Research article

Organic Rice Farming Systems in Cambodia: Socio-economic Impact of Smallholder Systems in Takeo Province

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Abstract Organic farming is recognized as an important system of agriculture and food production, that is environmentally sustainable and can generate several positive impacts to rural society. The development of organic farming in Cambodia is in its early stage. Thus, the objectives of this research were to identify the farmers' perception on organic rice farming and to analyze the economic effects of the system. Data collection was carried out through a pretested interview schedule, two types of questionnaires and a personal observation schedule while descriptive and inferential statistics were analyzed with the use of statistical package for the social sciences or SPSS software. The results showed that the majority of farmers converted their farms into organic farms because of premium prices on organic products and 15% increase from their farm incomes compared to conventional farms. Adapting organic rice farming is able to increase rice yields by 5% accounting from 2.46 to 2.59 tons per hectare. The increased amounts of rice production were equivalent to 21%. Furthermore, organic farming systems could be more stable since the analysis of its economic efficiency was higher than conventional farming system.

Keywords organic rice, farming system, potential, constraints, smallholder systems

INTRODUCTION

Rice production in Cambodia is considered as the dominant crop in the agricultural sector like the neighboring countries in Southeast Asia (Deichert and Yang, 2002) which provides food, income and employment. Most Cambodians consume rice as staple food and over 80% of farmers cultivate rice as the primary crop. Rice production accounts 9% of GDP (ACI, 2002) which directly connected to about 65% of Cambodians (Deichert and Yang, 2002).

Takeo province is one of the main rice farming areas in Cambodia. From 85% to 90% of population depend on agricultural sector. Rainfed rice cultivation is the main source of income of the farmers (Sath et al., 2008). In this region, farm sizes are classified into 3 extents; as small scale farming at an average of 0.8 ha, medium scale farming at an average of 2 ha and large scale farming at an average of 4.5 ha. Although farmland areas are limited in the region, agricultural cultivation method is still in a traditional way of farming (Saruth and Gee-Clough, 1998). Most farmers use synthetic fertilizer to increase crop production. In 2000, farmers in Takeo province initiated to use about 100% of inorganic fertilizers (Ieng et al., 2002, Pracilio et al., N/A).

According to the survey, using excessive amounts of fertilizer have only little effect on rice yields. In addition, poor practices in the application of agrochemicals can affect directly to human health, decline soil fertility and reduce aquatic resources (Mary et al., 2000).

An organic rice association (CEDAC) basing in Tramkok District, Takeo Province which produced organic rice, supports local farmers on technical knowledge in organic farming and facilitates marketing of organic rice products from the local farmers. However many farmers in the region could not adapt organic rice farming possibly due to the lack of education on the benefits of organic farming. Thus, the result in this study is expected that could contribute to the adaptation of the local farmers in organic farming.

The goal of this research is to analyze socio-economic impact of smallholder systems in Tramkok district. In this connection, the objectives of this study are to (1) identify the difference on production techniques and farmers' perception of organic rice farming in Tramkok district, Takeo province and (2) analyze the economic performance between organic and conventional farming.

METHODOLOGY

The results presented in this paper are based on qualitative and quantitative methods of primary data collection and inquiry. In order to study the differences of two rice farming systems, total of 60 farmers whom 30 farmers are dealing with organic farming and other 30 farmers from conventional farming were subjected for the interview in this study.

Furthermore, qualitative and quantitative methods such as semi-structured and in-depth interviews, identification of key-informants, and field visits were used to fulfill the necessary data needed in this study. Data was collected through a pretested interview schedule, two types of questionnaires and a personal observation schedule then descriptive and inferential statistics were analyzed with the use of SPSS software.

RESULTS AND DISCUSSION

Table 1 shows the differences between organic and conventional rice farming. It was observed that organic farming can save around 50% of seeds per hectare of rice field along with wider spacing on planting of rice seedlings in organic farming than that in conventional farming. Regarding with fertilizers, big amounts of organic fertilizers are necessary to be applied into the field than that of synthetic fertilizers. However the price of organic manures is much cheaper, that cost 10 riel per ton of cow manure than that of synthetic fertilizer that cost around 1600 riel per kg.

Table 1 Differences between organic and convention rice farming

	Production Stage	Organic farms	Conventional farm
Pre-cultivation	Farm location	Near from the village	Disperse
	Seed / ha	20 kg	More than 40 kg
Cultivation	Land preparation	2 or 3times	2 times or less
	Cultivation method	Transplantation	Direct seeding / transplantation
	Seedling age	12 - 15 days	More than 20 days
	Space between line and row	25 - 30 cm	< 20 cm
	Fertilizers	Organic fertilizers(1)	Chemical fertilizers
	Amount of fertilizers	3 - 4 tons	50-100 kg
	Weed control	Hoes and Hands	Hoes and Hands
	Pest control	No	No
	Irrigation	Rainfed	Rainfed
Post-harvest	Storage	12-13% of moisture separately with other products	No restriction

(1) *Organic fertilizers including compost, animal manure such as cattle dung …*
(2) *Farmers in the research area did not use pesticide or herbicides in their rice field.*

Motivations on transforming to organic farming

According to the data collected through individual interview, farmers have different motivations in transforming to organic farming. Farmers shifted to organic farming in order to reduce the expenses on synthetic fertilizers, to avoid the negative effects of synthetic fertilizers to health, to utilize the

available resources in the neighborhood, to conserve the environment as well as soil and water quality and to acquire the beneficial prices on organic products.

