Research article

Assessment on Local Awareness of Organic Farming Practices in Kampong Cham of Cambodia

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Abstract In rural areas of Cambodia, more than 70% of the total population is in the agricultural and related sectors, which are the important sectors of the Cambodian national economy. Rapid development of agricultural technologies depending on agricultural chemicals such as synthetic fertilizers, herbicide or pesticide has significantly increased agricultural production since 1990 (MAFF, 2009). However, overuse of agricultural chemicals is damaging the long-term soil fertility and productivity of farmlands. Also, agricultural chemicals released from farmlands to downstream cause the degradation of water environment. So, attention has been paid to promote sustainable agriculture through organic farming practices. Taking into account the conventional farming practices of rice and vegetable cultivations that have been done by local farmers, various workshops and trainings were conducted to promote organic farming practices. This paper dealt with the discussion on sustainability of organic farming practices introduced on the basis of local awareness. In addition, various workshops and trainings on organic farming practices were assessed in this study.

Keywords organic farming practices, crop production, local awareness, Kampong Cham

INTRODUCTION

In developing countries like Asia, agriculture plays an important role for economic growth as well as poverty reduction in rural areas. Rapid development of agricultural technologies has significantly increased agricultural production in Asia. Cambodia's economy is also based on agriculture. More than 70% of the total population of 13.8 million is in agriculture and related sub-sectors such as livestock raising, fisheries, aquaculture for their livelihoods. Although Cambodian farmers produce wide variety of crops, the major crop is paddy rice. However, agricultural sector remains unpredictable because it depends largely on natural topography and weather conditions. Currently in Cambodia, farming system tends to change to mono-cropping system with increasing cash crop demands, and the majority of farmers in Cambodia apply agricultural chemicals, such as chemical fertilizer, herbicide or pesticide to maintain high levels of crop yields.

Agricultural chemicals being released from farmlands cause not only polluting water environment but also worsening human health. The application of herbicides or pesticides without understanding of the safe usage results severe problems as the contamination of toxics in agricultural products that would induce human diseases. Also, the environmental integrity becomes necessary for human prosperity and sustainable development because of rapid and prevalent

environmental degradation, as agricultural practices by human beings are directly connected to the long-term environmental and sustainable development.

Recently, organic farming practices are promoted to local farmers in Kampong Cham province of Cambodia, as it contributes to increase organic and nutrient contents with improving soil physical and chemical properties, and to reduce the expenditure of agricultural chemicals for local farmers. In addition, organic farming practices may harmonize more with natural environment compared to conventional one depending on agricultural chemicals (Pinamonti, 1998, Brown et al., 2004 and ERECON, 2009). So, attention has been paid to suitable strategy to promote sustainable agriculture through organic farming practices. In this study, various workshops and trainings were conducted to promote local perception on organic farming practices, such as composting, making and applying bio-pesticide or liquid fertilizer. Based on various extension activities, this paper dealt with the assessment on local awareness of organic farming practices through the observation on the changes in farming practices.

METHODOLOGY

The target area of Roung Kor Village, Baray Commune in Prey Chhor District, Kampong Cham Province was selected for the case study to conduct the assessment on local awareness of organic farming practices, such as composting, making and applying bio-pesticide or liquid fertilizer. In the initial stage of this study, a baseline survey using a questionnaire sheet was conducted in August 2010 to get the basic information of local living as well as conventional farming practices in the village.

Then, various kinds of workshops and trainings were conducted to promote local awareness of organic farming practices as shown in Table 1. In the target area of Roung Kor Village, Baray Commune in Prey Chhor District, Kampong Cham Province, the core target farmers at 43 were selected in the study. And then, the local awareness and the changes in farming practices were evaluated.

