farm)	95.0 (8)	87.5 (4)	46.7 (6)	57.5 (4)	110.0 (5)
Seed price (Baht/kg)	3.00-5.50	2.10-4.30	2.50-6.00	3.00-5.00	2.20-3.50

Note : Figures in brackets are number of farmers reporting.



Agricultural Demonstration Center is the biggest seed source for the pilot areas. Agricultural Extension Office is the biggest source for Nongplamor, and there are some farmers who get seeds from the office in all other areas. Rice mills play as biggest seed source for Thatakor, and for some farmers in Pilot No. 1. Neighboring farmers are main sources of seed renewal in Doncha-em.

Diffusion of seeds from farmer to farmer is a common practice of seed renewas in all the areas. Many farmers have exchanged their products to new seeds. Only limited number of farmers have purchased the seeds in the last 5 years, and the seed price ranges 2.10 Baht to 6.00 Baht per kg.

### 3. Seed Rate

Table 54 shows the seed rates of nursery, transplanting field, and direct sowing field. The farmers in Nongplamor only practice transplanting method of rice cultivation using traditional varieties. The average rate of seeds is about 95 g per m<sup>2</sup> of nursery, and 7.4 kg per 1 rai of transplanting field. Both of the rates are quite reasonable.

Table 54 Seed rates of nursery, transplanting, and direct sowing.

	Nursery (g/m <sup>2</sup> )	Transplanting (kg/rai)	Direct sowing (kg/rai)
Pilot No. 1	138.8(56.5)	11.1(2.9)	14.8(2.1)
Thatakor	163.1(59.4)	11.7(3.2)	14.9(5.0)
Nongplamor	95.2(32.4)	7.4(1.7)	-
Pilot No. 2	141.7(54.1)	12.6(3.3)	16.2(3.8)
Doncha-em	161.7(64.8)	13.2(4.9)	15.9(3.2)

Note: Figures in brankets are standard deviations.

On the other hand, the seed rates of nursery and transplanting field are quite high in other areas, where they apply both of the transplanting

and direct sowing, practice rice double cropping, and using more HYVs. In the 4 areas, the seed rate of nursery ranges from 139 g per m<sup>2</sup> for Pilot No. 1 to 163 g per m<sup>2</sup> for Thatakor, while that of transplanting field ranges from 11.1 kg per rai for Pilot No. 1 to 13.2 kg per rai for Doncha-em. The seed rate of direct sowing field is rather high in all the areas, and ranges from 14.8 kg per rai for Pilot No. 1 to 16.2 kg per rai for Pilot No. 2.

#### 4. Handling and Treatment of Seeds

Table 55 shows the percent of the farmers who practice seed selection with water or salt water and disinfection of seeds. All the farmers in Thatakor and Nongplamor practice the selection of seeds with water. It is 91 percent of them in Pilot No. 1, 86 percent in Pilot No. 2, and 81 percent in Doncha-em. Seed selection with salt water is practiced by only limited number of farmers (3 in Pilot No. 1 and 2 in No. 2). About 21 percent of the farmers in Pilot No. 1 practice the disinfection of seeds.

Table 55 Selection and treatment of seeds (%).

	Selection with water	Selection with salt water	Disinfection
Pilot No. 1	90.5	7.1	21.4
Thatakor	100.0	0.0	9.5
Nongplamor	100.0	0.0	9.5
Pilot No. 2	85.7	4.8	2.4
Doncha-em	81.0	0.0	4.8

## II. Planting Method

### 1. Transplanting and Direct Sowing

Rice plant is cultivated either by transplanting or direct sowing method. Table 56 shows the percent of the farmers who adopted solely transplanting, solely direct sowing, or both of them in the 1983/84 seasons.

Table 56 Rice planting methods and transplanted area.

1983 wet season

	Planting method (%)			% of area transplanted
	Transplanting	Direct sowing	Both methods	
Pilot No. 1	61.9(26)	14.3(6)	23.8(10)	77.7
Thatakor	95.2(20)	0.0	4.8(1)	98.4
Nongplamor	100.0(21)	0.0	0.0	100.0
Pilot No. 2	78.6(33)	4.8(2)	16.7(7)	85.2
Doncha-em	85.7(36)	4.8(2)	9.5(4)	91.3

1984 dry season

Pilot No. 1	2.5(1)	90.0(36)	7.5(3)	5.2
Thatakor	36.8(7)	15.8(3)	47.4(9)	63.7
Nongplamor	-	-	-	-
Pilot No. 2	45.2(19)	28.6(12)	26.2(11)	56.7
Doncha-em	68.3(28)	19.5(8)	12.2(5)	74.6

Note: Figures in brackets are number of farmers reporting.

For the 1983 dry season rice, all farmers practiced the transplanting rice cultivation in Nongplamor, 95 percent of them transplanted and the rest (1 farmer) adopted both methods in Thatakor. In other areas, some limited number of farmers practiced solely direct sowing (14 % in Pilot No. 1, 5 % each in Pilot No. 2 and Doncha-em), and some other farmers adopted both methods (24 % in Pilot No. 1, 17 % in Pilot No. 2, and 10 % in Doncha-em). However, those who transplanted all the paddy fields were more in the 3 areas of Pilot No. 1 (62 %), Pilot No. 2 (79 %), and Doncha-em (86 %). Consequently, the area of transplanted field was all in Nongplamor, 98 percent in Thatakor, 91 percent in Doncha-em, 85 percent in Pilot No.2, and 78 percent in Pilot No. 1 in the season.

For the 1984 dry season rice, the area of transplanted field was decreased to 5 percent in Pilot No. 1, 64 percent in Thatakor, 57 percent in Pilot No. 2, and 75 percent in Doncha-em. The difference of the transplanted area between the seasons is quite surprising one. For the dry season, only 3 percent (1 farmer) transplanted all the paddy field in Pilot No. 1, 37 percent in Thatakor, 45 percent in Pilot No. 2, and 68 percent in Doncha-em. In Pilot No. 1, 90 percent of the farmers adopted the solely direct sowing method. In Thatakor, 47 percent of them adopted the both methods, and 16 percent direct seeded all the paddy fields. Rather more farmers practiced only direct sowing in Pilot No. 2 (29 %, and 26 % adopted the both methods) and Doncha-em (20 %, and 12 % adopted the both methods).

## 2. Nursery Preparation

Table 57 shows the practice of nursery preparation. Only 19 percent of the farmers in Thatakor and 29 percent in Nongplamor prepare nursery by themselves. It is 57 percent in Pilot No. 1, 62 percent in Pilot No. 2, and 64 percent in Doncha-em.

Table 57 Nursery preparation.

	Prepared by family (%)	Make furrows	
		Percent	Common width of seed bed (m)
Pilot No. 1	57.1	54.8	2(2), 3(5), 4(12), 6(1)
Thatakor	19.0	9.5	4(3), 6(1)
Nongplamor	28.6	14.3	3(1), 4(1), 6(2)
Pilot No. 2	61.9	61.9	2(6), 3(5), 4(11), 6(1)
Doncha-em	64.3	64.3	3(5), 4(10), 5(2), 6(3)

Note: Figures in brackets are number of farmers reporting.

All of the farmers in Pilot No. 2 and Doncha-em, except 1 farmer in Pilot No. 1, and about one half of Thatakor and Nongplamor make furrows when

they prepare the nursery. Although the width of the seed bed ranges from 1 m to 20 m, many farmers make the width within the range of 2 m to 6 m.

### 3. Seedling Age for Transplanting

Seedling age for transplanting is given in Table 58. It is quite different between traditional varieties and HYVs. Farmers in Pilot No. 2 and Doncha-em transplant younger seedlings of traditional varieties. The farmers in Pilot No. 2 start transplanting work with the average age of 26 days old seedlings, and finish with 36 days old seedlings, while those in Thatakor start with 30 days old seedlings and end with 48 days old seedlings.

Table 58 Seedling age for transplanting (days old).

	Traditional varieties			HYVs		
	Youngest	Oldest	Mean	Youngest	Oldest	Mean
Pilot No. 1	28.1	40.4	34.2	21.3	28.9	25.1
Thatakor	29.8	47.6	38.6	22.2	31.2	26.6
Nongplamor	28.8	44.4	36.6	23.4	33.6	28.5
Pilot No. 2	25.5	36.2	30.8	21.3	29.7	25.5
Doncha-em	27.2	36.5	31.8	20.2	27.8	24.0

Farmers transplant younger seedlings of HYVs in all the areas. The average age of youngest seedlings ranges 20 days for Doncha-em to 23 days for Nongplamor (average of 5 farmers who planted HYVs in 1984). The age of oldest seedlings ranges from 28 days for Doncha-em to 34 days for Nongplamor. Only about one half of the farmers in the pilot areas and Doncha-em finish transplanting of HYVs in less than 25 days after sowing to the nursery.

## III. Irrigation Water

### 1. Source of Irrigation Water to the Paddy Field

Table 59 shows the source of irrigation water. Source of irrigation

water is either rainfed, irrigation canal, pump or their combinations. Irrigation canal is the main source of water supply in all the areas. However, it ranges from 52 percent for Pilot No. 1 to 95 percent for Thatakor. Although there is no farmer using only pump for irrigation, but rather high percent of farmers in Pilot No. 1 (41 %) and Nongplamor (33 %) use pumps together with irrigation canal.

