

CHAPTER IV

ECONOMICS OF RICE PRODUCTION

The intent of this chapter is to investigate fully the cost and profitability of rice production as it relates to technology and farm management practice employed in the study areas. Profitability is certainly an important consideration in the farmers' selection of rice or other crops and in the adoption of new technology. Furthermore, return from production will determine the ability of farmers to acquire and sustain a certain type and quantity of resources for rice cultivation. Calculation of cost and profitability is based on expressions presented in section 2.8 of chapter II.

4.1 Material Input

There are four major inputs commonly used in rice production in the study area namely, chemical fertilizer, pesticide, seed, and water. These are basic factors in the composition of new rice technology. The intensity of input use refers to the amount of the input applied per unit area of land, and theoretically the more intensive the use of these inputs, the higher should be the level of yield per unit area. All fertilizers and pesticides used per acre are converted to NPK nutrient and kilogram of active ingredient (a.i.), respectively. Tables 25 and 26 present the amount of material inputs applied in six subdistricts, and by groups of farmers, respectively. The material input level used per acre varied across locations and farm sizes due to differences in rice farming practice.

Table 25. Material Inputs Used in Rice Farming Classified by Location

Area	Seed (kg/acre)	Fertilizer (kg NPK/acre)	Pesticide (kg a.i./acre)	Irrigation (VN dong/acre)
Vinh My	21.79b*	15.10bc	0.34a	21,780a
Long Dien B	23.89ab	16.35b	0.45a	16,555b
Tan Phu Trung	21.52b	13.76c	0.47a	2,981c
Thanh Xuan	23.62ab	16.72b	0.48a	0,950d
Dong Phuoc	25.69a	15.70bc	0.47a	0,107d
Nhi My	10.82c	20.60a	0.48a	3,825c
All area	21.14	16.41	0.45	7,461

* Figures within a column followed by at least one same letter are not significantly different at 1 per cent level

Source: Survey

Table 26. Material Inputs Used in Rice Farming Classified by Farm Size

Inputs	Units	Small farm	Large farm	MD ^a	t-Ratio
Seed rate	kg/acre	21.15	21.13	0.02	0.02
Pesticide rate	kg a.i./acre	0.50	0.38	0.12	2.18**
Fertilizer rate	kg NPK/acre	17.40	15.40	2.05	3.59***
N	kg/acre	11.40	10.55	0.87	2.22**
P	kg/acre	5.46	4.40	1.07	3.51***
K	kg/acre	0.54	0.45	0.11	1.26
Irrigation	VN dong/acre	8,131	6,672	1,459	1.12

*** : Significant at 1 per cent level

** : Significant at 5 per cent level

^a MD : Mean difference

Source: Survey

4.1.1 Seed

Seed rate per acre differs according to what planting method is applied. The adoption of direct seeding method resulted in increasing the

amount of seed used per acre. A relatively large use of seed in this method is for the purpose of increasing plant population per unit area. Highest seed rate was observed in Dongphuoc and Longdien B, about 24kg to more than 25 kg of seed per acre. On the other hand, Nhimy farmers used as less as 50 % of the seed rate as compared to all other areas, only 10.82 kg of seed per acre. The reason for this low seed rate applied in Nhimy is because about two-thirds of farmers grow rice by transplanting method. Difference in seed rate per acre between farm sizes was not significant.

4.1.2 Fertilizer

One would have expected that fertilizer application at the farm level in Vietnam would be relatively lower in comparison with other Southeast Asian countries. However, the current fertilizer consumption of the sample farmers in the Mekong Delta is at least comparable with that of other rice bowls in the region. The average amount of chemical fertilizers used was 16.41 kg NPK nutrient per acre for all areas. A glance at fertilizer figures in Table 25 easily reveals that Nhimy farmers intensively used fertilizer with an average of 20.60 kg NPK per acre. On the other hand, the smallest rate was applied in Tanphutrung. The low rate of fertilizer observed in Tanphutrung is due to the fact that some farmers quited fertilizing their rice crop during the third time when the crop were severely attacked by Brown planthopper.