Table 1 Important contents done for raising local awareness on organic farming practices

Month and year	Important contents	Number of participants
April 2010	Starting project	43
|	Conducting a baseline survey	43
	Holding workshop on composting	41
March 2011	Holding training on composting	43
April 2011	Holding workshop on compost application	41
	Holding training on compost application	43
|	Holding workshop on making and applying bio-pesticide and liquid fertilizer	42
	Holding training on making and applying bio-pesticide and liquid fertilizer	43
March 2012	Holding workshop on applying net for protecting insects	43
April 2012	Cultivating vegetables with organic farming practices	43
|	Cultivating rice with organic farming practices	41
	Selling safe agricultural products	43
March 2013	Assessing local awareness of organic farming practices	43

RESULTS AND DISCUSSION

Conventional Farming Practices

Local living: According to the results of baseline surveys, Roung Kor village has 756 inhabitants (196 households). There are 104 ha of paddy fields and 6 ha of orchards/upland fields. Around 20% of paddy fields are irrigated and others are depending on rainfalls. One household of farmer holds farmland at around 0.5 ha averagely. Around 66% of all households earn for their living exclusively from agriculture and all households cultivate rice and vegetables. The average rice yield varies from 1.5 t/ha to 3.0 t/ha. Rice is planted mainly for self-consumption but remains were

sold to middle man. Additionally, vegetable are cultivated in a small scale farms around resident. As a unit price of vegetables is high, many households generate cash income from vegetable cultivation.

Rice cultivation: Various species of rice have been cultivated by local farmers, such as IR66, Chul Sar, Sen Pidou, Riang Chey, Phnom Run, Car 6, Car 9, Ksay sticky rice, Somaly, Neang Nok, Kong or variety 59. Due to the lack of water for irrigation, farmers are conducting rice cultivation only once per year depending on rainfalls. To increase the rice productivity, chemical fertilizer is commonly applied for rice cultivation, especially 'Urea' (N:P:K 46-0-0) or 'Di-Ammonium Phosphate' (18-46-0).

Vegetable cultivation: In the target area, farmers are cultivating vegetables based on the market demands, especially various types of cabbage such as Chinese cabbage (*Brassica rapa L. subsp. ekinensis*), Green kuang futsol (*Brassica chinensis juslenius*) and Swatow mustard (*Brassica juncea* var. *rugosa*). Every two days, middle man comes to village for buying all vegetables then brings them to the market or restaurants. In the village, local farmers continue growing vegetable all round year, approximately harvesting 4 times per year. Some vegetables take only 30 days but some take longer more than 45 days. In dry season, some farmers cannot grow vegetables for a few months because of too many insects as well as lack of water. Additionally, farmers are afraid of applying multi-cropping or crop rotation; because they worry that enough income would not be achieved from selling various types but could get from small amounts of each vegetable. As same as rice cultivation, farmers are applying a lot of chemical fertilizers and pesticides for vegetable cultivation. Some farmers are applying more than 800 kg/ha of chemical fertilizer for cultivating vegetables. The most popular formula of chemical fertilizer applied in vegetable farms are granular form at N:P:K 46-0-0, 18-46-0 or 15-15-15, in addition to liquid form of 16-16-8 or powder form of 30-5-5, etc. Actually, farmers not well known about the benefit or effect of each fertilizer on vegetable growth, but they apply according to what they have been told by the sellers or other farmers.

Fig. 1 Crop cultivations and agricultural chemical application in Roung Kor village

Chemical pesticide or fungicide application: Based on the advertisements by the pesticide company or seller, a few types of chemical pesticide or fungicide such as Visor, Reagant 1.8 EC/Vitaco, Carbendazim and Abamectin, etc. are widely applied especially for vegetable cultivation by farmers. Farmers are expected it can help to decrease or stop insect or disease problems. Normally, the effectiveness of pesticide works well at the first time, and then it decreases because insect or disease improves their immunity. So, it is better to change a type of pesticide. However, they just try to apply same pesticide with increasing the amount applied, as farmers do not understand well. Most of pesticides or fungicides are imported from Thailand or Vietnam through both regular and irregular ways. However, farmers have a less understanding about the effect of those chemical on health or environment, even some sellers or farmers had been told or joined the safety use training coordinated by the governments or NGOs before start selling or using this kind of products. However, the safety use instruction is still not commonly understood by farmers.

