CHAPTER 6

RICE PRODUCTION MANAGEMENT

This chapter aims to describe the picture of rice production management in the study site, relating to production practice, input application, labor allocation, rice yield, and marketing aspect of input production and rice.

6.1 Rice production practice

The practice of rice production is described through several aspects, including land preparation, pest management, water management, seed use, weeding, and harvest and post-harvest operation.

6.1.1 Land preparation

Land preparation has to be carried out to create a suitable soil environment for planting, control of weeds and pests, incorporate manure, and fertilizers. This work is done from 30 to 45 days before transplanting. Recently, under the market-oriented economy with the development of national economy, machine gradually replaced manual works. In Hatay province, land preparation was done by machine. Small tractors, which are highly appropriate for the existing production conditions, have been purchased by individual cooperatives. All farmers signed the contract for land preparation with local agricultural cooperatives. The cooperatives were responsible for land preparation, including plowing and harrowing.

6.1.2 Crop establishment

In Hatay province, all farmers used the transplanting method for rice cultivation. After 30 to 40 days of seeding, farmers transferred seedling to the prepared land for

transplanting. Transplanting was done by traditional method, which created equal spacing that easily facilitated weed control than broadcasting method. Nevertheless, transplanting method required much more labor than broadcasting.

6.1.3 Pest management

Every two or three communes had one crop-protection technician who was responsible for informing farmers when pests occurred and the kind of pesticides to be applied. Farmers had to pay in cash for fee of pest forecast, which was equivalent to 45 kg rice per hectare per year. Farmers have learned to use pesticides from the technician or from sellers of pesticides. Some farmers also learned from various public information media, i.e., the radio, newspapers, magazine and their neighbors. Actually, many farmers have been facing problem with the inappropriate management of crop protection. They indicated that they did not know well what types of pest and disease was attacking rice crop and how to treat them, especially pest and disease of new rice varieties. Many farmers still sprayed pesticides even if there was no information from the technician or, they still used pesticides when no pest attacked, because they believed that early sprays could easily prevent infestation.

6.1.4 Water management

Irrigation was reported as an advantage for rice production in the Red River Delta and Hatay province as well. All sample farmers in the study site have access to irrigation service provided by the cooperative's irrigation systems and they were responsible for paying fee. Majority of the sample farmers' fields have received enough water directly from cooperative irrigation systems. The irrigation fee was equivalent to 20 kg of paddy per sao per year. (1 sao= 360 m^2).

6.1.5 Seed use

Basically, rice variety is differentiated into two main groups as conventional and hybrid varieties. Table 6.1 shows the proportion of rice varieties used by sample

households in the study site. As mentioned above, since Khang Dan and Bui Tap Xuan Thanh varieties were widely used, they were chosen as the main rice varieties for the study.

For conventional rice variety, farmers usually keep their own seed after harvesting and use it in the next season. After 2 years, they usually buy seed from local cooperatives or seed companies or market, because their own seed does not generate high yield.

Since hybrid rice seed has been imported from China, its price is much more expensive than price of conventional rice seed. The price of conventional rice seed was from 4 to 6 thousand VND/kg, whereas the cost of hybrid rice seed was from 21 to 25 thousand VND/kg (Quynh, 2001). Unlike conventional rice variety, farmers growing hybrid variety had to buy seed every planting season. In the study site, the local government has subsidized from 8 to10 thousand VND/kg of hybrid rice seed to encourage farmers to use hybrid rice variety. In spite of that, up to now hybrid rice variety has not been widely adopted in Hatay province.

Table 6.1: Rice varieties used by the sample households

Variety	Proportion (%)
Conventional variety	-
Khang Dan	100
Te Thom	55
Nep	30
Hybrid variety	-
Bui Tap Son Thanh	100

Source: Survey, 2002

6.1.6 Weeding

Weeds in the rice field were manually controlled. Farmers revealed that they preferred to use this method rather than herbicide, because this method allowed rice

plant to use fertilizer more efficiently. Normally, first weeding was done from 20 to 25 days after transplanting and the second weeding at 30 to 35 days after the first weeding. The survey result showed that all sample households did the first weeding and only 45 percent of them continued the second weeding.