As farm size becomes large, the intensity of fertilizer use appeared to decline. The difference of 2 kg NPK nutrient per acre of two groups of

farmers was significant at 1 per cent level. High level of fertilizer per acre was the explanation for higher yield of small farmer group. This will be proved in the last part of this chapter.

4.1.3 Pesticide

The rate of pesticide used was rather similar across areas. With the exception of Vinhmy farmers, fertilizer rate applied in the 1992 dry season was estimated from 0.34 to 0.48 kg active ingredient (kg a.i.) per acre. There were three major kinds of pesticides used in the study areas, i.e. which were insecticide, fungicide and herbicide. There was a reverse relationship between farm size and pesticide intensive use. Small farms were invested with a larger amount of pesticides than large farms. The difference of 0.1 kg a.i. per acre between groups of farmers was significant at 5 per cent level.

4.1.4 Irrigation Water

As described in chapter III, water utilization was not the same for all farmers in the study area, hence, there was a different in the irrigation expense. For those who used water from the irrigation system, irrigation fee was considered as the expense for water in rice production. For those who do not use the irrigation system, expenses related to irrigation was used (e.g. fuel cost). The average water expense per acre was 7,461 VN dong in the 1992 dry season. Vinhmy and Longdien B farmers spent more money in water use than other places. The expense for water in these two subdistricts was approximately equivalent to that of 20 kg of rice per acre. This is

because most farmers in these locations used water from community irrigation systems.

4.2 Labor Input

Intensity of labor use in rice farming activities in locations and by the farmer groups are presented in Tables 27 and 28. In these figures, it is pointed out that weeding was an activity which shared the big part of total labor used either by farm size or by locations. Around one-third of the total labor was for weeding. The other activities which utilized much human labor were harvesting and land preparation. These account for about 15 and 18 per cent of the total labor, respectively. As a consequence of different allocation of human labor in farming activities, total labor needed varied across areas as well as farmer groups. A significant difference ($p < 0.05$) in labor use was observed between groups of farmers. Small farmers invested around 16 mandays per hectare more than other group. The intensity of labor use was highest in Nhimy with 124 mandays per hectare, as a result of transplanting method of rice cultivation practiced by many sample farmers in this subdistrict.

Labor used in this season included two major categories: hired and family labor. The percentage of hired labor per total labor was 40.2 for all areas. This percentage for the large farms was similar to that of small farms which was about 40. It means that both groups of farmers mainly depended on family labor to do the farm work. Total family labor calculated as the sum of number of labor used in each farming activity provided by farm

households.

Table 27. Labor Allocation in Rice Farming Activities by Location

Activities	Vinh My	Long Dien	Tan Phu B Trung	Thanh Xuan	Dong Phuoc	Nhi My	All area
.....mandays/hectare.....							
Land preparation	8.3	16.9	12.5	15.3	15.0	11.8	13.3
Seeding	1.1	1.3	0.7	1.1	0.9	34.8	6.6
Weeding	26.3	40.3	29.9	19.4	29.7	37.7	30.6
Fertilizing	2.9	3.7	1.9	2.4	2.7	2.0	2.6
Pest control	4.0	4.4	5.6	8.8	6.5	5.2	5.7
Watering	1.2	1.3	3.4	2.4	2.2	3.8	2.4
Harvesting	13.3	17.5	14.5	15.6	15.2	21.7	16.3
Threshing	5.4	7.1	7.7	6.8	8.0	4.2	6.6
Transportation	2.4	1.8	4.0	4.9	5.2	2.8	3.5
Total	65.3	94.7	80.6	77.1	85.9	124.0	88.0
Hired labor	24.1	25.9	30.6	20.6	31.2	79.7	35.4
Family labor	41.2	68.8	50.0	56.5	54.7	44.3	52.6
Labor/ton of rice (mandays/ton)	11.2b*	13.2ab	16.6ab	13.2ab	13.8ab	17.6a	14.3

* Figures within a row followed by at least one letter are not significantly different at 1 per cent level

Source: Survey

The total number of labor per ton of paddy is also interested to examining . To produce a ton of paddy, farmers invested 11.1 to 17.6 mandays, with an average of 14.3 mandays per hectare. This indicator was significantly different at 1% level between Vinhmy and Nhimy farmers. Though small farmers invested more labor and obtained higher yields than those by large farmers, the difference in number of labor needed to produce a ton of paddy was not statistically significant at 1 per cent level.