Table 59 Source of irrigation water to the paddy field (%).

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-em
1: Rainfed	0.0	0.0	0.0	0.0	0.0
2: Irrigation canal	52.4	95.2	66.7	92.9	90.5
3: Pump	0.0	0.0	0.0	0.0	0.0
4: 1 + 2	2.4	4.8	0.0	4.8	0.0
5: 1 + 3	0.0	0.0	0.0	0.0	0.0
6: 2 + 3	40.5	0.0	33.3	2.4	9.5
7: 1 + 2 + 3	4.8	0.0	0.0	0.0	0.0

## 2. Farmers Feeling on Water Supply to the Paddy Field

Situations of water supply to the paddy field are shown in Table 60. About 91 percent of the farmers in Nongplamor, where only the supplementary irrigation for wet season rice is available at present, satisfy the irrigation water supply and its facilities. Contrastingly, only 52 percent of the farmers satisfy the supply of irrigation water in Pilot No. 1, where intensive type of land consolidation was completed in 1981, but water supply is due to pump operation, then about 33 percent of them face the problem of water shortage. In other areas, about 14 percent each of the farmers in Thatakor face the problems of water shortage, poor drainage, and poor irrigation facilities, and about 10 percent and 7 percent of them in Doncha-em have problems of water shortage and poor irrigation facilities, respectively.

Table 60 Situations of water supply to the paddy fields (%).

	Satis- factory	Problems of			Poor drainage	Poor irrigation facilities
		Not smooth field	Not timely water supply	Water shortage		
Pilot No. 1	52.4	4.8	4.8	33.3	4.8	0.0
Thatakor	57.1	0.0	0.0	14.3	14.3 <sup>a</sup>	14.3
Nongplamor	90.5	4.8	0.0	4.8	0.0	0.0
Pilot No. 2	81.0	4.8	2.4	4.8	4.8	2.4
Doncha-em	78.6	0.0	2.4	9.5	2.4 <sup>a</sup>	7.1

Note: <sup>a</sup> Include flood (1 farmer each).

### 3. Pump Use for Rice Cultivation

Practice of pump use is shown in Table 61. Two third of the farmers in Nongplamor and one half in Pilot No. 1 use pump, while it is one fourth in Doncha-em, 5 percent in Pilot No. 2, and none in Thatakor.

Most of the farmers use pumps for irrigated paddy fields. One farmer in Pilot No. 1 use the pump for rainfed paddy field, and one each in Pilot No. 1 and Doncha-em uses the pump for both of rainfed and irrigated paddy fields.

The pump is only used in wet season in Nongplamor where only wet season rice is planted. It is used in both seasons in other 3 areas. Number of farmers using pumps in both seasons are 9 in Pilot No. 1, 8 in Doncha-em, and 1 in Pilot No. 2. There are some farmers who use the pumps in dry or wet season only. In Pilot No. 1, 9 farmers use the pumps only in wet season, which is quite contrasting to that only one farmer uses the pump only for dry season in the area.

The purpose of using pump is only for irrigation in Nongplamor.

Table 61 Practice of pump use for rice cultivation.

	Pilot No. 1	Thatakor	Nongplamor	Pilot No. 2	Doncha-en
% of use	50.0 (21)	0.0	66.7 (14)	4.8 (2)	26.2 (11)
Kind of paddy field					
Rainfed	(1)	-	-	-	-
Irrigated	(19)	-	(14)	(2)	(10)
Both	(1)	-	-	-	(1)
Crops season: Wet					
	(9)	-	(14)	(1)	(2)
Crops season: Dry					
	(1)	-	-	-	(1)
Crops season: Both					
	(11)	-	-	(1)	(8)
Purpose: Irrigating					
	(18)	-	(14)	(1)	(6)
Purpose: Draining					
	(1)	-	-	(1)	(1)
Purpose: Both					
	(2)	-	-	-	(4)

Note: Figures in brackets are number of farmers reporting.



There are some farmers who use the pumps for draining water (1 farmer each in other 3 areas), and some other farmers use the pumps for both irrigation and drainage purposes (2 farmers in Pilot No. 1 and 4 farmers in Doncha-em).

#### 4. Irrigation Water Fee

Table 62 presents information on irrigation water fee. It is paid by all the farmers in Pilot No. 2, except 1 farmer in Pilot No. 1, and 19 percent in Doncha-em (8 farmers). The farmers paying the irrigation water fee (or maintenance fee for on-farm irrigation facilities) are those who have paddy fields in the pilot areas. So far, it is not collected outside of the pilot areas. Those farmers in Doncha-em have paddy fields in Pilot No. 2.

Table 62 Irrigation water fee.

	% of farmers paying	Amount (฿/rai/year)	Time of payment	Reason of not paying
Pilot No. 1	97.6	70	Every season(35) <sup>a</sup>	Not enough water(1)
Thatakor	0.0	-	-	No collection
Nongplamor	0.0	-	-	No collection
Pilot No. 2	100.0	40	Every year(42)	-
Doncha-em	19.0	40	Every year(8)	No collection

Notes: Figures in brackets are number of farmers reporting.

<sup>a</sup> 6 farmers pay every year.

The irrigation water fee is 70 Baht and 40 Baht per rai per year for Pilot No. 1 and No. 2, respectively. Some 6 farmers pay the fee yearly, and the rest of 35 farmers pay every crop season (35 Baht/rai) in Pilot No. 1. All farmers in Pilot No. 2 and 8 farmers in Doncha-em pay the fee every year.

One farmer in Pilot No. 1 has reported that poor water supply is the reason of not paying the irrigation water fee. Although the rest of the

farmers have reported that there is no collection of the fee, some farmers in Thatakor and Doncha-em have mentioned that they attended the orientational meetings about the payment of the fee.

#### IV. Labour

##### 1. Manpower Necessary for Rice Cultivation

It was difficult to obtain the total number of labour force necessary for rice cultivation. Many farmers confused when they were asked the ability of land preparation (especially those done in contract) and other farming works. However, based on their answers and discarding some untrustful ones, it may safe to state the following abilities or number of persons for respective work as shown in Table 63.

Table 63 Number of persons necessary for rice cultivation (persons/rai).

	Transplanting field	Direct sowing field
Ploughing	3-5 rai/day (power tiller)	
Puddling and leveling	3-5 rai/day (power tiller)	
Uprooting of seedlings	2-3	-
Transplanting	4-5	-
Direct sowing	-	0.1-0.2
Fertilizer application	0.1-0.2	
Weeding	1-10	
Harvesting	4-5	
Bundling and hauling	2-6	

Ability of land preparation depends on the capacity of power tillers (or tractors), ability of operators, soil conditions, and so on. Ploughing ability of the machines ranged mostly within 2 to 10 rai per day, but many farmers reported 3 to 5 rai per day. Puddling and leveling ability was

similar to the ploughing ability in total, although some farmers reported that ploughing took more time or vice versa. There were 2 farmers who used water buffalos, its ability of ploughing or puddling was 0.5 to 1.0 rai per day (based on the 2 farmers).

The uprooting of seedlings requires 2 to 3 persons to prepare enough seedling bundles for 1 rai of main field. Transplanting requires about 4 to 5 person per rai, while one farmer can finish direct sowing of 5 rai to 10 rai in a day. Ability of fertilizer application is similar to that of direct sowing. Harvesting requires about 4 to 5 persons per rai either direct seeded or transplanted field. Other works, such as nursery preparation and care, weeding, chemical application, bundling and hauling, and threshing depend on situations.

## 2. Hired Labour Cost

Many farmers used hired labour for rice cultivation. Labour cost for rice farming can be separated into wage for daily work or simple manual work in contract and contract work with machinery. Table 64 shows the hired labour cost for rice cultivation.

Table 64 Hired labour cost for rice cultivation (Baht/farm).

	1983 wet season	1984 dry season
Pilot No. 1	2,212.50(22)	1,115.50(20)
Thatakor	480.67(15)	371.43(7)
Nongplamor	2,853.13(16)	-
Pilot No. 2	1,180.56(27)	781.52(23)
Doncha-em	2,978.65(26)	1,933.64(22)

Note: Figures in brackets are number of farmers reporting.

More than one half of the farmers use the hired labours for rice cultivation except Thatakor in dry season. The cost of hired labour is

higher in Doncha-em and Nongplamor, but lower in Thatakor. The average cost of hired labour was about 3,000 Baht in Doncha-em (average of 26 farmers) and about 2,850 Baht in Nongplamor (16 farmers) in 1983 wet season rice cultivation, while it was about 500 Baht in Thatakor (15 farmers). The cost was lower in 1984 dry season rice in all the areas, but still it was about 2,000 Baht in Doncha-em (22 farmers).

The labour cost is probably affected by paddy planted area, labour force value for own farm, practice of labour exchange, planting methods, and others. The average area of rice planted was wider for Nongplamor, and its labour value is less than other areas. Lesser number of farmers practice labour exchange in Doncha-em, and the average area of rice planted was small for Thatakor in 1984 dry season. Direct sowing is more widely practiced in dry season especially in Pilot No. 1.

