Farmers' Knowledge, Attitude and Practice toward Organic Vegetables Cultivation in Northeast Thailand

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ABSTRACT

The main purpose of this preliminary study was to assess farmers' knowledge, attitude, and practices toward organic vegetable farming. A survey method through a face-to-face interview from a purposively selected simple random sample of 40 households using a semi-structured questionnaire was used to collect data from organic vegetables growers in Samsung, Khon Kaen province, Northeast Thailand. The findings showed that the knowledge levels of the respondents were low (55%) and medium (45%) with no high level respondents at all. The respondents' answers on organic farming, especially pertaining to use of organic insecticides, herbicides and fertilizers, showed there is still some need for improvement: their attitude was not satisfactory in obtaining organic materials, there were difficulties in implementation, they considered there were less befits in it for them and they were still dependent on conventional practices, especially for pest and disease control.

Keywords: organic vegetables, Thai farmer, knowledge, attitude, skill, practice

บทคัดย่อ

วัตถุประสงค์หลักในการศึกษาเบื้องต้น เพื่อประเมินความรู้ ทัศนคติ และวิธีการปลูกผักของเกษตรกรต่อการปลูกผักอินทรีย์ การศึกษาครั้งนี้ใช้วิธีการสำรวจโดยการสัมภาษณ์ที่ใช้แบบสอบถามแบบกึ่งโครงสร้างในการรวบรวมข้อมูลจากเกษตรกรผู้ปลูกผักแบบเจาะจงจำนวน 40 ราย ในอำเภอซำสูง จังหวัดขอนแก่น ภาคตะวันออกเฉียงเหนือของประเทศไทย ซึ่งคัดเลือกกลุ่มตัวอย่างโดยวิธีการสุ่มอย่างง่าย ผลการศึกษาพบว่า ร้อยละ 55 ของผู้ตอบแบบสอบถามมีความรู้ในระดับต่ำ ร้อยละ 45 มีความรู้ในระดับปานกลาง และไม่มีผู้ตอบแบบสอบถามที่มีความรู้ระดับสูงเลย ผู้ตอบแบบสอบถามที่ทำการเกษตรแบบอินทรีย์ จำเป็นต้องได้รับการความรู้เพิ่มเติม โดยเฉพาะเรื่องเกี่ยวกับการใช้สารควบคุมแมลง วัชพืช และปุ๋ยอินทรีย์ เกษตรกรประสบปัญหาปัญหาในการใช้วัสดุอินทรีย์ ด้านการได้มาซึ่งวัสดุอินทรีย์ ความยุ่งยากในการใช้ และเห็นว่าไม่มีประสิทธิภาพ และเกษตรกรยังคงพึ่งพาการเขตกรรมที่ปฏิบัติโดยทั่วไป โดยเฉพาะการควบคุมโรคและศัตรูพืช