6.1.7 Harvest and post-harvest operation

Rice is harvested from 90 to 110 days after transplanting, depending on rice variety. For spring crop, rice was harvested in June and summer crop in late August or early September. Usually, farmers used sickle as the tool for cutting rice stems and then they tied rice stems into bundles.

After harvesting, rice was commonly transported to the household yards, where threshing process was done. Currently, most of the farmers used their own threshing machine for this work. Land preparation and threshing was done by machine. This characteristic of the study site reflects a progress in agricultural production toward farm mechanization.

Following threshing is the process of drying. There was no special method used for rice drying. All farmers spread paddy on clean yard and used sun as energy for drying. After paddy was sufficiently dried, they were often stored in bamboo barrels, wooden dumps, tanks and plastic sacks for household consumption or selling when they need money or expectation for getting higher rice price.

6.2 Input application

In the study site, major inputs commonly use for rice production namely, manure, chemical fertilizers (nitrogen, phosphorus, and potassium), pesticide, seed, and water.

6.2.1 Schedule of fertilizer application

Schedule of input application of sample households was described in Table 6.2. This schedule was widely adopted by rice farmers in the Red River Delta as well. Manure and chemical fertilizers were the main source of nutrient to rice plant, were applied at different time corresponding to the growth stages of the rice plant. The first application, i.e. before transplanting, included manure, nitrogen, and phosphorus. Then, after transplanting from 15 to 20 days, the second application, which consisted of nitrogen, phosphorus, and potassium were applied. The final application of fertilizers that included nitrogen and potassium were applied after second application from 30 to 40 days.

Table 6.2: Schedule of input application of the sample households

Input	First application	Second application	Third application
Manure	Before transplanting	Non application	Non application
Nitrogen	Before transplanting	15 to 20 days after transplanting	30 to 40 days after second application
Phosphorus	Before transplanting	15 to 20 days after transplanting	Non application
Potassium	Non application	15 to 20 days after transplanting	30 to 40 days after second application

Source: Survey, 2002

Rice production in Vietnam is characterized by multiple cropping, small-irrigated farm, labor intensive, and the widespread use of fertilizer (IFPRI, 1996). The situation of input applications of the sample households is shown in Table 6.3.

Table 6.3 indicates that all farmers used manure only one time (first application). The application time of nitrogen, phosphorus, and potassium were different among the respondents. Farmers applied nitrogen in all three timings of

fertilizer application, whereas phosphorus and potassium were applied two times. It can be said that, besides the difference in input application in terms of quantity, method of input application could cause the gap of rice yield among selected farmers.

Table 6.3: Percentage of farmers following schedule of fertilizer application

Item	Proportion of sample households (%)		
	First application	Second application	Third application
Manure	100.0	0.0	0.0
Nitrogen	100.0	75.0	40.0
Phosphorus	100.0	30.0	0.0
Potassium	0.0	100.0	35.0

Source: Survey, 2002

6.2.2 Method of pesticide application

In recent years, the important insects recorded in Hatay province were bacterial leaf blight, brown plant hopper, rice thrips, leaf-folder, rice bugs, and rice blast. A large proportion of respondents thought that they could control insects such as leaf-folders and rice bugs by spraying pesticide early to prevent these insects since they caused yield loss. However, Hung (1998) showed that these sprays were not necessary. Early spraying increased amount of pesticide use but not necessarily increased rice yield. On the other hand, it increased the production cost and environmental pollution and human health hazard as well. The sample households can be grouped into two categories based on pesticide use. Group 1 includes farmers who only sprayed pesticide when it was considered necessary. Group 2 consists of farmers who sprayed pesticide before and after pest infestation or farmers sprayed pesticide based on the schedule calendar spray.

As illustrated in Table 6.4, majority of the households fall in Group 2 that accounted for about 75 percent of total observations. Most of the farmers indicated that they like to take preventive pest control to obtain high rice yield, thus they prefer to follow the schedule spray rather than the first method (Group 1), in which farmers

only sprayed pesticide after their rice field were infested by pest. Therefore, Group 2 spent much more money on pesticide than Group 1. The pesticide cost of Group 1 was 280 thousand VND/ha, while that of Group 2 was 416 thousand VND/ha.