### 3. Wage of Farming Work

Wages of farming works are usually paid in cash. Only 2 farmers in Nongplamor mentioned the payment by the amount of rice. Table 65 shows the standard wage and highest wage at different study areas.

Table 65 Wage of farming work (Baht/person/day).

	Standard wage	Highest wage (and kind of work)	
Pilot No. 1	35	40-45	(Bundling and hauling)
Thatakor	35	40-45	(Bundling and hauling)
Nongplamor	40 (35-50)	50-80	(Bundling and hauling)
Pilot No. 2	35	40-60	(Bundling and hauling)
Doncha-em	30-35	40-60	(Bundling and hauling)

Standard wage is 35 Baht per person per day in the pilot areas and Thatakor. It is about 40 Baht (ranges 35-50 Baht) in Nongplamor, and 30 to 35 Baht in Doncha-em. However, bundling and hauling works require more wage

in all the areas. It is 40 to 45 Baht in Pilot No. 1 and Thatakor, 50 to 80 Baht in Nongplamor, and 40 to 60 Baht in Pilot No. 2 and Doncha-em.

Table 66 shows the hired labour cost for 1983 wet and 1984 dry season rice cultivation (excluding that of land preparation and threshing). At most, about 76 percent of the farmers in Nongplamor used hired labours for rice cultivation. Percent of the farmers used the hired labours was lower in other areas.

Farmers in Doncha-em paid the highest amount of money to the labours per unit area. They paid about 166 Baht for 1 rai in 1983 wet season, and 145 Baht in 1984 dry season. The cost was least in Thatakor, where the farmers paid 44 Baht of labour cost for the wet and 65 Baht for the dry season.

The labour cost on the unit area of direct sowing field was lower than that of transplanting field in all the areas in 1983 wet season. In 1984 dry season, it was lower for Thatakor and Pilot No. 2, but higher for Pilot No. 1 and Doncha-em.

#### 4. Payment for Contract Work

Besides daily wage for farm labours, there are several kinds of contract works. Among those who do not have own machines, contracted land preparation is the common practice in all the study areas. Table 67 shows the conditions of contracted land preparation. About one half of the farmers in Pilot No. 1 and Nongplamor pay the land preparation fee by certain amount of rice. In other 3 areas, it is usually paid in cash. Cash equivalent of the contracted land preparation in average is about 215 Baht per rai for Pilot No. 1, 195 Baht for Thatakor, 180 Baht for Nongplamor, 205 Baht for Pilot No. 2, and 200 Baht for Doncha-em. The land preparation fee is quite similar between the wet and dry seasons.

Threshing work is another contract work widely adopted by the farmers.

Table 66 Hired labour cost for one rai of rice cultivation<sup>a</sup>.

	Transplanting <sup>b</sup>		Direct sowing <sup>b</sup>		Total	
	% paid	Average (฿/rai)	% paid	Average (฿/rai)	% paid	Average (฿/rai)
1983 wet season						
Pilot No. 1	45.7	122.7 (16)	62.5	46.5 (10)	52.4	97.9 (22)
Thatakor	71.4	43.6 (15)	0.0	0.0	71.4	43.6 (15)
Nongplamor	76.2	107.4 (16)	-	-	76.2	107.4 (16)
Pilot No. 2	66.7	100.5 (26)	66.7	29.2 (6)	64.3	94.3 (27)
Doncha-em	60.0	166.0 (24)	66.7	158.8 (4)	61.9	165.8 (26)
1984 dry season						
Pilot No. 1	66.7	7.0 (2)	48.7	53.1 (19)	51.3	50.6 (20)
Thatakor	37.5	91.3 (6)	33.3	23.3 (4)	36.8	64.8 (7)
Nongplamor	-	-	-	-	-	-
Pilot No. 2	55.6	115.3 (15)	47.4	61.8 (9)	54.8	86.4 (23)
Doncha-em	51.5	130.9 (17)	53.8	166.3 (7)	53.7	145.3 (22)

Notes: Figures in brackets are number of farmers reporting.

<sup>a</sup> Exclude land preparation and threshing.

<sup>b</sup> Based on the data which can be classified into transplanting and direct sowing rice cultivation.

Table 67 Payment for land preparation (per rai)

1983 wet season		Actual practice	Average (Baht) <sup>b</sup>
Pilot No. 1	70 kg (2), 80 kg (8), 180 Baht (2), 200 Baht (7), 220 Baht (3)		216 (22)
Thatakor	50 kg (1), 180 Baht (1), 200 Baht (6)		191 (8)
Nongplamor	36 kg (1) <sup>a</sup> , 60 kg (5), 180 Baht (1), 200 Baht (2), 205 Baht (1)		179 (10)
Pilot No. 2	200 Baht (16), 250 Baht (2)		206 (18)
Doncha-em	200 Baht (17)		200 (17)
1984 dry season			
Pilot No. 1	70 kg (2), 80 kg (8), 180 Baht (2), 200 Baht (6), 220 Baht (2)		217 (20)
Thatakor	180 Baht (1), 200 Baht (6)		197 (7)
Nongplamor	-		-
Pilot No. 2	60 kg (1), 200 Baht (16), 250 Baht (1)		202 (18)
Doncha-em	200 Baht (15)		200 (15)

Notes: Figures in brackets are number of farmer reporting.

<sup>a</sup> Quite wide area of 42 rai (1500 kg/42 rai).

<sup>b</sup> Based on a rice price of 3 Baht per kg.

Practices of contracted threshing and other contracted works are given in Table 68. Conditions of threshing is either 30 kg or 40 kg of rice per ton of threshed rice. Most farmers in Pilot No. 1 pay 40 kg (86 % in 1983 wet and 92 % in 1984 dry season), while all the farmers in Nongplamor pay 30 kg. In other areas, 30 kg is usually the amount of rice paid for threshing.

Except that of land preparation and threshing, there is no contracted work in Nongplamor. In other areas, some farmers adopt contracted transplanting and harvesting. Direct sowing is also done in contract in Pilot No. 1, and some limited number of farmers in Pilot No. 2 and Doncha-em adopt contracted uprooting of seedlings. Most farmers pay in cash for the respective work, and the rest by amount of rice. Cash equivalent of contracted works are, about 150 to 200 Baht for transplanting or harvesting, 20 Baht for direct sowing of 1 rai of paddy field, and 35 Baht per 100 bundles of uprooted seedlings. However, the payment for contracted works ranges widely as shown in the table.

#### V. Fuel and Lubricant Cost

Fuel and lubricant cost of rice farming is given in Table 69. The payment for contracted works of land preparation and threshing is not included.

The fuel and lubricant cost can be classified into that of land preparation, pump operation, and threshing. For the fuel and lubricant cost of land preparation, many farmers included the cost of land preparation of other farmer fields, and that of pump operation, because they could not separate each other. In this report, the cost of land preparation was taken from between the values of 20 Baht to 60 Baht per rai, and those lower or higher than the values were adjusted accordingly.

There were 12 farmers in Pilot No. 1, 6 farmers in Nongplamor, and



Table 68 Payment for contract threshing and other contract works.

1983 wet season		Threshing (kg/ton)	Other kind of works (Baht/rai or other forms)
Pilot No. 1	30 (6), 40 (36)	T <sup>a</sup> :150 (2), 200 (1), 220 (2), 250 (1), D <sup>b</sup> :20 (5), H <sup>c</sup> :150 (4), BH <sup>d</sup> :100 (1)	
Thatakor	30 (17), 40 (4)	T :300 (1), H :40 kg/rai (1)	
Nongplamor	30 (20), Free (1)	-	
Pilot No. 2	30 (35), 40 (6)	U <sup>e</sup> :35 Baht/100 bundles (3), T :170 (1), 200 (4), H :60 kg/rai (1), 200 (2)	
Doncha-em	30 (26), 40 (12)	U :35Baht/100bundles(1),T:150(5),160(4),200(1),H:40kg/rai(1),150(5),170(1),200(1)	
		B <sup>f</sup> :30	
1984 dry season			
Pilot No. 1	30 (3), 40 (36)	D :20 (12), 25 (1), H :150 (3), BH :100 (1)	
Thatakor	30 (19), 40 (1)	T :300 (1), D :20 (1)	
Nongplamor	-	-	
Pilot No. 2	30 (37), 40 (4)	U :35 Baht/100 bundles (1), T :200 (4), H :60 kg/rai (1), 200 (1)	
Doncha-em	30 (29), 40 (9)	T:150(2),160(3),200(1),H:60kg/rai(1),150(1),160(1),170(1),200(2),BH:400Baht/month.	

Notes: Figures in brackets are number of farmers reporting.

<sup>a</sup> Transplanting, <sup>b</sup> Direct sowing, <sup>c</sup> Harvesting, <sup>d</sup> Bundling and hauling, <sup>e</sup> Uprooting, <sup>f</sup> Bundling, respectively.

