



Organic Rice Farming Systems in Cambodia: Potential and Constraints of Smallholder Systems in Takeo

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Abstract The development of organic farming is limited in Cambodia because of low literacy rates for farmers in rural areas. In this study, organic rice farming systems were demonstrated to the farmers in Takeo province, Cambodia. As the result of the application, the farmers improved their income through increasing yields, premium prices and reduced expenditure on chemical fertilizers after implementing organic farming techniques. Moreover, all of the farmers adopting organic farming system improved their conditions of health, food quality and the ties of family and community. Nevertheless, these benefits were not completely distributed to all individuals and communities. Very poor and isolated farmers were generally unable to access the benefits. In conclusion, the three main factors for empowering Cambodian farmers to initiate the organic farming system are considered as follows: the individual's endowment of resources, the strength of the farmer groups and the policies and facilitation of the supporting organizations.

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

INTRODUCTION

Rice-based farming systems in Cambodia incorporate rain-fed lowland rice and dry season rice, and are often integrated with livestock, aquaculture, vegetable gardens and other activities (Mak, 2001). As the adverse environmental and social consequences of high input agriculture have been discussed, attention has been focused on sustainable systems of agricultural production. For approaching towards the sustainability, some points should be clarified, such as what the sustainability actually is and how to achieve it. One of the technological innovations, which resulted in strong farming institutional changes in recent year in Cambodia, is approaching to organic rice farming. Organic farming has become a significant element in policies promoting food safety and environmental quality of global food production considering that it rules out the use of mineral fertilizers and other chemicals such as pesticides and herbicides (Zanoli and Gambelli, 1999). Intensive agriculture has increased crop yields but also posed severe environmental problems (Knudsen et al., 2006). Sustainable agriculture would ideally produce good crop yields with minimal impact on ecological factors such as soil fertility (Knudsen et al., 2006).

The motivation of farmers to convert to organic farming ranges from pure production system considerations to conditions in the market (Christensen and Frandsen, 2001). By focusing on the production system, there is a need to get a better understanding of the importance of the factors that determine the conversion rate and the economics of organic farming (Sorensen et al., 2005). The required increased knowledge on these factors includes the type of farm (production practice), the labour situation and the economic constraints (Sorensen et al., 2005). However, Elizabeth et al. (2007) stated another important factor associated with the deliberation of farmers to convert to organic farming practice is the motivation.

The goal of this research was to analyse the potential and constraints of smallholder system in Tramkok district as our case study. The results of this thesis will be served as guidelines to set up appropriate strategies for the future development of organic farming in other areas in Cambodia. The objectives of the study were to (1) interview organic rice farmers in Tramkok district, Takeo

province for evaluating their production technologies and marketing and (2) identify major obstacles and opportunities for organic 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 between two rice farming systems, a total of 60 farmers were interviewed: 30 organic farmers and 30 conventional farmers.

Qualitative methods such as semi-structured interviews, identification of key-informants and field visits were used to complete the picture. The interviews aimed at finding out the rationale and the motivation of organic rice producers in this area as well as the constraints, the opportunities and the strategies as perceived by the farmers. The knowledge gained in the interviews was used in a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis to formulate options for the future.

RESULTS

Farm management in organic farming systems: Organic rice farming integrated with livestock or irrigation systems plays the most important for rice farmers especially during dry season. Due to lack of irrigation, farmers in this area grew rice only during wet season and rainfall is the main water resource for rice production as well as human consumption. Rice organic farming system mainly is related to the small livestock production (cattle, pigs, chickens and ducks). Incorporated the dungs from livestock with the other resources to produce organic manures, is the most important elements for organic farmers in their organic rice production.

Organic farmers in this area usually apply straw, rice grain and the rest of food from houses to feed the various cattle, as chicken, pig, and then make the manure with dungs from those animals. Farmers start to collect manure, kitchen waste etc and keep it in the organic store beside their homes. After 4 or 5 months, through the action of micro-organisms on those wastes become organic manures which are available to use during the raining season. Moreover, during dry seasons, some farmers cultivate the seasonal crops which do not need much water. Also, they use residues of the crops as green manures after harvesting by incorporated or plowed into the soil to add organic matter and nutrients for rice crop in the next season (i.e. ground bean etc).

Evaluating amounts of labour: Normally, the amounts of labour for rice production between men and women were not allocated equally. Referred to the information from the field survey, men are usually involved in task such as ploughing, fertilizing and transporting. Women undertake sowing, transplanting, weeding, while both are involved in harvesting and post harvesting. Concerning the labour, most of people who live in the study site hire labours during transplanting and harvesting period. People who live in the village or nearby the village and do not cultivate rice can sell their labour in for these activities. Table 1 shows the evaluation of amount of labour in organic and conventional rice farming. Organic farming needed much more labour intensively for weed control (19.2 md vs. 3.8 md) and nutrient management (8.5 md vs. 1.2 md) than in conventional farming. The rest of labor was nearly the same. Because of this, organic farmers need to spend at least 22 md (14%) more than conventional farmer per hectare rice filed.