Table 6.4: Classification of sample households based on pesticide use

Category	Household (%)	Average of pesticide cost ('000 VND/ha)
Group 1	25.00	280.65
Group 2	75.00	416.50

Source: Survey, 2002

6.2.3 Measurement of input application

As mentioned above, water used for rice production was supplied by the cooperative's irrigation system. All farmers in the study site had access to irrigation water on payment of irrigation fee. Therefore, this part only shows the level of input application in terms of physical performance (except pesticide).

Fertilizer is an important input in rice production. The types of chemical fertilizers used for rice production in Hatay province were nitrogen, phosphorus, and potassium. The level of fertilizer application depends on requirement of specific variety and soil type. According to Hatay Extension Office (2002), the recommendation chemical fertilizers rate are as follows:

The recommended rates of chemical fertilizers per hectare for conventional rice variety are N=70-80 kg, P_2O= 70-80 kg, and K_2O= 80-90 kg. In spring season, the weather is cool, farmers have to use higher amount of nitrogen and lower amount of phosphorus for rice production as compared with those in summer season.

In order to get higher yield, hybrid rice variety requires the higher chemical fertilizer than conventional rice variety with a recommended rate per hectare of N=90-110 kg, P_2O= 80-100 kg, and K_2O=100-120 kg.

In addition, the amount of manure requirement for both conventional rice variety and hybrid rice variety ranges from 100 to 200 kg/ha and if possible manure should be increased instead of nitrogen. Table 6.5 shows the actual input applied to hybrid rice production of the sample households.

Table 6.5: Input applications to hybrid rice

Input	Mean	Min.	Max.	SD	CV (%)
Seed (kg/ha)	33.10	27.00	54.00	6.42	19.39
Manure (kg/ha)	2,403.90	900.00	3,600	583.58	24.27
Nitrogen (kg/ha)	101.22	68.31	130.41	12.37	12.22
Phosphorus (kg/ha)	68.29	18.36	114.75	23.22	34.00
Potassium (kg/ha)	77.35	32.40	113.40	23.09	59.85
Pesticide ('000 VND/ha)	351.00	135.00	675.00	99.51	28.35

Source: Survey, 2002

The amount of hybrid seed use ranged from 27 to 54 kg/ha with an average of 33.10 kg/ha. In practice, the requirement of seed use ranges from 40.5 to 54 kg/ha. Hence, the variation in seed use among farmers was not much (6.42 kg/ha).

The average quantity of manure used for hybrid rice was 2,403 kg/ha. The variation in amount of manure application was quite high, because farmers bred livestock to get manure for their own cultivation. In case of households having large size of livestock, they used the higher amount of manure than others.

Among the nutrients, nitrogen plays an important role in increasing rice yield. Commonly, rice variety with high potential yield requires high amount of nitrogen application (Cuong, 2000). On the average, the amount of nitrogen application was 101 kg/ha and the disparity of nitrogen use was quite substantial (from 68 to 130 kg/ha). Furthermore, amount of phosphorus application was 68 kg/ha. The variation in amount of phosphorous application was also large (from 18.36 to 114 kg/ha). For potassium, the amount of potassium application was 77 kg/ha and ranged from 32 to

113 kg/ha. Tables 6.6 and 6.7 indicate the input applications to conventional rice variety in spring season and summer season.

Table 6.6: Input applications to spring conventional rice

Input	Mean	Min.	Max.	SD	CV (%)
Seed (kg/ha)	56.82	40.50	81.00	7.55	13.28
Manure (kg/ha)	2,230	900	3,600	566.80	25.41
Nitrogen (kg/ha)	76.40	49.68	99.36	11.50	15.05
Phosphorus (kg/ha)	51.55	22.95	91.80	14.76	28.63
Potassium (kg/ha)	64.54	32.40	97.00	19.28	29.87
Pesticide ('000 VND/ha)	382.40	270	540	54.30	14.20