Table 69 Fuel and lubricant cost

1983 wet season

	Total cost		For land preparation (Baht/rai)		For pump (Baht/rai)	For thresher (Baht/ton)	
	Reported (฿/farm)	Adjusted ฿/farm	Reported <sup>a</sup>	Adjusted			
Pilot No. 1 (42)	965.1 (26)	932.8	48.2	14-96 (20)	20-60	25.6 (12)	0.0
Thatakor (21)	1,366.5 (13)	1,193.1	51.9	19-167 (13)	20-60	0.0	0.0
Nongplamor (21)	1,076.4 (14)	1,067.9	39.2	10-67 (11)	20-60	20.9 (6)	0.0
Pilot No. 2 (42)	1,223.7 (25)	743.6	50.0	18-208 (24)	20-60	0.0	35.0 (1) <sup>b</sup>
Doncha-em (42)	1,312.1 (27)	1,080.4	64.9	18-250 (25)	20-60	35.3 (4)	33.5 (4)
1984 dry season							
Pilot No. 1 (40)	765.5 (22)	730.3	47.5	11-96 (20)	20-60	22.9 (5)	0.0
Thatakor (19)	530.2 (12)	401.2	55.3	14-152 (12)	20-60	0.0	0.0
Nongplamor (0)	-	-	-	-	-	-	-
Pilot No. 2 (42)	939.0 (25)	536.7	43.4	18-113 (24)	20-60	0.0	35.0 (1) <sup>b</sup>
Doncha-em (41)	787.7 (27)	718.0	62.4	10-150 (26)	20-60	35.4 (5)	32.7 (3)

Notes: Figures in brackets are number of farmers reporting.

<sup>a</sup> Many farmers included the fuel and lubricant cost of other farmer fields or that of pump operation.<sup>b</sup> The farmer spent 9,000 Baht for wet and 8,000 Baht for dry season, the was estimated from those in Doncha-em.

4 farmers in Doncha-em, who separately reported the fuel and lubricant cost for pump operation for 1983 wet season rice. The average cost was 26 Baht per rai for Pilot No. 1, 21 Baht for Nongplamor, and 35 Baht for Doncha-em. There were 5 farmers each in Pilot No. 1 and Doncha-em who mentioned the cost of pump operation for 1984 dry season rice, then the average was 23 Baht per rai for Pilot No. 1 and 35 Baht for Doncha-em.

There are one farmer in Pilot No. 2 and 4 farmers in Doncha-em who have own threshing machines. The farmer in Pilot No. 2 could not separate the fuel and lubricant cost for his own farm and other contract works. He spent 9,000 Baht in 1983 wet season and 8,000 Baht in 1984 dry season. The value of 35 Baht per 1 ton of rice was estimated from those in Doncha-em, where 2 farmers in the wet and a farmer in the dry season reported the value.

Total fuel and lubricant cost was rather low for Nongplamor (39 Baht/rai), and rather high for Doncha-em (65 Baht/rai for wet and 62 Baht/rai for dry season). There observed a small differences in the fuel and lubricant cost per unit area between the season.

#### VI. Fertilizer Application.

Table 70 shows the fertilizer application to 1983 wet and 1984 dry season rice. Although fertilizer is used by most farmers in the areas, there are some differences between planting seasons, varieties, and areas. More than 90 percent of the farmers in Pilot No. 1, Nongplamor and Pilot No. 2, 69 percent in Doncha-em, and 52 percent in Thatakor applied fertilizer to 1983 wet season rice. All the farmers in Thatakor, Pilot No. 2 and Doncha-em applied fertilizer to HYVs, while it was 93 percent in Pilot No. 1. On the other hand, 71 percent of the farmers in Pilot No. 1, 50 percent in Thatakor, 95 percent in Nongplamor, 78 percent in Pilot No. 2, and 67 percent in Doncha-em used fertilizer to traditional varieties. Every farmer, who

Table 70 Fertilizer application

	% of farmers applied		Average cost (Baht/rai)		Nitrogen rate (kg/rai)		% of split application			
	HVY	Local	Total	HVY	Local	Total	HVY	Local		
1983 wet season										
Pilot No. 1	92.9	71.4	90.5	91.0	76.7	77.5(38)	6.1 (26)	4.9 (20)	61.5	50.0
Thatakor	100.0	50.0	52.4	152.7	59.2	78.5(11)	9.0 (3)	2.5 (10)	100.0	50.0
Nongplamor	-	95.2	95.2	-	80.3	80.3(20)	-	3.1 (20)	-	35.0
Pilot No. 2	100.0	77.8	97.6	151.5	124.2	136.3(41)	7.8 (34)	7.4 (21)	58.8	42.9
Doncha-em	100.0	66.7	69.0	168.1	118.5	126.6(29)	8.8 (8)	6.5 (26)	87.5	50.0
1984 dry season (all HVYs)										
Pilot No. 1	100.0			112.8			6.9 (40)		77.5	
Thatakor	100.0			161.4			7.9 (19)		89.5	
Nongplamor	-			-			-		-	
Pilot No. 2	100.0			140.8			8.9 (42)		50.0	
Doncha-em	100.0			147.0			8.1 (41)		65.9	

Notes: Figures in brackets are number of farmers reporting.

Means are based on the number of farmers reporting.

planted dry season rice used fertilizer in 1984.

Fertilizer cost is more for HYVs and more for dry season. In the wet season, the average cost of fertilizer was about 80 Baht per rai for Pilot No. 1, Thatakor and Nongplamor, while it was about 130 Baht for Pilot No. 2 and Doncha-em. The cost was about 110 Baht per rai for Pilot No. 1, 160 Baht for Thatakor, 140 Baht for Pilot No. 2, and 150 Baht for Doncha-em in the dry season.

Nitrogen fertilizer rate is more for HYVs, but it is almost similar between the HYVs planted in wet and dry season. The least nitrogen rate was observed for the traditional varieties in Thatakor (2.5 kg of N/rai), followed by that in Nongplamor (3.1 kg of N/rai). The highest rate was found for the HYVs in Thatakor in the wet season (9.0 kg of N/rai), followed by that in Pilot No. 2 in the dry season (8.9 kg of N/rai). The rate for HYVs in Pilot No. 1 was lowest in the both crop seasons (6.1 kg for the wet and 6.9 kg for the dry season).

The farmers practice the split application of fertilizer more for HYVs than for traditional varieties. At least 50 percent of the farmers practiced the split application to the HYVs, and at most 50 percent to the traditional varieties.

## VII. Chemical Application

Practice of chemical use is shown in Table 71. More than 90 percent of the farmers used chemicals in Pilot No. 1 in 1983 wet and 1984 dry season. Percent of the farmers used chemicals was lower in other areas, but at least one half of them used chemicals regardless the crop seasons.

The cost of chemicals ranged from 12.6 Baht per rai for Nongplamor (in the wet season) to 56.7 Baht per rai for Thatakor (in the dry season). The cost was most for Thatakor regardless the crop seasons. Many farmers

Table 71 Practice of chemical use.

	% of farmers used			Average cost (Baht/rai)			Purpose: Control of				
	HYV	Local	Total	HYV	Local	Total	Weed	Insect	Disease	Crab	Rat
1983 wet season											
Pilot No. 1	96.4	75.0	90.5	24.3 (27)	19.8 (21)	22.3 (38)	(30)	(9)	-	(10)	-
Thatakor	100.0	50.0	52.4	73.0 (3)	16.0 (10)	29.8 (11)	(6)	(1)	(1)	(6)	-
Nongplamor	-	61.9	61.9	-	12.6 (13)	12.6 (13)	(7)	(4)	-	(3)	-
Pilot No. 2	67.6	55.6	64.3	23.7 (23)	19.8 (15)	20.6 (27)	(14)	(10)	-	(3)	(1)
Doncha-em	62.5	66.7	66.7	12.8 (5)	18.3 (26)	17.1 (28)	(13)	(7)	-	(5)	(2)
1984 dry season (all HYVs)											
Pilot No. 1	92.5			21.5 (37)			(32)	(7)	-	(2)	-
Thatakor	73.7			56.7 (14)			(12)	(3)	-	-	(1)
Nongplamor	-			-			-	-	-	-	-
Pilot No. 2	71.4			21.0 (30)			(20)	(8)	-	(2)	(1)
Doncha-em	51.2			28.6 (21)			(12)	(6)	-	(5)	(2)

reported using chemicals for weed control, followed by insects and crab control.

#### VIII. Rice Yield

Rice yield of HYVs, traditional varieties and their average, and the gross income from rice cultivation are in Table 72. In 1983 wet season, the average yield of HYVs was higher than that of traditional varieties. Although there were only limited samples of HYVs in Thatakor and Doncha-em, the difference between the yields of HYVs and traditional varieties was 37 kg per rai in Pilot No. 1, 241 kg in Thatakor, 23 kg in Pilot No. 2, and 141 kg in Doncha-em. The highest average yield was 571 kg per rai for Pilot No. 2, and the lowest average yield was 465 kg per rai for Nongplamor. Standard deviation of the rice yield was lowest for Pilot No. 1 (95 kg), and highest for Doncha-em (154 kg).