Table 1 Evaluating labour utilization per hectare

| Items | Organic farm | Conventional farm |
|---------------------|--------------|-------------------|
| | man-day (md) | |
| Land preparation | 10.6 | 8.8 |
| Transplanting | 14 | 15.8 |
| Nutrient management | 8.5 | 1.2 |
| Manual weeding | 19.2 | 3.8 |
| Harvesting | 35 | 35.5 |
| Total | 87.3 | 65.1 |

Trends of organic farmers: Based on the field survey, all organic rice was cultivated by System of Rice Intensification (SRI). In the beginning, most farmers living in the two villages of the site did not believe and joint the association to produce or cultivate organic rice, so the number of households and the size of lands were small and limited in scale for the organic rice cultivation. Even some farmers decided to grow organic rice to meet the market demand; they did not cultivate organic rice fully in their fields.

Trends of non-organic farmers: Many farmers kept some fields for traditional farming system which depends on agricultural chemicals. According to the information collected in the interview with local farmers, the shortage of the information on organic farming system made farmers difficult to accept organic farming system fully and became major constraints to convert their farming system.

Potentials and constraints of organic rice faming system in Tramkok: The relative potentials and constraints of smallholder system for organic farming system were analyzed on the basis of the SWOT analysis. The data obtained from the survey were classified into 4 categories: Strengths, Weaknesses, Opportunities and Threats.

Strengths

- Incorporated the new method of organic farming system in the rice farm, farmers could get higher rice yield than the previous farming method (traditional or conventional method).
- Even farmers are poor but they could consume the premium quality of the free-chemical products and made them healthier than before.
- Instead of chemical fertilizers purchased only from the import markets, farmers could produce their organic fertilizer (i.e. compost) by using the resource available in the farms especially the manures from their small livestock such as cattle, pig, chicken etc.
- Increased the rice production in the organic farms, farmer has possibility for greater food security and selling surplus locally with the premium prices which provide more income for their families. Moreover, the profit net from rice production increases as the cost of input has been reduced by less or no cost for the organic fertilizers used.
- Stop chemical fertilizers and replaced it by organic fertilizers, the soil quality has been improved and better for the environment.

Weaknesses

- Organic farming always involves substantial additional labour input, especially weed control and nutrient management.
- Organic farming is priority for small farm size which mostly located nearly the village or home. Lack access for transportation for huge amount of compost or cow manure and taking care after the transplantation through weeding is also a barrier for farmers.
- Conflict location between the organic and conventional farms may introduce the high risk of insects for organic farms and the flow of chemical fertilizers from conventional farms into organic farms during the raining. However, farmers tried to induce the organic farming system to their neighbours but some of them did not care because they consider rice production as their second source of income.
- Since the illiteracy rate is high at farmers, the adoption of new technology is slowly developed according to their limit knowledge. Moreover, the availability of information on organic farming to farmers is still very limited. The main sources of information for organic farmers include the publication (books and magazines) and the communication among farmers.
- With the large scale of rice farm (>2 ha), farms could not afford to purchase the external labour (hiring labour especially for weeding etc) and the huge amount of organic fertilizers.

Opportunities

- Organic rice farming is the first priority for farmers to manage it (including the amount of organic fertilizer, the labour used for taking care and weeding after the transplanting) especially for smallholders system since the majority of the farms in this area hold land less than 0.80 ha.
- Organic farming can create new on farm income for farmers and generating opportunities.
- Opportunities for greater social contacts and aids through international/local NGOs and Ministry of Agriculture Forestry and Fisheries (MAFF).
- High market opportunities of products since the organic products have been considered as premium quality.
- With growing public concern for food quality and safety, animal welfare and nature resources; Organic farming become more accepted by government, farmers and consumers worldwide. This trend and market demand directly influence the rapid grow of organic farming in Cambodia.

Threats

- The organic farming movement is still very new to Cambodia. That is a reason why organic markets and consumers are very limited. Also, people may concern the price of products as the majority of Cambodia people live under poverty line up to now.
- Lack of irrigation system, farmers can produce rice only in wet season and also they depend on the natural situation (drought).
- There is no international certificate of organic rice. And organic farmers have to sell their products to consumers by NGOs markets.
- Nowadays, the organic producer groups are under the project support of each NGO, “Will organic farmers sustain by themselves in future after the projects finish?”

DISCUSSION AND SUGGESTIONS

How to improve weakness of organic farming: The major constrains of organic farmers in the study area are; impact on labour utilization, conventional farm always located near organic farm, high impact of the epidemics (virus and bacteria) by uncontrolled quality of manures.

Improvement of the labour requirement: The labour requirement has been increased mainly during the growing stage of rice production through weed control (19.2 md vs. 3.8 md) and nutrient management (8.5 md vs. 1.2 md).