Fig. 1 shows that the low cost production and high price of organic rice products are the remarkable reasons for converting the conventional farming to organic farming accounting for 63% and 57% respectively. Meanwhile some of the farmers were encourage converting to organic farming due to its increasing effects on rice yields which accounts 40% of the interviewed farmers while 17% of them stated for health benefits.

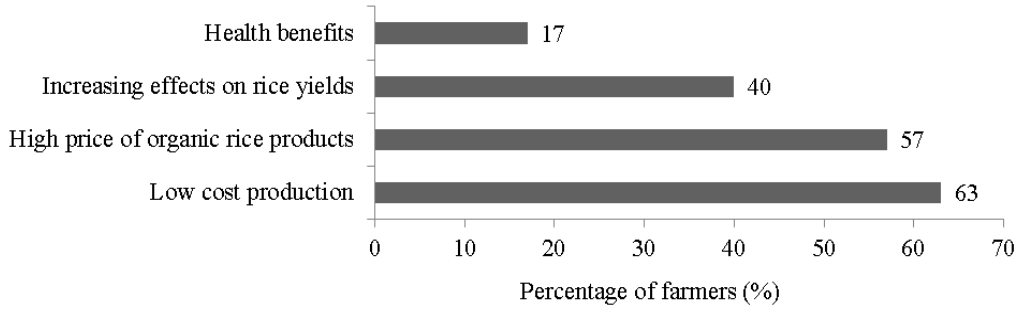

Fig. 1 Farmers' motivation on transforming to organic farming

Perception of organic farmers

Farmers slowly realized the advantages on cultivating rice through organic farming which results the increasing number of households along with the increasing area of paddy fields in rural villages in the region. In addition, most of the organic farmers pursue to continue on carrying out organic farming. As shown in Fig. 2, 80% of organic farmers were motivated to pursue organic farming due to the higher net income from organic products. Also, the high market demand and high quality of organic products was 57% and 30% respectively. Other farmers, constituting 15%, were favored to keep the products for their own consumption.

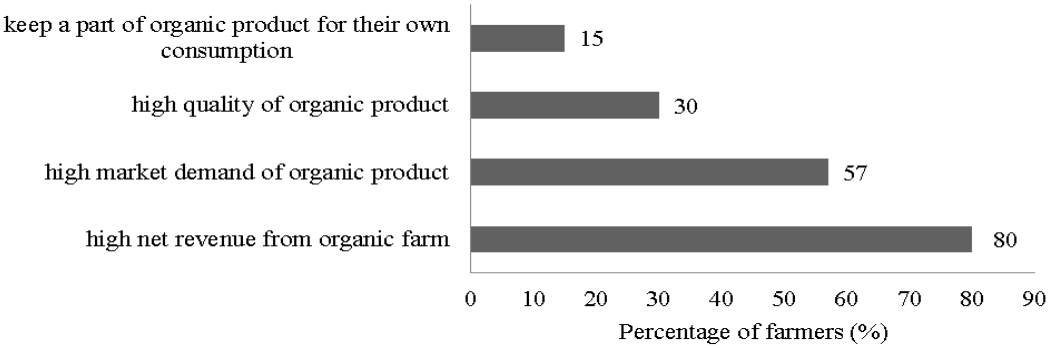

Fig. 2 Perception of organic farmers

Perception of conventional farmers

Fig. 3 shows that 60% of conventional farmers were convinced to convert their rice field into organic while the other 40% stated to remain the conventional method of rice farming.

Reasons from farmers who intend to shift into organic rice farming;

- Production cost is getting higher every year with the increasing prices of chemical fertilizers
- More amounts of synthetic fertilizers needed to be applied into conventional rice fields to maintain its production output

- Prevent the side effects of applying agrochemicals on human health
- Economically favorable for them since they can produce compost by themselves
- Promote social relationship among local farmers through ideas and knowledge sharing
- Farmers can have a benefit of acquiring technical support on organic farming from NGOs

Reasons from farmers who intend to continue the conventional methods on rice farming:

- High labor cost of transporting manures or organic fertilizers to the rice fields
- Excessive use of synthetic fertilizers results more rice yields
- Poor soil quality will be improved by using synthetic fertilizers.
- There is no enough labor to carry out organic rice farming.
- Rice cultivation is considered as the second source of income in their families
- Lack of understanding on the benefits of organic rice farming