The average yield of 1984 dry season rice was higher than that of 1983 wet season in all the areas where dry season rice was planted. The highest average yield was 718 kg per rai for Thatakor, and the lowest average was 576 kg per rai for Pilot No. 1. The difference in rice yield between the crop seasons was 76 kg per rai for Pilot No. 1, 221 kg for Thatakor, 117 kg for Pilot No. 2, and 184 kg for Doncha-em. Trend of the standard deviation of the yield in the dry season was similar to that of the wet season, but the range was wider in the dry season (111 kg for Pilot No. 1 to 178 kg for Doncha-em).

The average unit price of rice (unhulled) ranged from 3,026 Baht per ton for Pilot No. 1 to 3,317 Baht per ton for Nongplamor in 1983 wet season. It ranged from 3,021 Baht per ton for Thatakor to 3,234 Baht per ton for Doncha-em in 1984 dry season.

Table 72 Rice yield and gross income.

1983 wet season	Rice yield (kg/rai)			Unit price (Baht/ron)	Planted area (rai/farm)	Gross income (Baht/farm)
	HYV <sup>a</sup>	Local	Average SD <sup>b</sup>			
Pilot No. 1	511.1 (22)	474.5 (22)	499.7 (42) 95.2	3,066.0	19.34	29,630.4
Thatakor	725.0 (2)	483.9 (19)	497.4 (21) 105.0	3,071.4	23.00	35,137.4
Nongplamor	-	465.2 (21)	465.2 (21) 101.1	3,316.7	27.24	42,029.4
Pilot No. 2	589.3 (28)	567.8 (21)	571.3 (42) 148.1	3,026.4	14.88	30,230.5
Doncha-em	615.0 (3)	474.2 (33)	488.6 (42) 154.4	3,069.1	16.64	24,952.7
1984 dry season (all HYVs)						
Pilot No. 1		576.1 (39)	110.6	3,139.2	15.38	27,814.6
Thatakor		718.4 (19)	137.9	3,021.1	7.26	15,756.8
Nongplamor		-	-	-	-	-
Pilot No. 2		688.6 (42)	155.5	3,064.3	12.37	26,101.7
Doncha-em		672.7 (41)	178.1	3,234.2	11.51	25,041.7

Notes: Figures in brackets are number of farmer reporting.

<sup>a</sup> Based on the data can be classified into HYVs and local varieties.

<sup>b</sup> Standard deviation of average yield.



## IX. Handling of Harvested Rice

Information on handling of harvested rice is given in Table 73. Percent of the farmers having storage facilities is more in Doncha-em (81 %), and less in Pilot No. 1 (19 %). At least two third to at most 90 percent of the farmers sell rice just after the threshing. One third in Nongplamor and 29 percent in Doncha-em sell rice when the price is high. Buyers of rice are either rice-mill owners or middlemen. More percent of the farmers sell their rice to the rice-mill owners in Pilot No. 1, Thatakor and Nongplamor, while more farmers sell to other middlemen in Pilot No. 2, and about one half of them sell to the rice-mill owners and the others to the middlemen in Doncha-em.

Table 73 Handling of harvested rice (%)

	Pilot No.1	Thatakor	Nongplamor	Pilot No.2	Doncha-em
Have storage	19.0	38.1	38.1	66.7	81.0
Time of selling rice					
Just after threshing	71.4	71.4	66.7	95.2	66.7
When the price is high	9.5	0.0	33.3	4.8	28.6
Others <sup>a</sup>	19.0	28.6	0.0	0.0	4.8
Buyer of rice					
Rice-mill owner	85.7	76.2	85.7	23.8	45.2
Other middleman	7.1	14.3	14.3	76.2	54.8
Not sell	7.1	9.5	0.0	0.0	0.0

Note: <sup>a</sup> Include home consumption.

Appendix 1 Questionnaire of the farm survey.

Farm No: \_\_\_\_\_  
(F001)

Area No: \_\_\_\_\_  
(F002)

Date of interview: \_\_\_\_\_.

Name of interviewer: \_\_\_\_\_.

SITUATIONS OF FAMILY AND HOUSE

1. Name of family head: \_\_\_\_\_.

2. Educational background of family head: 1 Primary school incomplete,  
(F101)  
2 Primary school graduate, 3 Secondary school incomplete, 4 Secondary school  
graduate, 5 none, 6 others ( \_\_\_\_\_ ).

3. Name of the person interviewed and his or her relation to family head:  
\_\_\_\_\_.

4. Address: \_\_\_\_\_.

5. Period of stay at present address: 1 less than 10 years, 2 Between 10 to  
(F102)  
30 years, 3 More than 30 years.

6. Source of living water: 1 Water pipe, 2 Deep tube well, 3 Shallow well,  
(F103)  
4 Stream or canal, 5 Others ( \_\_\_\_\_ ).

7. Electricity: Have or not have. If have, since which year: \_\_\_\_\_.  
(F104)

8. Major consumer durables. Please tell how many units of followings you have.  
(F106-F120)

1) Bicycle: \_\_\_\_\_ . 1) Radio: \_\_\_\_\_ . 1) Electric fan: \_\_\_\_\_ .

2) Radio-tape recorder: \_\_\_\_\_ . 2) Black and white TV set: \_\_\_\_\_ .

2) Sewing machine: \_\_\_\_\_ . 2) Rice cooker: \_\_\_\_\_ .

3) Motorcycle: \_\_\_\_\_ . 3) Generator: \_\_\_\_\_ .

4) Gas table: \_\_\_\_\_ . 4) Refrigerator: \_\_\_\_\_ .

5) Color TV set: \_\_\_\_\_ . 8) Pick-up truck: \_\_\_\_\_ .

Others: \_\_\_\_\_ .

9. Telephone: Have or not have. If have, since which year: \_\_\_\_\_ .  
(F121) (F122)



SITUATIONS OF FARM AND TENURE SYSTEM

1. Land and tenure (all agricultural land including fish pond, rai).  
(F201-F222)

Kind of land	Own	Lease in	Lease out	Area within pilot project
<u>Paddy field</u>				
<u>Rainfed</u>				
<u>Irrigated</u>				
<u>Sugarcane land</u>				
<u>Not irrigable</u>				
<u>Irrigable</u>				
<u>Upland</u>				

2. Type of irrigation for paddy field: 1 Rainfed, 2 Irrigated, 3 Pump, 4 Rainfed and irrigated, 5 Rainfed and pump, 6 Irrigated and pump, 7 All 1, 2 and 3.  
(F223)

3. Have you purchased or sold land in last 5 years? Yes or No If yes,  
(F224-F225)

Kind of land*	Purchased or sold	Area (rai)	Value (฿/rai)	Year

- 1) Kind of land: 1 Rainfed paddy, 2 Irrigated paddy, 3 Not irrigable sugarcane land, 4 Irrigable sugarcane land, 5 Others (specify).

4. Livestock and poultry.  
(F226-F231)

Kind of animal	Number	Kind of animal	Number
<u>Cattle</u>	<u>          </u>	<u>Chickens</u>	<u>          </u>
<u>Water buffalo</u>	<u>          </u>	<u>Ducks</u>	<u>          </u>
<u>Swine</u>	<u>          </u>		<u>          </u>

5. If you have land of lease in or lease out, please tell the conditions of lease in or lease out.

Kind of land*	Area (rai)	Lease in or out	Amount of payment* fixed*	Share or year	Since which year	Time of payment*	Contract period*	Position of lessor/lessee*	Address of lesser/lessee*

1) Kind of land: 1 Rainfed paddy field, 2 Irrigated paddy field, 3 Not irrigable sugarcane land, 4 Irrigable sugarcane land, 5 Not irrigable upland, 6 Irrigable upland, 7 Others (specify).

2) Amount of payment: Specify ฿ \_\_\_\_\_/crop, ฿ \_\_\_\_\_/year, \_\_\_\_\_ kg of rice/ crop, \_\_\_\_\_ kg of rice/year, \_\_\_\_\_ % of products, or other forms. If there is difference between wet and dry season, please tell both of them.

3) Share or fixed: 1 Fixed cash, 2 Fixed products, 3 Share (percent of) products, 4 Free, 5 Others (specify).

4) Time of payment: 1 Before planting, 2 After harvesting, 3 Others (specify).

5) Contract period: 1 Every crop season, 2 Every year, 3 Every 2 years, 4 Every 3 years, 5 Others (specify).

6) Position of lessor or lessee: 1 Relative, 2 Neighboring farmer, 3 Merchant, 4 Other private personal, 5 Government, 6 Others (specify).

7) Address of lessor or lessee: 1 Within Tambon, 2 Within Amphur, 3 Others (specify Amphur and Changwat).

(F232-F281)

CROPPING PATTERN (F301-F349)

Please tell the periods of (1) Nursery (nursery field ploughing to end of transplanting): 1, (2) Land preparation: 2,

(3) Transplanting: 3, (4) Direct sowing: 4, (5) Planting of sugarcane and other upland crops: 5, and

(6) Harvesting: 6

Month	1	2	3	4	5	6	7	8	9	10	11	12
Kind of crops												
Rice												
Sugarcane												
Upland crops												

FARM LABOR

1. Labor exchange. Without any actual wage payment, do you work together with (F401) other farmers during transplanting, harvesting or any other farming work?

Yes or No

If yes, please tell the followings.