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INTRODUCTION

Organic agriculture is the most dynamic and rapidly growing sector of the global food industry (Ellis, Panyakul, Vildozo, & Kasterine, 2006). The yields from organic agriculture are not less than from conventional agriculture (Ramesh, Singh, & Subba, 2005). Badgley et al. (2006) showed organic food can fulfill the demands for food and sustain the environment. Thailand is predominantly an agricultural-based country with a favorable climate and well-developed agricultural processing facilities, being among the top ten agricultural exporters in the world. In Thailand, production of organic crops is undertaken mainly by smallholders, farmers groups, or large agro-enterprises using organized groups of contract farmers (Chouichom and Yamao, 2010). An estimation by Ratanawaraha, Ellis, Panyakul, and Rauschellbach (2009) indicated that certified organic production increased from 2,147 ha in 2001 to 22,550 ha in 2006, equivalent to 0.11 percent of the country's total agricultural area (21 million ha), representing an increase of over 950 percent over the 2001 area. However, Northeast Thailand (NET), also known as Isarn, is located in a sub tropical area with a total population of about 21 million and a territory of 160,000 km^2 comprising one third of the Kingdom of Thailand in terms of the population and the territory. The majority of the population in NET is resource-poor farmers undertaking for subsistence farming with an average land size of 15 rai (2.4 hectares), mostly growing rice under rainfed conditions. The Northeast region has the biggest area and population, but a moderately low supply of vegetables. The Northeastern plateau drains via a number of smaller rivers into the Mekong River on the Lao PDR border. The area has features of typical rainfed agriculture with inadequate water during the hot and dry seasons. Vegetables are grown as crops after rice, with limited use of modern technology. Important vegetables for fresh markets include chilies *(Capsicum spp.),* multiple onions (*Allium cepa*), shallots (*Allium cepa* var. *aggregatum*) and long cucumbers (*Cucumis sativus*) but accessibility to vegetables in low income groups is limited to gardening and gathering indigenous vegetables from forests. The production of organic vegetable is increasing in Northeastern Thailand daily, but in many cases, farmers are not satisfied with their productivity and concepts of organic vegetables production are also not clear to some of them. Organic vegetables are a promising option now due to the low external input cost for cultivation such as low fertilizer and low pesticide amounts by increasing the efficient use of farm resources (Ramesh, Singh, & Subba, 2005). Many "alternative" approaches have been developed to achieve more sustainable agricultural practice. Well known approaches are: integrated pest management, integrated crop management, low-input agriculture, permaculture, biodynamic farming, precision agriculture, and organic farming (Gold, 1994). Among these approaches, sustainability can be considered in relation to organic farming as a sector growing rapidly in many countries (Rigby & Caceres, 2001). However, there are many factors related to better cultivation of organic vegetables. Mahamud (2005) showed that knowledge is a factor for organic rice cultivation. From the above discussion it is clear that knowledge is an important factor in organic vegetable cultivation and a farmers' attitude and skill also depend on knowledge. Thus, it is important to know the level of knowledge, attitude and skill of the farmers with regard to organic vegetable cultivation because organic vegetables cultivation imposes clear rules and regulations to maintain the standards or quality (Food and Agriculture Organization, 1998). Knowledge of organic vegetables is also needed for the future because of the growing demands placed on food production from the increasing population and climate change. The objective of the study was to assess the knowledge, attitude and practice toward organic vegetable cultivation by the farmers of Ban Sam Oang and Ban Sawang villages, Hoi Toei subdistrict, Samsung district, Khon Kaen

province, Northeastern Thailand.

Statement of the problems

In the study area, more than 100 farmers are cultivating pesticide-free organic vegetables but a significant number of farmers produce lower yields of vegetables. It is notable that all the farmers are cultivating similar sized plots, using similar initial subsidies under the same environmental conditions. Thus, determining what factors are influencing the yields of vegetables is of interest. So, in the view of the forgoing discussion, the current investigation was undertaken.

METHODOLOGY

A survey method through face-to-face interviews using a semi-structured questionnaire was used to collect data from 40 vegetable growers in Ban Sawang and Ban Sam Oang villages, Hoi Toei sub-district, Sam Sung district, Khon Kaen province, Thailand. The respondents were selected using a random sampling method. Farmer knowledge toward organic farming was investigated through simple-dichotomy statements (true/false). Attitude was measured using Likert's rating scale (Likert, 1932) statements (undecided, strongly disagree, disagree, agree, and strongly agree), while the practices was measured through frequency-determination statements (never, once, and more than once). The questionnaire was pretested to validate the questions. General percentage (%) was used to describe demographic characteristics, knowledge, attitude, and practice; however for the knowledge levels, the highest, lowest, and mean scores were obtained from statistical analysis. The mean score was used in determining the level of knowledge of organic farming among the respondents. Therefore, all the respondents having scores from 0 to 9 were categorized as having a low level, while respondents having scores of 10–12 were graded at the moderate level and scores of 13–15 were categorized as a high level of knowledge on organic farming. These three levels followed the cut off points of 60% and 80% (Bloom, 1956) which are given in Table 1.

RESULTS AND DISCUSSION

Gender and age are one of the important demographic factors that can contribute to the knowledge, attitude, and practices of farmers (Molder, Negrave, & Schoney, 1991; Burton, Rigby, & Young, 1999; Ghorbani, & Hamraz, 2009; Sarker, Itohara, & Hoque, 2010; Sayeed, Shabanali, Khalil, Yaser, & Abbas, 2010). In the current study area, males comprised 20 percent and females 80 percent of the respondents, with 25 percent of all respondents below 50 years of age and 75 percent above 50 years of age as shown in Table 2. By taking into account these two demographic factors in sampling the respondents, the response bias could be reduced and the findings can be generalized. It is noted that most of the organic vegetables growers are old female farmers; male farmers in the study area are engaged in rice and sugarcane farming and young farmers are not interested in agricultural jobs as they prefer industrial, educational or other off-farm activities (Sourced from interviews, data not shown).