Source: Survey, 2002

Table 6.7: Input applications to summer conventional rice

Input	Mean	Min.	Max.	SD	CV (%)
Seed (kg/ha)	50.40	40.50	54.00	4.26	8.45
Manure (kg/ha)	2,136	900	2,700	428.08	20.04
Nitrogen (kg/ha)	68.87	49.68	93.15	8.87	12.88
Phosphorus (kg/ha)	60.80	22.95	91.80	17.91	29.45
Potassium (kg/ha)	62.10	32.40	97.20	18.87	30.38
Pesticide ('000 VND/ha)	379.50	270.00	486.00	46.60	12.28

Source: Survey, 2002

As shown in Table 6.6 and 6.7, the average amount of conventional seed use was about 50 kg/ha and there was small variation in seed use among sample households. For manure, nitrogen, and phosphorus, farmers used less than those for hybrid rice. In addition, farmers used higher amount of nitrogen for conventional rice in spring season than in summer season (76.4 kg/ha versus 68.87 kg/ha). In spring season, amount of phosphorus use was 51.55 kg/ha, while in summer season that was

higher at 60.80 kg/ha. In addition, it was found that the difference in amount of potassium application to conventional rice between two seasons was not much.

In short, there were differences in amount of fertilizer use for hybrid rice and conventional rice among farm households. This is also a contributing factor explaining the differences in the rice yield among them. However, the analysis and evaluation of input application of the sample households will be further discussed in Chapter 7 by the estimated result of production frontiers.

6.3 Labor allocation

It was found that labor used for rice farming activities did not vary from spring season to summer season. Labor use was estimated for both spring season and summer season in Table 6.8.

It is pointed out that land preparation, transplanting, weeding, and fertilizer application were main activities, which need high quantity of labor use. There were variations in labor use for these activities among the farmers. Although, land preparation was done by hired machine of local cooperative, farmers still needed to do some work such as making bunds, incorporation of manure into the soil before transplanting. Therefore, labor use for land preparation varies from farm to farm. There was no variation in labor use for seedling, harvesting, transporting, and threshing among the sample households, because the ability of farmers in doing these works was the same. As shown in Table 6.8, average labor spent on rice farming activities was 218 man-days/ha and the range of labor use was from 189 to 253 man-days/ha. It was recognized that the variation in labor was small, 14 man-days/ha. Furthermore, transplanting and harvesting season were the peak time, which needed much labor. In the study site, hired labors were mainly used for these activities. On the average, the quantity of hired labor accounted for about 30 percent of the total labor use.

Table 6.8: Labor allocation in rice farming activities

Activities	Mean	Min	Max	SD	CV (%)
	(man-day/ha)				
Land preparation	26.13	13.50	40.50	7.55	28.90
Seedling	8.10	8.10	8.10	0	0
Transplanting	56.05	54.00	62.10	4.07	7.26
Weeding	31.05	27.00	40.50	6.20	19.96
Fertilizing	38.93	29.70	48.60	7.20	18.49
Pest control	16.84	8.10	27.00	6.70	39.78
Harvesting	27.00	27.00	27.00	0	0
Transporting	8.10	8.10	8.10	0	0
Threshing	8.10	8.10	8.10	0	0
Total	218.26	189.00	253.80	14.32	6.56
Of which					
Hired labor	54.56	-	-	-	-
Percent of total	30.00				
Family labor	163.7	-	-	-	-
Percent of total	70.00				

Source: Survey, 2002

Since, Hatay province is densely populated, labor use for rice production was intensive. Table 6.9 is reviewed from the previous studies, which aims to compare labor use of the study site with those of others.

Machines are gradually replacing the manual work such as land preparation, transportation, threshing, hence the average labor use (218 man-days/ha) in Hatay province was lower than that found by Hien (1998), Pingali *et al*. (1998), Dac (1996), and IFPRI (1996).

Table 6.9: Labor use in rice production

Unit: man-day/ha

Region	Hien (1998)	Pingali *et al*. (1998)	Dac (1996)	IFPRI (1996)	Dung (1994)
Red River Delta	230	246	238	252	-
Mekong River Delta	-	96	-	89-92	88
Vietnam	-	-	-	116-134*	

Source: Hien (1998), Pingali et al. (1998), Dac (1996), IFPRI (1996), and Dung (1994)

* Given range by IFPRI figures refers to labor use in different crop season.