- 1) With how many farmers: \_\_\_\_\_.  
(F402)
- 2) In what kind of farm families: \_\_\_\_\_  
(F403)
- 3) About how many man-days in one year: \_\_\_\_\_  
(F404)
- 4) How do you call the labor exchange system: \_\_\_\_\_  
(F405)

2. Approximate wages earned by your household members in farming work in one year (excluding labor exchange).

- 1) As farm labor: ₪ \_\_\_\_\_.  
(F406)
- 2) As operator of own farm machine: ₪ \_\_\_\_\_.  
(F407)
- 3) As hired farm machine operator: ₪ \_\_\_\_\_.  
(F408)
- (F409)

3. Ability of farming work (in average).

- 1) Uprooting: \_\_\_\_\_ bundles/person/day, then can be transplanted for (F410) \_\_\_\_\_ rai.
- 2) Transplanting: \_\_\_\_\_ persons/rai.  
(F411)
- 3) Direct sowing: \_\_\_\_\_ persons/rai.  
(F412)
- 4) Harvesting of transplanted field: \_\_\_\_\_ persons/rai.  
(F413)
- 5) Harvesting of direct seeded field: \_\_\_\_\_ persons/rai.  
(F414)
- 6) Weeding: \_\_\_\_\_ persons/rai.  
(F415)
- 7) Fertilizer application: \_\_\_\_\_ persons/rai.  
(F416)
- 8) Bundling of harvested rice: \_\_\_\_\_ persons/rai.  
(F417)

RICE FARMING PRACTICES

1. Renewal of seeds. Have you bought or exchanged seeds in last 5 years?  
(F501-F516)

Yes or No

If yes, please tell the followings.

Name of varieties	Purchased or exchanged	Quantity (kg)	Unit price (฿/kg)	Source*	Year

1) Source: 1 Agricultural extension office, 2 Agricultural demonstration center of Mae Klong project, 3 Relative, 4 Neighboring farmer, 5 Friend, 6 Land owner, 7 Rice-mill owner, 8 Others (specify).

2. Seed selection and treatment. What kind of followings do you practice?

1) Selection of seeds with water: Yes or No  
(F517)

2) Selection of seeds with salt water: Yes or No  
(F518)

3) Seed treatment with chemical: Yes or No  
(F519)

If yes, name of chemical used: \_\_\_\_\_  
(F520)

4) Seed treatment for hastening germination: Yes or No  
(F521)

3. Seed rate.

1) Transplanting: \_\_\_\_\_ tang of seeds for \_\_\_\_\_ ngan of nursery  
(F522)  
and transplanted \_\_\_\_\_ rai.

2) Direct sowing: \_\_\_\_\_ tang of seeds for \_\_\_\_\_ rai.  
(F523)

4. Nursery.

1) Do your family members prepare nursery? Yes or No  
(F524)

2) Do you make furrows in the nursery? Yes or No  
(F525)

If yes, width of each nursery bed: \_\_\_\_\_ m.  
(F526)



3) Seedling age,  
(F527-F532)

(1) Traditional varieties: \_\_\_\_\_ to \_\_\_\_\_ days.

(2) RD varieties: \_\_\_\_\_ to \_\_\_\_\_ days.

5. Land preparation (ploughing, puddling, leveling) of paddy field.

1) Who prepare paddy field: 1 Mostly family members, 2 Mostly family members  
(F533)  
and others working together, 3 Mostly other persons.

2) If prepared by other persons, please tell,

(1) Machine or animal used: \_\_\_\_\_  
(F534)

(2) Position of the owner of machine or animal: 1 Relative,  
(F535)  
2 Neighboring farmer, 3 Friend, 4 Land owner, 5 Rice-mill owner,

6 Others ( \_\_\_\_\_ ).

3) Abilities of machines or animal for following work.  
(F536-F538)

Kind of machine or animal (name and horse power)	Ploughing (rai/day)	Puddling and leveling (rai/day)
---	------------------------	------------------------------------

_____	_____	_____
_____	_____	_____
_____	_____	_____

4) Do you make furrows in paddy field?

(1) Transplanting: Yes or No      If yes, every \_\_\_\_\_ m.  
(F539)      (F540)

(2) Direct sowing: Yes or No      If yes, every \_\_\_\_\_ m.  
(F541)      (F542)

6. Water supply to paddy field.

1) Availability of water to the field (from which month to which month).

(1) Rainfed paddy: From \_\_\_\_\_ to \_\_\_\_\_  
(F543)

(2) Irrigated paddy: From \_\_\_\_\_ to \_\_\_\_\_  
(F544)

2) How do you think about water supply to your paddy field? Select one from  
(F545)

the following: 1 Satisfactory, 2 Problem of not smooth field, 3 Problem  
of not timely water supply, 4 Problem of water shortage, 5 Problem of  
poor drainage, 6 Poor irrigation facilities, 7 Others ( \_\_\_\_\_  
\_\_\_\_\_ ).



1983 WET SEASON RICE (F601-F658)

Please tell the reason if area planted and area harvested were not equal:

Varieties used	Transplanting or direct sowing	Seed cost (฿/kg)	Area planted (rai)	Area harvested (rai)	Rainfed or irrigated	Water fee paid or not paid	Own land or leased in	Yield (kg)	Unit price (฿/kg)	Sold value (฿)

1. Land preparation cost.
  - 1) Conditions of land preparation if done by contractor: \_\_\_\_\_ /rai.
  - 2) Fuel and lubricant cost of land preparation if done by farmer-self: ฿ \_\_\_\_\_.
2. Threshing cost.
  - 1) Conditions if done by contractor: \_\_\_\_\_.
  - 2) Fuel and lubricant cost if done by farmer-self: ฿ \_\_\_\_\_.
3. Fuel and lubricant cost for pump operation (if used): ฿ \_\_\_\_\_.
4. Repair and maintenance cost of farm machines and equipment: ฿ \_\_\_\_\_.

For number of persons hired for farming work, please tell number of persons you paid wages (not include persons of labor exchange).

Fertilizer		Agri-chemical used		Number of persons hired for farming work						
Kind	Quantity	Price	Kind	Quantity	Price	Transplanting	Gap-filling	Harvesting	Bundling & hauling	Others
	(bags or others)	(₹/unit)		(bags or bottles)	(₹/unit)		or direct sowing		threshing	

1. Wage for farm labor. Standard wage: ₹ \_\_\_\_\_/person/day. If changes in some farming work, please mention.

1) Transplanting: ₹ \_\_\_\_\_/person/day. 2) Direct sowing: ₹ \_\_\_\_\_/person/day.

3) Gap-filling: ₹ \_\_\_\_\_/person/day. 4) Weeding: ₹ \_\_\_\_\_/person/day.

5) Harvesting: ₹ \_\_\_\_\_/person/day. 6) Bundling, hauling and threshing: ₹ \_\_\_\_\_/person/day.

7) Others: ₹ \_\_\_\_\_/person/day.

1984 DRY SEASON RICE (F701-F758)

Please tell the reason if area planted and area harvested were not equal: \_\_\_\_\_

Varieties used	Transplanting or direct sowing	Seed cost (₱/kg)	Area planted (rai)	Area harvested (rai)	Rainfed or irrigated	Water fee paid or not paid	Own land or leased in	Yield (kg)	Unit price (₱/kg)	Sold value (₱)

1. Land preparation cost.

- 1) Conditions of land preparation if done by contractor: \_\_\_\_\_/rai.
- 2) Fuel and lubricant cost of land preparation if done by farmer-self: ₱ \_\_\_\_\_.

2. Threshing cost. 1) Conditions if done by contractor: \_\_\_\_\_.

2) Fuel and lubricant cost if done by farmer-self: ₱ \_\_\_\_\_.

3. Fuel and lubricant cost for pump operation (if used): ₱ \_\_\_\_\_.

4. Repair and maintenance cost of farm machines and equipment: ₱ \_\_\_\_\_.

For number of persons hired for farming work, please tell the number of persons you paid wages (not include persons of labor exchange).

Fertilizer used		Agri-chemical used		Number of persons hired for farming work							
Kind	Quantity	Price	Kind	Quantity	Price	Transplanting	Gap-	Weeding	Harvesting	Bundling	Others
(bags or others)	(bags or others)	(₪/unit)	(bags or bottles)	(bags or bottles)	(₪/unit)	or	filling			hauling & threshing	
						direct sowing					

1. Wage for farm labor. Standard wage : ₪ \_\_\_\_\_ person/day. If change in some farming work, please mention.

- 1) Transplanting: ₪ \_\_\_\_\_/person/day. 2) Direct sowing: ₪ \_\_\_\_\_/person/day.
- 2) Gap-filling: ₪ \_\_\_\_\_/person/day. 4) Weeding: ₪ \_\_\_\_\_/person/day.
- 5) Harvesting: ₪ \_\_\_\_\_/person/day. 6) Bundling, hauling and threshing: ₪ \_\_\_\_\_/person/day.
- 7) Others: ₪ \_\_\_\_\_/person/day.

COST AND RETURNS OF OTHER FARM PRODUCTS IN 1983

Please tell the followings, if you had more than family consumption.