Table 1 Level of knowledge towards organic vegetable production

Score	Description
0–9 (less than 60%)	Low level
10–12 (61–80%)	Moderate level
13–15 (81–100%)	High level

based on Bloom (1956)

Table 3 shows the number of respondents who answered all the 15 'true/ false' statements in relation to organic vegetable production. The majority of the respondents knew that: good soil (sandy loam) is required for organic vegetable production (90%); organically balanced fertilizer increases vegetables yields (81%); green manure adds organic matter to soil (70%), and crop rotation helps in proper nutrient management (80%). Research has shown that organic matter is important for increasing the grain yield of a crop compared to organic fertilizer (Nehra and Grewal, 2001). About 80 percent of farmers believed that flood irrigation is good for organic vegetable cultivation which is clearly false in the case of vegetable production because vegetables cannot survive and grow in stagnant water. Howell et al. (1980) showed that drip irrigation is the best method for vegetables cultivation because the method increases yield and conserves water as well. Of the respondents, 47 percent believed that chemical pesticide can be used at a critical stage for organic vegetable cultivation. Another 37 percent of farmers did not know that chemical pesticide should not be used in organic vegetable cultivation and this is remarkable because this is a primary requirement in the definition of organic vegetables and both these responses were incorrect as organic produce must be chemical-pesticide free, chemical-fertilizer free and it must be environmentally friendly (Food and Agriculture

Table 2 Demographic information on survey respondents

(n = 40)

		n	%
Gender	Male	8	20
	Female	32	80
Age group	>50	35	75
	≤50	5	25

Table 3 Farmer's knowledge on organic vegetable production (OVP)

(n = 40)

Items	True (%)	False (%)
Sandy loam soil is the most suitable for vegetable cultivation	90.0	10.0
Crop rotation helps proper nutrient management	80.0	20.0
Mixed cropping does control weed	14.0	86.0
Flood irrigation is good for organic vegetable cultivation	80.0	20.0
The proper time for transplanting vegetables is at noon	50.0	50.0
Pesticides should not be used before harvesting vegetables	70.0	30.0
Quality seeds are not important for getting higher yield	43.0	67.0
Organically balanced fertilizer increases vegetables yield	81.0	19.0
Aphid/fruit fly is a disease of leafy vegetables	60.0	40.0
Chinese kale is a summer vegetable	46.0	54.0
Weedicides may be used for weed control for OVP	53.0	47.0
For OVP, chemical pesticides can be used at a critical stage	47.0	53.0
Only organic pesticide is used for pest control in OVP	37.0	63.0
Green manure adds organic matter to the soil	70.0	30.0
Harvesting in the morning reduces the field heat of vegetables	49.0	51.0

Organization, 1998). More than 50 percent of farmers do not know that weedicides should not be used to control weeds and 67 percent of farmers had no idea of the requirements for quality seed. Around 43 percent of farmers believed that quality seeds do not matter for good yield and getting fresh vegetables as well. Furthermore, 54 percent of farmers had poor knowledge about the growing season of vegetables such as Chinese kale. About 60 percent of farmers believed that aphids are dangerous for leafy vegetable cultivation while the other 40 percent of farmers did not believe this. Only 50 percent of farmers gave the correct answer regarding the time of day for transplanting whereas the other 50 percent believed that noon was a good time for transplanting. Normally, harvesting is done in the morning when it is cooler which may enhance the shelf-life of vegetables (Sims, 2007). About 86 percent of farmers did not know mixed cropping is good for weed control. In mixed cropping, light competition can offer weed suppressing capacity, with mixed cropping reducing weeds compared to mono cropping (Szumigalki & Van Acker, 2005). From the above discussion, we can say that some farmers have little knowledge of the concepts of organic vegetable production; for example, some farmers believe chemical pesticide can be used in organic vegetable production at a critical stage. It can be concluded that some of the respondents know of the general concepts of organic farming, but not all.

The distribution of knowledge of the respondents showed that 45 percent of respondents had a medium level of knowledge and 55 percent of respondents had a low level of knowledge while there were no organic vegetables growers who had a high level of knowledge as shown in Table 4.

From Table 4, we can conclude the knowledge level, which is very important for organic vegetable cultivation, is not satisfactory. A high level of knowledge is very important for maintaining the standards of vegetable growing or the vegetable quality.