Table 28. Labor Allocation in Rice Farming Activities by Farm Size

Activities	Small farm		Large farm		All farms	
	mandays/ha	%	mandays/ha	%	mandays/ha	%
Land preparation	14.7	15.5	11.6	14.6	13.3	15.0
Seedling	9.1	9.7	4.9	6.3	6.6	8.0
Weeding	32.8	34.0	27.6	34.9	30.6	34.5
Fertilizing	2.4	2.6	2.8	3.6	2.6	3.1
Pest control	5.5	5.8	6.2	7.8	5.7	6.8
Watering	1.9	2.1	1.9	2.5	2.4	2.3
Harvesting	17.6	18.6	14.9	18.8	16.3	18.7
Threshing	7.0	7.4	6.0	7.5	6.6	7.5
Transportation	4.0	4.3	3.1	4.0	3.5	4.1
Total	95.0	100.0	79.0	100.0	88.0	100.0
Hired labor	38.2	40.2	31.5	39.9	35.4	40.2
Family labor	56.8	59.8	47.5	60.1	52.6	59.8
Labor/ton of rice (mandays/ton)	14.8	-	13.7	-	14.3	-

Source: Survey

4.3. Yield

Farmers in the Mekong Delta could enjoy the benefit of irrigation systems by producing the dry season rice. The yield in this season is quite higher than that in the wet season. At the sample means, rice yields differed according to location, farm size, soil class and land preparation techniques which are showed in table 29.

Of the six locations, farmers in Longdien B was the most productive with an average of 717.7 kg per acre, followed by the Nhimy farmers with 702.7 kg while the farmers in Tanphutrung had the lowest yield of 447.1 kg. The low yield obtained by Tanphutrung farmers was due to damages caused

Table 29. Average Rice Yields classified by Locations, Farm Sizes, Soil Classes and Land Preparations (kg/acre)

Category	Yields	Standard Deviation
Locations		
Vinh My	591.7 b*	83.56
Long Dien B	717.7 a	88.42
Tan Phu Trung	474.1 c	85.00
Thanh Xuan	590.0 b	113.80
Dong Phuoc	620.3 b	59.43
Nhi My	702.7 a	49.75
Small farms		
Vinh My	572.2 c	61.67
Long Dien	711.8 a	102.10
Tan Phu Trung	466.0 d	63.28
Thanh Xuan	606.0 c	117.90
Dong Phuoc	635.3 bc	60.34
Nhi My	705.0 ab	58.71
Large farms		
Vinh My	620.0 bc	104.7
Long Dien	726.8 a	65.51
Tan Phu Trung	478.4 d	95.82
Thanh Xuan	572.9 c	110.80
Dong Phuoc	604.3 c	56.12
Nhi My	698.0 ab	25.73
Soil classes		
1	659.5 a	108.80
2	650.2 ab	141.10
3	596.0 bc	93.02
4	508.8 c	66.33
5	500.0 c	88.06
6	490.0 c	84.06
Land Preparation		
Non-tillage	642.2 a	125.40
By bullock	622.7 ab	127.30
By tractor	612.1 ab	98.72
By bullock and tractor	585.7 b	96.86

* Yields within a category followed by at least one same letter are not significantly different at 1 per cent level.

Source: Survey

by Brown planthopper. The high productivity can be traced to several factors such as high intensity of input utilization, favorable weather, methods of rice cultivation, and technology supports. Most of the Longdien B and Nhimy farmers cultivated on favorable soils (soil class 1)⁴. Moreover, agricultural extension activities in these areas were so helpful.