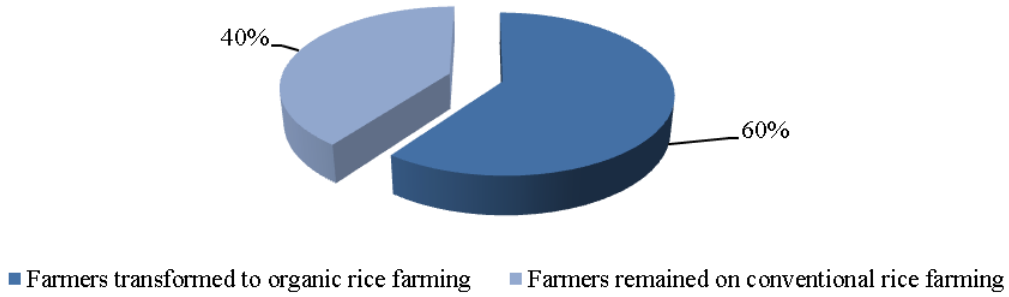

Fig. 3 Proportion of conventional farmers to convert into organic farming

Economic performance in organic and conventional rice farming

Based on the data collected at the research site, it was found out that the gross revenue at conventional rice farming was 2,460,059 riel while at organic rice farming was 2,081,110 riel. For clear comparisons of economic performances between organic and conventional farming, indicators were used as follows; net revenue, total cost, break-even yield, net revenue/cash expense ratio.

The net revenue was calculated per hectare of the field and as shown in Table 2, it is clearly indicated that organic rice farming was higher of net revenue at 21% than that in conventional rice farming. This could be attributed to the higher yields and higher prices of organic rice products. Total cost of production includes noncash and cash form. It was found out that conventional rice farming had higher cost production for 45% than that in organic rice farming. This was due to the higher cost of synthetic fertilizers accounting to 90% of cash cost. In this connection, to produce 1 ton of unmilled organic rice will cost 81,040 riel compared to conventional rice which will cost 147,061 riel. Break-even yield is the yield that will pay for the total cost variable cost. Since the total cost of production was mainly due to the higher cash cost of production, the break-even yield was the highest in the conventional farm followed by organic farm. Organic fields could produce 212 kg per ha at a price of 950 riel per kg of rice compensating for the total cost of 201,071 riel. Meanwhile, conventional fields could produce 343 kg per ha at a price of 848 riel per kg of rice compensating for the total cost of 290,946 riel. Net revenue/cash expenses are the ratio between the net return over the cost of production. Due to the high cash costs and the lower net revenue in the conventional farming, the net revenue/cash expenses values were lower than that in the organic farming. The economic efficiency of organic rice farming was at an average of 19 higher than that of conventional rice farming at an average of 9. Therefore, it was clearly indicated that the organic rice farming is economically more beneficial than conventional rice farming.

According to these results, organic rice farming has become the priority for the development

in agricultural sector in Cambodia, especially for small scale farmers. Although, organic rice yields increased only at 5%, its net revenue was higher than that in conventional rice farming. It was also observed that organic rice farming saves up to 50% of rice seeds compared to conventional rice farming by controlling the spaces between planting of rice seedlings.

Table 2 Economic performances between organic and conventional rice farming

Items	Organic farm	Conventional farm	OF-CF	Δ%	Significant level
Gross revenue (riel)	2,460,059	2,081,110	378,949	15%	**
Yield (t/ha)	2.59	2.46	0.13	5%	n.s
Price (riel/kg)	950	848	102	11%	
Total cost (riel)	201,071	290,946	-89,875	-45%	*
Noncash cost (riel)	82,494	53,959	28,535	35%	**
Cash cost (riel)	118,577	236,988	-118,411	-100%	*
Net revenue (riel)	2,258,987	1,790,164	468,823	21%	*
Net revenue/cash expenses	19	8	11	58%	**
Break-even yield (kg/ha)	212	343	-131	-62%	**
Total cost to produce 1 ton of rice	81,040	147,061	-66,021	-81%	**
Economic efficiency	19	9	10	53%	**

n.s : *no significant*, *: *significant at 0.05 level*, **: *significant at 0.01 level*
OF : *Organic farming*, CF : *Conventional farming*
Δ% : *Difference in percentage between organic and conventional farming*

CONCLUSION

The findings presented throughout this study indicated that organic rice farming is not only environment friendly but also gains more profit and economic efficiency than that of conventional farming with the use of high amounts of synthetic fertilizers. Farmers were also proposed to expand the area of organic rice fields to increase organic rice production. Moreover, farmers became aware of the risks and effects of chemical pesticides and synthetic fertilizers, thus, most of the conventional rice farmers in the study area proposed to stop using agricultural chemicals.

In conclusion, with the positive perception of farmers in Tramkok District, Takeo Province on organic rice farming, 60% of farmers adapted and converted their rice fields into organic farming. Organic rice farming also contributed to the improvement of economic situation to the farmers where its net revenue was higher than that on conventional rice farming.

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