Rice cultivation in the Red River Delta required more than 200 man-days/ha, while in the Mekong River Delta the corresponding figure was from 89 to 100 man-days/ha. For the country as a whole, the average labor use was from 116 to 134 man-days/ha (Table 6.9). This was roughly in the middle range found in Asian countries. Farmers in the Red River Delta used more labor in many phases of rice production. Land preparation in the Red River Delta was more labor-intensive, because the use of rented two-wheeled tractors was less common than in the south, though the use were growing in both regions. In the Red River Delta, most of the farmers use manure, while very few do so in the Mekong River Delta. Similarly, planting in the Red River Delta uses four times as much labor per hectare as in the Mekong River Delta, largely because in the Red River Delta farmers transplant rice seedlings rather than broadcasting seed. In addition, harvesting in the Red River Delta was three times as labor intensive as in the Mekong River Delta because threshing was less mechanized (Pingali *et al*., 1998).

6.4 Rice yield

Rice yield is a very crucial indicator to evaluate the performance of rice production system. Rice yield depends on many factors, including external and internal factors affecting rice production system. Table 6.10 presents rice yield of sample households. Given the same season, the yield of hybrid rice (5,307 kg/ha)was

higher than that of spring conventional rice (4,976 kg/ha). Furthermore, commonly farmers achieved the higher conventional rice yield in spring season than that in summer season. In addition, the differences in yield of hybrid rice, spring conventional rice , and summer conventional rice among farm households were approximately 505 kg/ha, 366 kg/ha, and 362 kg/ha, respectively. The disparity of hybrid rice yield was higher than that of spring conventional rice and summer conventional rice. This can be explained that farmers had more experience in conventional rice production than hybrid rice production. Nevertheless, hybrid rice in the study site has not reached its potential yield yet. Given the same climate and alluvium soil, farmers growing this hybrid rice variety in Thaibinh and Namdinh, neighboring provinces, had hybrid rice yield from 6.2 to 6.7 tons/ha (Cuong, 2000). It was higher as hybrid rice yield of the study site.

Table 6.10: Rice yield of the sample households

Category	Mean	Min.	Max.	SD	CV (%)
	(kg/ha)				
Hybrid rice	5,307.12	4,050	6,210	505.50	9.53
Spring conventional rice	4,976.24	3,915	5,805	366.41	7.36
Summer conventional rice	4,413.80	3,780	5,265	362.84	8.22

Source: Survey, 2002

6.5 Marketing aspect

6.5.1 Input market

Agricultural policy reform of 1988 created a good environment for market of production inputs. Pesticide and fertilizer are the main inputs of rice production and are readily available. Farmers have the choice to buy either from the private or state agents. However, low quality or counterfeit inputs is still an existing problem in the recent years.

Table 6.11: Proportion of respondents buying input from various input suppliers

Unit: %

Input	Local cooperative	Service agency	Market
Hybrid seed	100	0	0
Conventional seed	30	70	0
Chemical fertilizer	30	65	15
Pesticide	70	25	5

Source: Survey, 2002

As shown in Table 6.11, inputs were supplied by three sources. Since the local cooperatives sold hybrid seed at subsidized price, all the sample households brought hybrid rice seed from them. In addition, many farmers also bought pesticide, chemical fertilizers from local cooperatives, and service agencies because sellers guaranteed the quality of their products, unlike the market, where the quality of products were not guaranteed. Moreover, farmers could pay money for pesticide to local cooperative after harvesting. On the other hand, it was found that farmers in the study site could buy inputs, such as fertilizer, pesticide, and seed from the other sources almost at the same average price.

6.5.2 Rice market

Rice marketing is one of important factors affecting income of rice growers. Regarding rice marketing performance, this study refers to some aspects, because the survey information was directly got from rice farmers.

It is useful to investigate how rice farmers sell their own product to find out a constraint. In the study site, farmers commonly sold their rice either at the farm gate or at the local market. It was reported that about 55 percent of sample households sold rice. Once the paddy rice left the farm, it entered rice markert and was handled by assemblers. The markets for rice surplus of famers in Hatay province were local

market and Hanoi capital market. In other words, rice surplus was only supplied for domestic consumption.