Organic Farming Practices Promoted

Promoting organic farming practices: For decreasing the expenses of buying chemical fertilizer and the effects on natural resource and human health, sustainable farming practice through composting and liquid bio-fertilizer/pesticide making were proposed to farmers as alternative farming practices. According to the previous surveys and requests from farmers in Roung Kor village, 43 compost boxes (2 m x 4 m x 1 m) were constructed for composting as same as plastic container were distributed for making bio-fertilizer and bio-pesticide. Then, the workshop on "how to make compost" was conducted for giving knowledge and training to farmers at Roung Kor village. In addition to bio-fertilizer and bio-pesticide were introduced and trained to farmers by using available materials in/around the village.

Fig. 2 Workshops on making compost, liquid bio-fertilizer and liquid bio-pesticide

For 2 years, organic fertilizer application through composting and liquid bio-fertilizer/ pesticide making had been promoted to farmers in Roung Kor village for supporting to increase the productivity and decrease effects to health and environment. Totally 43 compost boxes had been provided to 43 farmers, and all 43 farmers learned how to make compost and application methods in farmlands.

During the 2nd year, farmers had produced compost averagely 4,363 kg per compost box. Since then a few times composting had been done and applied to farmlands especially for rice and vegetable cultivation. Averagely, 150 kg of compost had been applied for 100 m^2 of rice cultivation and 119 kg for 100 m^2 of vegetable cultivation. Additionally with the application of compost, farmers can decrease the amount of chemical fertilizer about 20-100 percent as shown in Table 2. Through farmers' observation, all of 43 farmers were satisfied with the effectiveness of compost (Table 3) and willing to continue composting. Also, farmers understanding on making bio-fertilizer and bio-pesticide and safety use of chemical pesticide. The results were summarized in Tables 4 and 5.

Table 2 Decrease in chemical fertilizer through compost application

Decrease in chemical fertilizer	Percentage of farmers (%)
0-20%	-
20-40%	10
40-60%	56
60-80%	32
80-100%	2

Source: Results from the questionnaire survey (ERECON, 2011)

Table 3 Changes in crop growing after applying compost

	Crop yield (%)	Crop quality (%)	Soil quality (%)
Increase	98	93	100
Same	2	7	-
Decrease	-	-	-

Source: Results from the questionnaire survey (ERECON, 2011)

Table 4 Percentage of amount of chemical fertilizer or pesticide to be decreased

Content	Decreasing percentage up to				
	0-20%	20-40%	40-60%	60-80%	80-100%
Decreasing chemical fertilizer with applying bio-fertilizer	2%	2%	21%	51%	24%
Decreasing chemical pesticide with applying bio-pesticide	0%	0%	35%	53%	12%

Source: Results from the questionnaire survey (ERECON, 2011)

Table 5 Summary of questionnaire results of workshop on bio-fertilizer, bio-pesticide and safety use of chemical pesticide

Content	Percentage of farmers		
	Yes	No	Not sure
Understand how to make bio-fertilizer	86%	14%	-
Interested in making bio-fertilizer	100%	0%	-
Bio-fertilizer is benefit to farmland	95%	5%	-
Want to continue making bio-fertilizer	100%	0%	-
Understand how to make bio-pesticide	91%	9%	-
Interested in making bio- pesticide	98%	2%	-
Bio-pesticide is benefit to farmland	86%	2%	12%
Want to continue making bio- pesticide	98%	2%	-
Knowing the safety use of pesticide before attend this workshop	60%	40%	-
Doing the safety use of pesticide before attend this workshop	65%	35%	-
Understanding the safety use of pesticide through this workshop	98%	2%	-
Willing to adapt the safety use of pesticide	98%	2%	-

Source: Results from the questionnaire survey (ERECON, 2011)

Evaluating participatory level: Additionally, the results of questionnaire survey conducted after the 1st workshop showed that 93% of farmers were applying chemical fertilizer and only 7% were applying cow manure instead of chemical fertilizer. However, after 2 years with 4 times of workshops and training, farmers' adaptability for organic fertilizer increased. The level of participation was evaluated according to the answers in questionnaire survey and attitudes of farmers in workshops. There are various levels or degrees of farmers' participation as shown in Table 6. The evaluation of level or degree of farmers' participation is important for increasing farmers' adaptability for organic fertilizer application.