1. Upland crops.

(F801-F828)

Kind of crops	Sugar-cane		
Harvested area (rai)			
Sold value (฿)			
Land rent fee (฿/year)			
Machine rent fee (฿)			
Fuel and lubricant cost (฿)			
Machine repair cost (฿)			
Fertilizer cost (฿)			
Chemical cost (฿)			
Hired labor cost (฿)			
Other cost (฿)			
Total cost (฿)			

2. Livestock, poultry and fish.

(F829-F833)

Kind			
Number of Quantity			
Sold value (฿)			
Hired labor cost (฿)			
Feed cost (฿)			
Other cost (฿)			

(F834)

(F835)

REVENUE AND EXPENDITURE

1. Revenue in 1983.

- 1) None farm enterprise income: ₪ \_\_\_\_\_  
(F841)
- 2) Wage of none farming work (all household members): ₪ \_\_\_\_\_  
(F842)
- 3) Payment from land lessees: ₪ \_\_\_\_\_  
(F843)
- 4) Remittance: ₪ \_\_\_\_\_  
(F844)
- 5) Grant: ₪ \_\_\_\_\_  
(F845)
- 6) Other incomes: ₪ \_\_\_\_\_  
(F846)
- (F847)
- (F848)

2. Total amount of money necessary for one year (including living and farming):  
(F849)

About: ₪ \_\_\_\_\_

3. Food expense: About ₪ \_\_\_\_\_/month including or excluding rice expense.  
(F850)

If excluding rice expense, quantity of white rice consumed in a month:  
(F851)

\_\_\_\_\_ tang.

(F852)



SAVINGS AND DEBTS

1. Do you have savings or money for loan at present? Yes or No If yes, How much: ₪ \_\_\_\_\_.
2. Have you used any credit in 1983 and/or 1984? Yes or No
3. Do you have credit or debts at present? Yes or No
4. Please tell more in detail about credit or debts at present and that you already repaid in 1983 or 1984.

Source*	Type*	Purpose*	Amount (₪)*	Contract period*	Interest*	Type of repayment*	Since which year	Amount repaid in 1983 or 1984	Remained amount

- 1) Source: 1 Bank, 2 Cooperative, 3 Relative, 4 Neighboring farmer, 5 Friend, 6 Land owner, 7 Rice-mill owner, 8 Community association, 9 Both 1 and 2, 10 Bank and private, 11 Cooperative and private, 12 All private, 13 Others (specify).  
 2) Type: 1 Cash, 2 Material, 3 Cash and material.  
 3) Purpose: 1 Living expenses, 2 Farm investment, 3 Repayment of debts, 4 Both 1 and 2, 5 Both 1 and 3, 6 Both 2 and 3, 7 All 1, 2 and 3.  
 4) Amount: If used material, equivalent value in Baht. 5) Contract period: \_\_\_\_\_ month or \_\_\_\_\_ year.  
 6) Interest: Any means which you pay. 7) Type of repayment (for capital and interest): 1 Cash, 2 Products, 3 Cash and products, 4 Others (specify). 8) Amount repaid in 1983 or 1984: Total amount repaid in cash and/or products.

FARMERS ORGANIZATION AND AGRICULTURAL EXTENSION

1. Membership in organization. Please tell whether you or your family members participate farmers organizations or not. If you or family members have posts in organizations, please mention.

- 1) Member of cooperative: Yes or No Post: \_\_\_\_\_  
(F901) (F902)
- 2) Member of water user group: Yes or No Post: \_\_\_\_\_  
(F903) (F904)
- 3) Member of other organizations: Yes or No If yes, name and post:  
(F905)  
1 \_\_\_\_\_, 2 \_\_\_\_\_, 3 \_\_\_\_\_  
(F907)
- 4) If you are not a member of farmers organization, any reasons  
(F908)  
about it: 1 Not interest, 2 No profit, 3 Additional cost, 4 Many meeting,  
5 Others ( \_\_\_\_\_ ).

2. Do you attend the meeting of farmers organization or seminar on farming?  
(F909-F913)

Yes or No If yes, please tell the followings.

Kind of meeting or seminar	Agencies concerned	Frequency*

1) Frequency: How many times per month or per year you attend.

3. Do you have visitors of government personals relating farming to your house  
(F914-F917)  
or farm? Yes or No If yes, please tell the followings.

Name of agencies	Frequency of visit	Purpose of visit

4. Please tell whether you know the following persons who are concerned with your farming or community.

- 1) Agricultural extension officer: Yes or No (F918)
  - 2) Cooperative promotion department officer: Yes or No (F919)
  - 3) Zone man: Yes or No (F920)
  - 4) President of water user group: Yes or No (F921)
  - 5) President of cooperative (Amphur): Yes or No (F922)
5. Do you get information about farming from TV or radio programs, agricultural journals, or others? Yes or No If yes, please tell,

Kind of information	Frequency of receiving	Source of information

6. Change of farming methods.

- 1) When you change farming methods, do you ask advice from government agencies? Yes or No (F931)
- 2) If yes from which agencies: \_\_\_\_\_ (F932)

HISTORICAL CHANGE OF FARMING AND FARMING CONDITIONS (F951-F973)

1. Mechanization of farming. 1) Farm machines and equipment you have. Ownership: 1 Personally own, 2 Jointly own.

Name and capacity of machine	Year purchased	Price when bought (P)	Price of same new one at present (P)	Repair and maintenance cost per year (P)	Ownership
1. Tractor ( )					
2. Pick-up truck ( )					
3. Power tiller ( )					
4. Pump ( )					
5. Sprayer ( )					

2) Farm machines and equipment which you borrow from others.

Name and capacity of machine	Since which year	Owner: 1 Relative, 2 Neighboring farmer, 3 Friend, 4 Land owner, 5 Rice-mill owner, 6 Others (specify)	Conditions of rental
1. Tractor ( )			
3. Power tiller ( )			
6. Thresher ( )			

2. Change of farming. Please tell when (which year) you introduced following matters first time. If not introduce yet, say not.

- 1) RD varieties: \_\_\_\_\_; it was what variety: \_\_\_\_\_.  
(F974) (F975)
- 2) Rice double croppings a year: \_\_\_\_\_.  
(F976)
- 3) Tractor or power tiller for land preparation: \_\_\_\_\_; and from  
(F977)  
which year you do not use animal for land preparation: \_\_\_\_\_.  
(F978)
- 4) Fertilizer: \_\_\_\_\_; it was for what crop: \_\_\_\_\_.  
(F979) (F980)
- 5) Agricultural chemical: \_\_\_\_\_; for what purpose: \_\_\_\_\_.  
(F981) (F982)
- 6) Credit from bank or cooperative: \_\_\_\_\_.  
(F983)

3. Living conditions. Comparing to your livelihood of 5 years ago, do you think (F984)

it is better at present? Yes or No or Same

- 1) If yes or no, what are the factors which contributed to better or worse (F985-F986)  
living conditions? Select 3 from the followings: \_\_\_\_\_.

1 Rice price, 2 Other farm products price, 3 Fertilizer cost, 4 Cost of farm machineries and equipment, 5 Other material cost, 6 Cost of dairy necessities, 7 Increased rice production, 8 Decreased rice production, 9 Increased other farm products, 10 Decreased other farm products, 11 Increased day working out of own farm, 12 Decreased days working out of own farm, 13 Expansion of farming size, 14 Reduction of farming size, 15 Land tenure system, 16 Debts, 17 Credit system, 18 Irrigation facilities, 19 Agricultural extension work, 20 Farm mechanization, 21 Variety and seeds, 22 Improved farming methods, 23 Problems of insects, diseases, weeds, rats, and/or crabs. 24 Transportation. 25 Others ( \_\_\_\_\_ ).

- 2) Problems in farming: Have or Not have If have, tell major problems. (F987-F988)

(1) \_\_\_\_\_  
(2) \_\_\_\_\_

- 3) What means do you want to increase incomes: 1 Self-farming, 2 Self-farming and out of own farm working, 3 Out of own farm working, 4 Others

( \_\_\_\_\_ ).

Appendix 2 Land use and farm household in Thamuang district, Kanchanaburi province<sup>a</sup>.