Most of the farmers (80 percent) sold their own produce at farm gate. The buyers at farm gate were assemblers and millers. They tend to be relatively young, and slightly more than half were women. Most of the buyer live in the same village as rice growers. The proportion of rice grower selling their rice in the market was only 20 percent. Most of the farmers indicated that since they need to sell a quite large amount of their rice, they informed assemblers or miller to buy it at their homes. In addition, the farmers having small amount of rice, usually sold it in the local market. Farmers indicated that there was no difference in terms of rice price between the farm gate and local market. Farmers in the study site have good source of information from their neighbors about the rice price. In addition, the study site is sub-urban province so farmers have access to price information. However, the local market price and farm gate price were established under the influence of the upper levels of the marketing system, which was dominated by merchants.

Furthermore, there were 5 percent of rice growers, who were also assemblers or millers. A part from working on-farm activities, they either purchased the surplus rice from other rice farmers and transferred it to rice market or both collected and milled rice to supply to consumers. By doing so, they could partly generate their income.

Table 6.12: Rice marketing information

Category	Proportion of sample households (%)
Selling rice	55
Of which	
Farm gate	80
Market	20
Buying rice as rice trader, miller	5

Source: Survey, 2002

Table 6.13 presents rice price in 2002. During the peak season, the rice price was low. Therefore, there were not many farmers, who sold rice after drying, except they needed cash for their urgent expenditure.

Table 6.13: Rice price in 2002

Category	Minimum	Maximum	Mean
	VND/kg		
Hybrid rice	1,700	2,100	1,900
Spring conventional rice	1,800	2,300	2,000
Summer conventional rice	1,800	2,400	2,000

Source: Survey, 2002

Although the quality of hybrid rice was slightly lower than that of conventional rice, the recovery of milled rice per one kilogram from hybrid rice was higher than conventional rice. Therefore, the average rice price of hybrid rice was similarl to that of conventional rice.

Rice price has been stable over recent years. However, farmers indicated that rice price have been stable but low, therefore, they got very low benefit from rice production. This is regarded as one constraint to rice producers.

6.6 Economic returns from rice production

The descriptive statistics of cost and economic returns of rice production are presented in Tables 6.14, 6.15, and 6.16. It is reported that the prices of chemical fertilizers were stable in recent years. In this study site, most of the sample farmers bought chemical fertilizer and pesticide from local cooperatives and service agencies at the same average price. Therefore, the average price of each input was used for calculation of economic returns. Total cost of rice production was divided into three main components, namely material cost, labor cost, and service fee and land tax. It can be seen that the difference in material cost completely led to the variation in total cost of rice production.

The material cost included the cost of seed, manure, nitrogen, phosphorus, potassium, and pesticide. As shown in Tables 6.5, 6.6, and 6.7, the average amount of such physical inputs applied to hybrid rice, spring conventional rice, and summer conventional rice were different. Therefore, the value of material cost of each type of rice production differed from each other. The material cost of hybrid rice, spring conventional rice, and summer conventional rice were approximately 2,400 thousand VND/ha, 2,232 thousand VND/ha, and 2,014 thousand VND/ha, respectively. It was pointed out that, farmers used much more material inputs for hybrid rice, so that the material cost for hybrid rice production was higher than others. The variation in material cost of hybrid rice, spring conventional rice, and summer conventional rice were 258 thousand VND/ha, 228 thousand VND/ha, and 208 thousand VND/ha respectively. Moreover, the variation in material cost of hybrid rice was the highest as compared with those of spring conventional rice and summer conventional rice. This could be explained by the higher variation in material inputs of hybrid rice.