Cultivating rice in soil class 1 brought about the highest yield per unit area. The yield gap between soil class 1 and soil class 6 were more than 50 kg per acre. However, this yield gap was statistically significant. Differences in yield among soils class 3, 4, 5 and 6 was not significant.

Rice yield also varied according to land preparation techniques. Non tillage techniques provided the highest yield (642.2 kg/acre). Yield difference among land preparation techniques by bullock, tractor, or non tillering were not statistically different. Therefore, this implies that farmers could reduce the cost of land preparation by choosing the most economical technique for their field conditions.

Comparing the yield obtained by two groups of farmers, it is not surprising to see that small farmers got as much as 300 kg higher than that by large farmers. The significant difference at 5 per cent level of yields was, among other things, due to different levels of input investment of farmer groups. This is supported by Tables 25 and 26 in section 4.1.

⁴ Soil classification followed the Act No:73-CP dated on 25 Oct. 1993 of Vietnamese Government. Soil class is enclosed in the land use certificate.

The influence of varieties on rice yield can not be pointed out since too many varieties were grown within an area, and some of these varieties can not be identified by both farmers and agricultural engineers.

Given current technologies and biophysical environment, rice yields obtained by the sample farmers are comparable to those of rice farming in some Asian countries (Table 30). Through this comparison, one can see the levels of yields and input utilization practiced by rice farmers in different farming environments.

Table 30. Comparison of Material Inputs and Yield among Different Rice Farming Environments^a.

Items	Thai.	Philli.	Nepal	China	Cambo.	Pakistan	Vietnam
Yield (kg/ha)	3822	6175	2880	5000	2721	1780	6163
Fertilizer(kg NPK)	121	149	42	171	46	45	164
N (kg/ha)	80	97	30	114	40	33	110
P (kg/ha)	41	40	11	43	6	6	49
K (kg/ha)	-	12	1	14	-	6	5
Labor use (mandays/ha)	58	74	128	194	123	52	88
Mandays/ton of paddy	15.2	12.0	44.4	38.8	45.2	29.2	14.3
Kg NPK/ton of paddy	31.7	24.1	14.6	9.9	16.9	25.2	26.6

Source: World Rice Statistics, 1990.

^a Rice farming environments cited as follows:

- Thailand : Wang Yang village in Suphan Buri, Central plain, 1988.
 Philippines : Maragol village, Neuva Ecija, 1987-89.
 Nepal : Anandban village in western Tarai Region, 1987.
 China : County Anxiang, Hunan Province, 1988.
 Vietnam : Mekong Delta, dry season, 1992.

The farmers from the Philippines get the highest yield with low

investment of labor and fertilizer. The next advantageous environment in rice farming is the study area in the Mekong Delta-Vietnam. The required investment of labor and fertilizer per hectare is slightly higher, but the yield is nearly the same to those of the Philippines. Farmers in three rice farming regions of China, Nepal, and Cambodia invested a larger amount of labor per unit area than others. Finally, farmers in the Central Plains of Thailand used a relative large amount of NPK nutrient per hectare but the yield is not comparatively high.

4.4 Cost of Production

The amount of inputs and their specific prices finally determine the total cost of rice production. The total cost of production per acre was 300,900 VN dong in which total labor accounts for 34 %, and material inputs for 45.2% (Table 31). Approximately 70% of total cost of production farmers were purchased input costs. The Nhimy farmers incurred the highest total cost of production of 351,000 VN dong per acre followed by the Thanhxuan farmers with 318,400 VN dong while the farmers in Tanphutrung had the lowest cost of 256,900 VN dong. The average cost per kg of rice production was about 500 VN dong. Farmers in Tanphutrung and Thanhxuan involved in the highest cost/kg of rice due to yield damage caused by BPH, and high prices of inputs in these subdistricts.