Name of Tambon	Total area (rai)	Arable land		Paddy field		Sugar cane		Upland crops		Perennial		Vegetable		Household	Population	Farm household
		(rai)	%	(rai)	%	(rai)	%	(rai)	%	(rai)	%	(rai)	%			
Thamung	7,500	5,273	100	-	-	1,680	32	1,480	28	188	4	1,925	36	2,012	13,914	1,187
Thatakor	15,625	10,713	100	4,908	46	4,489	42	448	4	790	7	78	1	533	3,396	479
Khao noi	51,875	36,137	100	3,632	10	1,020	3	31,376	87	118	0	-	-	620	4,717	496
Nong kao	39,375	30,397	100	23,475	77	796	3	5,819	19	307	1	-	-	1,343	8,436	1,208
Rang salee	44,375	30,302	100	3,552	12	14,266	47	11,634	38	850	3	-	-	896	5,664	806
Wang-ka-nai	19,375	11,287	100	940	8	8,359	74	886	8	992	9	110	1	1,013	6,307	800
Banmai	46,785	34,193	100	13,050	38	7,854	23	12,868	38	295	1	126	0	930	6,164	809
Nongtakya	49,375	38,925	100	-	-	24,011	62	13,989	36	925	2	-	-	1,059	6,890	1,012
Thalor	18,125	16,614	100	2,500	15	1,926	12	8,474	51	800	5	2,914	17	1,007	7,088	946
Muongchum	17,500	9,767	100	3,409	35	751	8	5,131	52	440	5	36	0	1,246	7,596	1,133
Toong tong	23,750	20,317	100	2,422	12	11,982	59	3,166	16	450	2	2,297	11	849	5,986	772
Pungtru	64,465	54,578	100	7,960	15	24,487	45	21,557	39	460	1	114	0	1,026	7,074	872
Wangsaala	39,375	33,204	100	5,600	17	12,472	37	13,924	42	973	3	235	1	1,310	11,633	1,205
Total	437,500	331,707	100	71,448	22	114,093	34	130,743	40	7,588	2	7,835	2	13,844	94,865	11,725

Notes: <sup>a</sup> From Thamuang Agricultural Extension Office.

Pilot No. 1 covers part of Banmai and Muongchum villages.

Appendix 3 Land use and farm household in Banpong district, Ratchaburi province<sup>a</sup>.

Name of Tambon	Total area (rai)	Arable land		Paddy field		Upland crops		Perennial		Vegetable		Household	Population	Farm household
		(rai)	%	(rai)	%	(rai)	%	(rai)	%	(rai)	%			
Krub yai	29,853	26,037	100	6,479	25	18,653	71	435	2	470	2	1,283	10,834	1,020
Nhong-oar	13,424	10,383	100	6,174	59	3,339	32	480	5	350	4	1,427	8,826	815
Khao Klung	57,141	23,207	100	12,143	52	10,594	46	240	1	230	1	1,735	9,930	1,109
Kung payom	13,102	8,392	100	5,025	60	2,137	25	810	10	420	5	1,046	6,125	657
Nhong kob	13,346	11,427	100	8,967	79	1,700	15	480	4	280	2	1,540	8,053	714
Nakonchum	12,042	9,828	100	4,543	46	4,415	45	630	6	240	3	3,090	14,335	640
Nongplamer	18,426	16,570	100	15,935	96	300	2	245	2	90	0	1,143	6,378	785
Donkrabueng	7,201	6,662	100	2,625	39	3,317	50	440	7	290	4	695	4,449	461
Pak rad	13,076	7,057	100	4,489	64	1,753	25	515	7	300	4	1,499	8,966	442
Bueg prai	11,504	8,415	100	5,072	60	2,516	30	607	7	220	3	1,359	7,879	611
Thapha	21,052	17,253	100	9,962	58	6,584	38	567	3	140	1	3,090	14,335	794
Ladbuakhaw	11,059	9,568	100	4,883	51	3,800	40	625	7	260	3	657	5,092	311
Banmcung	11,320	10,548	100	8,728	83	1,050	10	550	5	220	2	712	2,709	604
Suankluay	9,394	8,711	100	2,975	34	4,516	52	470	5	750	9	1,168	7,610	565
Banpong	1,820	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	243,750	174,058	100	98,000	56	64,674	37	7,094	4	4,290	3	20,454	115,721	9,528

Note: <sup>a</sup> From Banpong Agricultural Extension Office.

Appendix 4 Land use and farm household in Thanaka district, Kanchanaburi province<sup>a</sup>.

Name of Tambon	Total area (rai)	Arable land		Paddy field		Sugarcane <sup>b</sup>		Perennial		Vegetable		Household	Population	Farm household
		(rai)	%	(rai)	%	(rai)	%	(rai)	%	(rai)	%			
Thanaka	10,576	6,426	100	1,012	16	4,534	70	420	7	450	7	3,087	11,487	867
Thamai	9,765	3,517	100	1,060	30	1,765	50	482	14	210	6	1,145	11,454	925
Thaseo	7,347	4,234	100	1,539	36	2,190	52	325	8	180	4	675	8,024	667
Prathan	24,197	19,377	100	5,272	27	12,850	66	715	4	540	3	1,202	12,125	1,009
Ulok-sammuan	22,679	11,958	100	344	3	10,964	92	405	3	245	2	990	7,114	514
Takram-en	30,611	20,034	100	5,270	26	13,593	68	561	3	610	3	2,029	16,249	1,230
Doncha-am	12,642	10,588	100	2,097	20	7,964	75	342	3	185	2	707	10,011	622
Sanam-yae	12,927	8,832	100	2,776	31	5,535	63	411	5	110	1	910	5,474	574
Yangmung	14,808	7,352	100	4,032	55	2,849	39	376	5	95	1	701	6,735	676
Donkamin	4,936	2,446	100	724	30	1,349	55	253	10	120	5	1,064	7,259	825
Koktabong	13,325	6,204	100	5,203	84	718	12	218	3	65	1	512	3,512	417
Khao samsiphab	14,102	8,818	100	5,273	60	3,159	36	246	3	140	1	650	8,280	577
Saentor	13,162	10,489	100	3,054	29	6,550	63	460	4	425	4	682	5,563	641
Val-nuew	6,784	4,062	100	974	24	2,629	65	249	6	210	5	630	4,493	575
Pongtuek	11,629	6,987	100	5,346	77	1,289	18	262	4	90	1	597	3,057	467
Tharua	4,575	149	100	-	-	124	83	15	10	7	1,644	1,644	10,255	1,000
Total	214,065	131,473	100	43,976	34	78,062	59	5,750	4	3,685	3	17,235	131,192	11,586

Notes: <sup>a</sup> From Thanaka Agricultural Extension Office.

<sup>b</sup> Include other minor upland crop fields.

Pilot No. 2 covers part of Takram-em village.



REPORT OF PRACTICAL WATER MANAGEMENT EXPERIMENT ON RICE CULTIVATION  
AT MAE KLONG PILOT PROJECT  
IN 1984 DRY SEASON

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AND

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OCTOBER, 1984

MAE KLONG PILOT PROJECT (Royal Irrigation Department)

IRRIGATED AGRICULTURE DEVELOPMENT PROJECT (Cooperation Project of

Ministry of Agriculture and Cooperative, Thailand and Japan International  
Cooperation Agency)

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## ABSTRACT

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 Greater Mae Klong Irrigation Project in 1984 dry season (March 3 to August 1). Additional data were 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 preparation water supply. Water management in the common area depended on farmers practices.

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 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 was supplied to the area.

Period from starting irrigation water supply to finishing puddling was 27 days for the experimental area and 30 days for the common area. 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 land preparation period of 30 days is enough for dry season rice cultivation in Mae Klong area, if farmers apply direct sowing and irrigation water of 300 mm to 330 mm is properly distributed. Farmers have enough capacity of farm machines to finish land preparation within 30 days.

After preparation 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 in average to the intensive and semi-intensive area, respectively. Approximate water requirement in depth obtained at different fields was 9.26 mm per day in 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 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 obtained the average yield of

the pilot project No. 1 in 1984 dry season.

Excluding seepage water, 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 in sunny days (May 22-29), and 6.13 mm per day in rainy days (June 6-10, include rainfall of 7.5 mm in 4 days). However, there observed at most 10 mm per day of water requirement in some sunny days.

About 4.91 mm per day of water in 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. Comparing with the amount of water drained from 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.

## INTRODUCTION

Water is one of the most critical limiting factors of rice production. Adequate amount of water supply and its proper distribution are pre-requisites for stable rice farming. Amount of necessary water to be supplied to the paddy field depends on soil and field conditions, growth duration of the variety planted, crop season and management practices. Daily and total water requirement in depth should be taken into account when deciding the irrigation schedule for the period from land preparation to about 2 weeks after flowering.

In Thailand, there are 8 Water Requirement Research Stations under the Royal Irrigation Department (RID). Basic data of water on rice and other crop production have been collected at the stations. The data are useful in terms of evapotranspiration (evaporation and transpiration) and percolation.

However, they hardly represent the paddy field of common farmers. In farmer fields, levees between paddy fields and ditches of irrigation and drainage system are constructed with soil, and field to field irrigation is a common practice. As the result, lateral seepage from and between paddy fields is a usual case in farmer fields.

In 1984 dry season, a practical water management experiment was conducted in farmer fields at the pilot project No. 1 in the Greater Mae Klong Irrigation Project of RID. Two terminal irrigation units (paddy fields supplied water by farm ditch) of about 36.4 ha (227.5 rai) were used for the experiment. Some additional data regarding the experiment were also collected at the agricultural demonstration center of the said project, another terminal irrigation unit and a main drainage canal.

Part of the results of early stage of the experiment was reported as a progress report (Murao, 1984). In this report, however, all the necessary data are included in the results and discussions.

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#### OBJECTIVES

1. To collect data of preparation water for dry season rice cultivation in farmer fields.
2. To collect data on amount of water necessary for dry season rice cultivation.
3. To confirm the amount and distribution of water was adequate or not through field observation.
4. To collect data of water requirement in depth in farmer fields and a controlled field.
5. To collect data on progress and period of respective farming work in rice cultivation.