Table 6.14: Descriptive statistics of cost and economic returns of hybrid rice

Unit: '000 VND/ha

Indicator	Mean	SD	Min.	Max.
Total cost	8,493.41	416.99	7,558.65	9,694.35
-Material cost	2,400.05	258.82	1,752.30	2,998.35
-Labor cost	4,357.51	284.22	3,780.00	5,076.00
Hired labor cost	1,452.50	94.74	1,260.00	1,692.00
Family labor cost	2,905.01	189.48	2,520.00	3,384.00
-Service fee and land tax	1,728.00	0.00	1,728.00	1,728.00
Gross return	10,083.52	960.46	7,695.00	11,799.00
Net return	1,590.11	983.77	-1,205.55	3,206.25
Return to family labor	4,500.35	901.81	2,031.30	6,063.30

Source: Survey, 2002

Table 6.15: Descriptive statistics of cost and economic returns of spring conventional rice

Unit: '000 VND/ha

Indicator	Mean	SD	Min.	Max.
Total cost	8,317.83	397.95	7,558.65	9,431.00
-Material cost	2,232.31	228.31	1,776.60	2,883.60
-Labor cost	4,357.51	284.22	3,780.00	5,076.00
Hired labor cost	1,452.50	94.74	1,260.00	1,692.00
Family labor cost	2,905.01	189.48	2,520.00	3,384.00
-Service fee and land tax	1,728.00	0.00	1,728.00	1,728.00
Gross return	9,952.48	732.83	7,830.00	1,1610.00
Net return	1,634.65	759.96	-1,077.30	2,840.40
Return to family labor	4,539.66	688.50	2,270.70	5,792.40

Source: Survey, 2002

Table 6.16: Descriptive statistics of cost and economic returns of summer conventional rice

Unit: '000 VND/ ha

Indicator	Mean	SD	Min.	Max
Total cost	8,100.24	368.38	7,425.00	9,072.00
-Material cost	2,014.60	208.73	1,609.20	2,457.00
-Labor cost	4,357.51	284.22	3,780.00	5,076.00
Hired labor cost	1,452.50	94.74	1,260.00	1,692.00
Family labor cost	2,905.01	189.48	2,520.00	3,384.00
-Service fee and land tax	1,728.00	0.00	1,728.00	1,728.00
Gross return	8,827.63	653.68	7,560.00	10,530.00
Net return	727.39	596.31	-1,107.00	1,949.40
Return to family labor	3,632.48	545.46	2,277.00	4,973.40

Source: Survey, 2002

Labor cost consists of hired cost and family cost. The labor use per hectare for hybrid rice production, spring conventional rice production, and summer conventional rice production of sample households were identical. Hence, the labor cost was also the same. The average labor cost was 4,357 thousand VND/ha and ranged from 3,780 to 5,076 thousand VND/ha. The variation in total labor cost among households was caused by the variation in labor use (Table 6.8).

Service fee consists of land preparation fee, irrigation fee, field protection fee, and pest prediction fee. Irrespectively, spring or summer season farmers got to pay the same amount of service fee and land tax. In the study, after harvesting season farmers had to pay all such fees for local cooperatives. Therefore, the total of service fee and land tax per hectare of all sample households was the same. The average of service fee and land tax was 1,728 thousand VND/ha and was consistent with hybrid rice, conventional spring rice and summer conventional rice.

Gross return, net return, return to family labor, gross return per total cost, net return per total cost, and net return per one kilogram of output were used as the indicators of economic returns. It was shown that the net return from spring rice production was the highest (1,634 thousand VND/ha), followed by hybrid rice production (1,590 thousand VND/ha) and summer conventional rice production (729 thousand VND/ha). Farmers also gained the highest return to family labor from spring conventional rice production. Moreover, minimum net return was negative for some farmers. It reflects that rice producers could be at loss if they completely use hired labor instead of using family labor. In other words, using labor force in rural area is the common way either to get income or to sustain family livelihood. This comparison results were verified by using the statistical test. The differences in economic returns between spring conventional rice, summer conventional rice, and hybrid rice is significant (Appendix Table 9). On the average, net return from rice production attained about 3,951 thousand VND/ha (or 50 thousand VND per/sao). Net return from rice was lower than those of other annual crops. Farmers revealed that they could earn 100 thousand VND/sao, 90 thousand VND/sao, and 70 thousand VND/sao

from vegetable, soybean, and corn production, respectively. However, rice production still has been chosen as the main crop because of its high value as the main staple food crop and its market is wider than that of other crops.