Table 31. Profitability at Farm Specific Prices of Rice Production
Classified by Location

Items	Vinh My	Long Dien B	Tan Phu Trung	Thanh Xuan	Dong Phuoc	Nhi My	All area
Yield (Kg/acre)	591.7b*	717.7a	474.1c	590.0b	620.3b	702.7a	616.3
Paddy Price (VN dong/Kg)	856.3c	899.1bc	932.1b	935.5b	953.6b	1,184a	963.0
.....Thousand VN dong/acre.....							
Gross return	511.2de	646.1b	443.5e	551.4cd	592.7bc	832.4a	598.3
Cost of production	289.9bc	302.2abc	256.9c	318.4ab	283.8bc	351.9a	300.9
Material cost	142.3a	142.6a	117.1b	146.4a	131.6ab	137.1ab	136.1
Labor cost	75.8b	100.1ab	93.8b	101.3ab	105.2ab	138.1a	102.9
Hired labor	30.2b	27.3b	35.4b	27.1b	37.3b	88.6a	41.5
Family labor	45.6a	72.7a	58.3a	74.2a	67.8a	49.5a	61.4
Purchased cost	211.7bc	119.1bc	174.1c	219.7b	194.6bc	267.7a	210.3
Cost/kg of rice	0.497ab	0.426b	0.552a	0.556a	0.462b	0.502ab	0.500
Net return	221.3cd	343.9b	186.6d	233.0cd	308.9bc	408.4a	297.3
Family income	266.9d	416.6b	245.0d	307.1cd	376.8bc	530.0a	358.8
Value added	368.9de	503.5b	326.5e	404.9cd	461.0bc	695.2a	462.2
Return to labor	4.74ab	6.15a	3.69b	4.09b	5.10ab	5.30ab	4.84
Return to material input	3.17b	4.04b	3.20b	3.47b	3.98b	5.24a	3.80
Cost/return ratio	0.59ab	0.48c	0.59a	0.60a	0.49bc	0.42c	0.53
Return/cost ratio	1.78c	2.28a	1.80c	1.85c	2.25ab	2.45a	2.07
Net return/Gross return	0.41bc	0.52a	0.40c	0.39c	0.50ab	0.58a	0.47

* Figures within a row followed by at least one same letter are not significantly different at 1 per cent level

Source: Survey

Table 32. Profitability at Farm Specific Prices of Rice Production
Classified by Farm Size

Items	Small farm	Large farm	MD	t-Ratio
Yield (kg/acre)	630.5	599.6	30.9	1.76**
Paddy Price (VN dong/kg)	962.4	963.7	1.3	-0.06
.....Thousand VN dong/acre.....				
Gross return	611.2	583.0	28.2	1.01
Cost of production	318.9	279.8	39.1	3.46***
Material cost	144.6	126.0	18.6	3.48***
Labor cost	109.5	95.1	14.4	1.88**
Hired labor	44.6	37.8	6.8	1.03
Family labor	64.9	57.3	7.6	1.02
Purchased cost	222.6	195.7	26.9	2.69***
Cost/kg of rice	0.513	0.484	0.029	1.41
Net return	292.4	303.2	28.2	1.13
Family income	357.3	360.5	3.2	-0.44
Value added	466.6	457.0	9.6	0.38
Return to labor	4.76	4.94	0.18	-0.38
Return to material input	3.64	4.13	0.49	-1.99**
Cost/return ratio	0.55	0.51	0.04	1.19
Return/cost ratio	1.99	2.17	0.18	1.72
Net return/Gross return	0.46	0.49	0.03	-1.19

*** : Significant at 1 per cent level

** : Significant at 5 per cent level

Source: Survey

Table 33. Profitability at Farm Specific Prices of Rice Production
Classified by Farm Size and Location