Improvement of the labour input on weed control: Farmers could choose the indirect method to prevent the development of weed and the improving of nutrient management such as; (1) Crop rotation is one of the weed management practices in the cultivation. Each rice culture is associated with a characteristics weed problem, influenced cultural practices used (i.e. three-year rotation of rice / soybeans / grain crop.) (2) Choosing appropriate rice varieties which are although complete again weeds. (3) Water management will play an important role in rice cultivation. Since ancient times, water has been used to manage weeds in rice fields. Many non-aquatic weeds do not survive in submerged environment, Moreover, grassy weeds can be largely eliminated by continuous flooding. (4) Biological weed control is the utilization of natural enemies for the reduction of weed population. Natural enemies of weeds include insect, nematodes, fish and other animals. Example: ducks eat new-borne weeds in the growth stage of rice. The ducks walk 3-4 km/day on the field, making the water turbid in which weed seed or seedlings cannot grow up.

Improvement of the labour input on nutrient management: Two weeks after the transplantation, farmers in this area start to provide more organic manures or livestock manure directly (cattle dung, pig manure, chicken manure) until the flowering stage. They believed that the rice productivity increases with providing fertilizers in this period. Referred to Reich (2000), the best times to apply organic fertilizers are early spring and fall or even a few months before planting, because that allows time for soil microbes to digest the organic matter and transform nutrients into forms plants can use (Reich, 2000). Therefore, farmers could apply all the compost

fertilizers in the first land preparation in order to save their labour input on the nutrient management during the growing period of rice crop.

Controlling manure and limit of manure: Up to now, uncontrolled the quality of manure and over dosage of manure applied to rice field. It was not yet considered as main problems for farmers. In addition, (1) it is better that farmers use the resources which are available in their villages in order to prevent their health and other domestic animals from the epidemic of virus or bacteria. (2) If farmers have to bring the manures from other farms outside their villages, farmers have to be sure those manures is from the sanitary farm. (3) Moreover, farmers have to consider well how to apply manure in the rice field in order to reduce water pollution of surface and groundwater by nitrate, phosphate and other heavy metals such as copper, zinc etc. in the manures.

How to cope with threats in organic farming: External factors of organic farming include market, consumer, and role of government which plays an important part in developing and establishing organic farming in this region.

Development of organic market: Recently, it seems that organic rice farming system have been growing very fast especially for small holder farming in Cambodia, but in fact organic rice farming is still very limited as compared to the total land rice in this country (0.02 percent of total land rice). Moreover, organic farmers are also facing the similar drawback as the conventional farmers, generally improving the business environment and investment climate at the local as well as national level, are likewise essential. The latter would also stimulate investment in the agro-industry sector, which traditionally is the major link between farmers and markets and the driving force for agricultural growth.

Improvement of the irrigation system in the rural area: Beside this, poor governance of Cambodia government is a major concern to late development of the agriculture sector in Cambodia. Evidently, 85 percent of Cambodia people relies agricultural business for their income. However, agriculture sector appeared slower progress compared to other sectors such as industry and service following 4.4%, 17% and 11% of GDP growth in 2006, respectively (EIC, 2008). In addition, 36 percent of total Cambodia population (including 40 percent of people live in rural area) have been living under the poverty line as recorded in 2007 (World Bank, 2008).

In order to develop the agriculture sector in Cambodia particularly organic rice farming system and other cropping system, the government should (1) build more canals or dams which supply water for irrigation in the dry season and avoid the flooding in the raining season. Water is used not only for agriculture but also it use for drinking, cooking and bathing. Also, (2) attention should be paid to construct more roads and bridges in the rural area. Mostly farm gate prices are squeezed by the high transportation costs through the drawback in transportation services.

How to develop and sustain organic farming in the future: All the organic rice farming is under the support project of local and international NGOs. Sustainability of this farming method is still a main concern to smallholders system because many farmers still unaware of their ability to pay on certifying their organic products in the future despite the fact whether organic markets grow or stop in near future. Fortunately, Royal Government of Cambodia has recently become interested in organic farming with the market expansion for promoting sustainable agriculture.

Furthermore, to develop organic farming in this area as other area in Cambodia; (1) general awareness needs to be raised for easy access to organic seeds and technical training. (2) Awareness of organic farming could be enhanced through appropriate research and extension programs as well as education, training and promotion activities. (3) Public-private sector partnerships are also urgently needed if the rapid growth of organic farming in the country is expected, along with continuing international assistance in the form of technical and financial aid for strategic initiatives, networking and collaboration with stakeholders in organic and fair trade movements, and to stimulate market access. (4) International organic certificate is necessary for organic farmers to export their product to the other countries.

CONCLUSION

This paper dealt with the discussion on organic farming, which was demonstrated to the farmers in

Trankok district of Takeo province, Cambodia. As the results applied organic rice farming systems in Trankok district, the farmers improved their income through increasing yields, premium prices and reduced expenditure on chemical fertilizers after implementing organic farming techniques. Moreover, all of the farmers adopting organic farming system improved their conditions of health, food quality and the ties of family and community. Nevertheless, these benefits were not completely distributed to all individuals and communities. Very poor and isolated farmers were generally unable to access the benefits.

It was considered that there may be three main factors for empowering Cambodian farmers to initiate organic farming system, the individual's endowment of resources, the strength of the farmer groups and the policies and facilitation of the supporting organizations.

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