At the 1st workshop, although many farmers attended, it was evaluated as low participation at Level 2 or 3, because most of them participated only for responding to the requests for attending. However, farmers became active after understanding the benefits of composting and bio-fertilizer /pesticide making at the 3rd workshops. At the 4th workshop, Roung Kor safety agriculture group was established and farmers' participation was very high and they were willing to adapt organic fertilizer to their farmlands. So the level or degree of farmers' participation was evaluated as interactive participation at Level 6.

The awareness of disadvantages to human and environment of agricultural chemicals pushed farmers to find natural materials for making compost, liquid bio-fertilizer and liquid bio-pesticide in order to increasing the nutrients to crop and control pest or plant diseases in farmland. Recently, farmers pay attention to produce and develop liquid bio-fertilizer or liquid bio-pesticide using some kinds of trees, herbs or spices which are available to that area. As these liquid bio-fertilizer and liquid bio-pesticide are new knowledge for farmers in Roung Kor village. However, various workshops and trainings could lead them to see and accumulate experiences of those practices. As more than 98% of farmers were willing to continue making bio-fertilizer and bio- pesticide as well

as to adapt the safety use of pesticide**,** so establishing the farmers' group had advantage to make continue and enhance of organic farming practices.

Table 6 Level of participation

Level	Type	Characteristics of each type
1	Passive participation	People participate by being told what is going to happen or has already happened. It is a unilateral announcement by an administration or project management without any listening to people's responses. The information being shared belongs only to external professionals.
2	Participation in information giving	People participate by answering questions posed by extractive researches using questionnaire surveys or similar approaches. People do not have the opportunity to influence proceedings, as the findings of the research are neither shared nor checked for accuracy.
3	Participation by consultation	People participate by being consulted, and external agents listen to views. These external agents define both problems and solutions and may modify these in the light of people's responses. Such a consultative process does not concede any share in decision making, and professionals are under no obligation to take on board people's views.
4	Participation for material incentives	People participate by providing resources, for example labour, in return for food, cash, or other material incentives. Much on-farm research falls in this category, as faermers provide the fields but are not involved in the experimentation or the process of learning. It is very common to see this called participation, yet people have no stake in prolonging activities when the incentives end.
5	Functional participation	People participate by forming groups to meet predetermined objectives related to the project, which can involve the development or promotion of externally initiated social organization. Such involvement does not tend to be at early stages of project cycles or planning, but rather after major decisions have been made. These instructions tend to be dependent on external initiators and facilitators, but may become self-dependent.
6	Interactive participation	People participate in joint analysis, which leads to action plans and the formation of new local institutions or the strengthening of existing ones. It tends to involve interdisciplinary methodologies that seek multiple perspectives and make use of systemic and structured learning processes. These groups take control over local decisions, and so people have a stake in maintaining structures or practices.
7	Self-mobilization	People participate by taking initiative independent of external institution to change systems. They develop contacts with external institutions for resources and technical advice they need, but retain control over how resources are used. Such self-initiated mobilization and collective action may or may not challenge existing inequitable distribution of wealth and power.

Source: Pretty (1994), adapted from Adnan et al. (1992)

CONCLUSION

According to the results through the observation and questionnaire surveys, many of farmers wanted to reduce chemicals application and the expenses for agricultural chemicals, if there were other things being available to replace. In order to improve the farming systems and economical conditions, it is important to provide the appropriate knowledge and to improve the technologies of farming practices for farmers. It is no doubt that this project has been contributed well for improving the farming systems and economical conditions at Roung Kor village. Sustainable agriculture enhances the quality of life for farmers and society, and in the long term enhances environmental quality and natural resources which agriculture depends. The capacity building of farmers and their institutions is essential for achieving a balance among economic, social and environmental development goals. Farmer-centered development and farmers' awareness was created to facilitate farmers to develop by them. The participation of farmers means that farmers assume a major role in decision-making and managing their own affairs. Efforts should be made to build confidence in farmers so that they make decisions on how to solve the facing problems. Other players such as governments and NGOs have a supportive role, providing some guidance, advices, comments, and trainings for building farmers' confidence. Grouping of farmers is a way for facilitating among farmers through exchanging knowledge and experiences related to agricultural

practices in sustainable way.

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