Items	Vinh My	Long Dien B	Tan Phu Trung	Thanh Xuan	Dong Phuoc	Nhi My
Yield (Kg/acre)						
Small farms	572.2c*	741.8a	466.0d	606.0c	635.3bc	705.0ab
Large farms	620.0bc	726.8a	478.4d	604.3c	604.3c	698.0ab
Paddy Price (VN dong/Kg)						
Small farms	828.1d	877.9cd	947.5bc	910.0bc	970.0b	1.183a
Large farms	897.3b	931.8b	923.9b	962.9b	936.1b	1.188a
..... Thousand VN dong/acre.....						
Gross return						
Small farms	474.8cd	624.5b	443.0d	551.8bc	616.1b	824.3a
Large farms	564.2bc	679.5b	443.8d	551.0cd	567.6bc	828.6a
Total cost of production						
Small farms	288.2b	330.6ab	262.1b	317.9ab	315.6ab	365.0a
Large farms	292.5ab	258.4b	254.1b	318.9a	249.6b	325.8a
Material cost						
Small farms	144.3a	150.7a	134.6a	153.6a	143.3a	139.0a
Large farms	139.4a	130.0a	107.8a	138.8a	119.1a	133.3a
Labor cost						
Small farms	73.6b	116.2ab	86.5ab	95.4ab	118.5ab	148.5a
Large farms	79.0a	75.5a	97.6a	107.5a	91.0a	118.0a
Purchased cost						
Small farms	208.6b	205.4b	176.5b	221.6ab	216.3ab	277.2a
Large farms	216.2ab	169.0c	173.0c	217.6ab	171.4c	248.7a
Net return						
Small farms	186.6cd	293.9bc	180.8cd	233.8bc	300.4b	469.3a
Large farms	271.8bcd	421.1ab	189.7d	232.1cd	318.0bc	502.7a
Family income						
Small farms	233.3c	378.2b	243.1c	306.2bc	374.5b	521.2a
Large farms	315.7cd	476.0ab	246.0d	308.2cd	379.3bc	547.5a
Value added						
Small farms	424.8bc	549.4b	336.0c	412.2c	448.5bc	695.3a
Large farms						

Table 33. (continued)

Return to labor						
Small farms	4.62a	5.24a	3.91a	4.28a	5.13a	4.98a
Large farms	4.92ab	7.54a	3.56b	3.89b	5.08ab	5.94ab
Return to material input						
Small farms	2.84b	3.50b	2.88b	3.17b	3.67b	5.10a
Large farms	3.65ab	4.86ab	3.36b	3.77ab	4.31ab	5.53a
Cost/return ratio						
Small farms	0.61a	0.53ab	0.60a	0.60a	0.52ab	0.44b
Large farms	0.55abc	0.39c	0.59ab	0.61a	0.45bc	0.39c
Return/cost ratio						
Small farms	1.66b	1.99ab	1.75b	1.83b	2.14ab	2.38a
Large farms	1.95bc	2.71a	1.82c	1.86bc	2.37abc	2.58ab
Net return/Gross return						
Small farms	0.38b	0.46ab	0.39b	0.39b	0.47ab	0.55a
Large farms	0.44abc	0.60a	0.40bc	0.38c	0.54ab	0.60a

* Figures within a row followed by at least one same letter are not significantly different at 1 per cent level

Source: Survey

Though the cost of material inputs paid by the small farmers were higher than that by large farmers, and the difference of 18,600 VN dong in total cost was significant at 1 per cent level, the share of material inputs in total costs is nearly the same for both groups of farmers which were 45,3% for small farmers and 45,03% for large farmers (Table 32). The high cost of production of the small farmer group was also due to the total cost of labor. 109,500 VN dong and 95,100 VN dong were spent on labor utilization for small and large farmer groups, respectively. However, the share of labor costs in total costs of production was about 34% for both groups. Cost and profitability of small and large farmers in different locations are presented in table 33.

4.5 Comparative Analysis of Profitability

Gross return (Gross value of production) was estimated at 598,300 VN dong per acre for the sample farmers. This value varied among areas as well as farmers' groups due to differences in yields obtained and specific rice prices faced by farmers. For instance, gross return (832,400 VN dong/acre) received by Nhimy farmers was significantly higher than that by others due to significant high yield and rice price in this location.