Table 6.17: Return ratios of rice production

Indicator	Hybrid rice	Spring conventional rice	Summer conventional rice
Gross return / Total cost	1.18	1.20	1.10
Net return / Total cost	1.19	0.20	0.10
Net return / kg of output ('000 VND/kg)	0.28	0.32	0.16

Source: Survey, 2002

Table 6.17 also elaborates on the return ratios of rice production. Given the same conventional variety, the gross return per total cost, return per total cost, and net return per one kg of spring conventional rice were higher than those of summer conventional rice. For instance, the net return per total cost of spring conventional rice was 0.2, while that of summer conventional rice was 0.1. This implies that since farmers invested 1 VND in spring conventional rice production, they earned net return (net benefit) of 0.2 VND, whereas it was only 0.1 VND from summer conventional rice production. The possible reason explaining this scenario was the influence of weather condition on rice yield. Rice production suffers from the hot weather and storm in summer season.

Given the spring season rice, there were differences in economic return ratios between spring conventional rice production and hybrid rice production, such as net return per one kilogram of spring conventional rice and hybrid rice were 0.32 and 0.28, respectively. The possible reason is that rice yield of hybrid rice was slightly higher than that of spring conventional rice under the same climate conditions (Table 6.10), however hybrid rice required much more fertilizer than spring conventional rice and price of hybrid rice was slightly lower than that of spring conventional rice (Table 6.14). As the results, the gross return of hybrid rice was not much higher than that of

spring conventional rice, and economic return ratios of hybrid rice were lower than spring conventional rice.

According to Hien (1998), the ratios of net return per total cost of rice growers in Thaibinh and Hanoi provinces (neighboring provinces of Hatay province) were 0.32 and 0.35, respectively, while that of rice growers in the study site was 0.2. Therefore, an improvement on rice yield and input use may be alternative solutions in order to maximum profit.

In can be concluded that, farmers could obtain the highest economic returns from spring conventional rice production, followed by hybrid rice production, and summer conventional rice production. However, the net return from rice production was very low. Some rice producers could run in loss in case they completely hire labor.

6.7 Factors influencing farmer's decision of rice growing

Farmer's decision making is regarded as very important aspect, which considerably affects resource allocation and utilization that creates the opportunity cost. For example, farmers may decide whether they should use their own land for rice production or leased out to make profit. The respondents were asked to rank among some alternative factors that they considered as influencing factors on the decision of rice growing. The factors obtained from the questionnaire were staple crop, cash crop, livestock feed, no alternative and other factors such as requirement of cooperative, government policy, keeping cultivation land, etc. This result was presented in Table 6.18.

Almost all the respondents revealed that they grow rice because it is the main staple crop for their daily meal. Seemingly, rice as the staple crop ranked as the major influencing factors. The second factor was livestock feed, followed by no alternative and cash crop. Rice growing for cash crop purpose was ranked after some others due to rice land is limited and rice price is low.

Table 6.18: Ranking of factors affecting farmer's rice growing decision

Factor	Proportion (%)
Staple crop	100.0
Cash crop	45.0
Livestock feed	50.0
No alternative	55.0
Others	3.0

Source: Survey, 2002

It was found that rice growers coped with several major problems, such as high cost of seed of hybrid variety, low rice price, pest and disease, inappropriate fertilizer use, and lack of information. However, high seed cost and low rice price were could be regarded as the important problems.

Attempts to improve on rice production with adoption of hybrid rice variety have not significantly contributed to increasing family income. The hybrid seed is costly, requires more fertilizer, and is more risky under conditions of cold weather than conventional varieties coupled with low net profit from hybrid rice. Currently, Vietnam is able to produce hybrid rice seed, but its quality and yield is lower than Chinese hybrid seed. Therefore, Vietnamese seed companies have mainly imported hybrid rice seed from China. This caused high cost of hybrid seed. Many respondents reported that if they do not get price subsidy of hybrid rice seed, they would not grow hybrid rice in the following years.

An open question was placed to the farmers to reveal problems encountered in the marketing process. Low rice price and lack of bargaining power were the main problems. In responding to the question of what was the basis to evaluate the current rice price, whether it was low or high; 78 percent of the respondents evaluated that rice price was low, and the remaining farmers indicated that rice price was rather low or fair.