After deducting all cost of production farmers realized a net return of 297,300 VN dong during the 1992 dry season. Among the six locations, the farmers in Vinhmy received the lowest net return of 221,300 VN dong while farmers in Nhimy generated highest net return of 408,400 VN dong per acre. Despite high gross return obtained by small farmers, large farmers generated higher net return per acre which was 303,200 VN dong. Nevertheless, none of these differences were significant at 5 per cent level. The share of net return to gross return of locations varied from 42% to 58% with an average of 49% which means that around half of the return were for cost of production.

The actual amount of money returned to farm family was certainly greater than net return since part of the total cost was imputed values of family labor and other services supplied from the household. Thus, family income from rice production was 358,800 VN dong per acre which accounted for about 60% of gross return. This value varied so much across locations. With the family income of 530,000 VN dong farmers in Nhimy was ranked the

first in making such value. Farmers in Tanphutrong and Vinhmy could get as high as 46% and 50% this value, respectively, in comparison with Nhimy farmers. The difference in family income of 32,000 VN dong per acre between small and large farmers was not statistically different.

Labor productivity can be estimated through value added per day of labor and return to labor. One day of labor in rice production of farmers in Vinhmy and Nhimy could make the additional values of 56,493 VN dong and 56,065 VN dong, respectively, which were the highest values among study areas. This value was about 30% higher for the large farmer group. Return to labor implies that every VN dong investment in labor provided for how much in return. The highest return to labor was found in Longdien B with 1 VN dong for labor investment would bring about 6.15 VN dong. There was no significant difference between small and large farmers by this indicator.

All of the returns to material inputs were lower than returns to labor. This may highlight the importance of labor investment in rice production as compared to capital requirements at present. On the average, one VN dong invested in material inputs would provide a return of 3.80 VN dong for all locations. Once again, investment in material inputs of Nhimy farmers generated highest return which was 5.24 VN dong. Significant ($P < 0.05$) difference in the return to material inputs was recorded between groups of farmers. These values were 3.64 and 4.13 for small and large farms, respectively. This may imply that investment in material inputs for rice production of the large farmers offered more in return than that of small farmers.

Finally, return/total cost and total cost/return ratios are helpful to compare profitability of rice production across locations and groups of farmers. These two ratios are invertedly related with each other (e.g. if return/total cost ratio is highest then the total cost/return must be lowest). Therefore, interpreting the result of one ratio the readers could refer to the other. Return/cost ratio varied from 1.78 to 2.45 with an average of 2.07 for rice production in the 1992 dry season. This implies that every VN dong investment generated a total return from 1.78 to 2.45 VN dong. Investment in rice production of Nhimy and Longdien B farmers resulted in highest return/total cost which were 2.45 and 2.28, respectively. The return/cost ratios generated by small farmers were 1.99 and 2.17 respectively. However, the difference was not statistically significant. This implies that efficiency of investment in rice production of both small and large farmers were similar.

4.6 Highlights

The level of input utilization, rice yield, cost and return per unit area varied across locations and farm sizes.

The average amounts of seed, fertilizer, pesticide and labor used per acre were 21.14 kg, 16.41 kg NPK, 0.45 kg a.i., and 8.8 mandays, respectively. Nhi My farmers applied a rather high level of fertilizer, and labor but a low rate of seed per acre. Using water from irrigation systems the farmers in the two subdistricts of Angiang province paid the highest irrigation fees. The small farmers tended to use more labor and material

inputs than those by the large farmers.

Significantly higher yield was obtained by small farmers (630.5 kg/acre) as compared to large farmers (599.6 kg/acre). Farmers in Longdien B and Nhimy got the significant high yields as compared to other locations. As a consequence of damage caused by Brown planthopper to yield, farmers in Tanphutrung got the lowest yield and involved in the highest cost/kg of rice.

Net return, family income, value added, return to labor and material inputs, return/cost ratio, net return/gross return were all significantly high in Longdien B and Nhimy subdistricts where production and marketing environments are favorable than other locations. Though on the whole differences in cost of production were observed, net return, family income, and value added were statistically similar between small and large farmers.

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