Table 5 shows the five-point Likert's scale ratings (Likert, 1932) for the statements to measure the attitude of the respondents towards organic vegetable production. The statements consist of six positive statements and three negative statements. The majority of the respondents (60%) had a positive attitude (that is, agreed and strongly agreed) towards organic farming and that organic farming will decrease production costs by reducing input purchases. Around 50 percent of respondents believed (strongly agree and agree) organic vegetables are beneficial for the consumer not the producer. In addition, 30 percent of farmers and 40 percent of farmers respectively strongly agreed and agreed that it was troublesome for farmers to cultivate organic vegetables. Of the farmers, 50 percent were undecided on obtaining organic fertilizer which is essential for organic vegetable production; and the remainder considered mixed type fertilizer was suitable. While only 20 percent of respondents did not believe that organic farming was difficult to implement, 10 percent strongly believed that organic farming was difficult and 50 percent of respondents were undecided. Only 30 percent of respondents strongly agreed that organic vegetable production increased soil fertility and texture, perhaps due to a lack of knowledge on

Table 4 Distribution of knowledge level on organic vegetable production

(n = 40)

Knowledge level	n	%
Low level (<60%)	22	55
Moderate level (60–80%)	18	45
High level (> 80%)	0	0

organic vegetable production. However, 60 percent of farmers strongly agreed that organic vegetable production increases the income of the farmers. So the farmer's attitude is not satisfactory in many cases for organic vegetable cultivation and this might be due to their low level of knowledge. A review of different studies (Sanderson, 2004; Stobbelaar, Casimir, Borghuis, Marks, Meije, & Zebeda, 2006; Gotschi, Vogel, & Lindenthal, 2007; Wheeler, 2008) showed that attitudes are affected by a set of variables on knowledge and socio-structural factors such as, community pressure, family concern, ethical principles, and values. There is no doubt that the farmers' attitudes depend on their knowledge. From the above discussion on attitude, we can conclude that the attitude of the farmers is not satisfactory in many cases and there is a mixture of attitudes.

Table 6 shows the frequency of the respondents to the 19 practices listed in the questionnaire. The majority of respondents stated that in the past year they have been practicing sequential cropping (90%), using organic manure (80%), using light trapping (70%), kitchen waste

Table 5 Attitude towards organic vegetables cultivation (OVP)

(n = 40)

Statements	Extent of agreement				
	Strongly agree (%)	Agree (%)	Undecided (%)	Disagree (%)	Strongly disagree (%)
Organic farming will decrease the production cost by reducing the input purchases (+)	60.0	40.0	0.0	0.0	0.0
Chemical pesticides are most suitable for pest control(+)	10.0	20.0	50.0	10.0	10.0
Chemical pesticides are most suitable to control weed(+)	20.0	50.0	30.0	0.0	0.0
Organic vegetable only benefits the consumer not the producer(-)	50.0	50.0	0.0	0.0	0.0
OVP is only troublesome for the farmers because it needs more attention(-)	30.0	40.0	10.0	10.0	10.0
OVP is very difficult to implement due to difficulties in obtaining organic matter(+)	10.0	20.0	50.0	20.0	0.0
Organic farming is very difficult to implement (-)	10.0	30.0	50.0	10.0	0.0
OVP is effective in increasing the texture and fertility of soil(+)	30.0	40.0	20.0	10.0	0.0
OVP can increase the income of the producers(+)	60.0	40.0	0.0	0.0	0.0

(60%), using sticky boards for pest control (60%) and this is satisfactory practice for organic vegetable production. However, responses for never using some practices were high: never practice crop rotation (53%), no intercropping or mixed cropping (64%), never using kitchen waste (60%) and never using predators or other biological insects (80%). Rouging is a good practice in the case of organic vegetables cultivation; however 53 percent of farmers have never practiced it which is unsatisfactory. Rouging is the technique of removing diseased plants or leaves that appear in the existing crop. Good practice depends on management skill (Marshall, 1993). We can conclude that proper knowledge is important for good practice in organic vegetable production including activities such as biological pest control methods, practicing intercropping or mixed cropping, crop rotation, using an irrigation system, applying a rouging technique, and applying mulching.

CONCLUSION AND RECOMMENDATIONS

The knowledge of the farmers who responded in the survey on organic vegetable production concepts, especially pertaining to the use of chemical insecticides, herbicides, and fertilizers, still needs to be improved. Their attitude towards an organic farming system is also mixed. Many farmers are still dependent on conventional practices but they are trying to implement good practice. Many of the farmers have good practices like soil management, using trap methods for controlling pests, sequential cropping etc. but in some important cases, farmers do not use good practice such as using biological insects for predation on other insect pests, intercropping or mixed cropping, using irrigation systems, and applying rouging to obtain good yields. However, they did use more organic matter (for example, animal manure and plant

Table 6 Practices of organic vegetable production by respondents

(n = 40)

Practices in last 12 months	Never (%)	Only once (%)	More than once (%)
Crop rotation	53.0	20.0	37.0
Manual weeding or hand weed	20.0	0.0	80.0
Intercropping/mixed cropping	64.0	12.0	16.0
Sequential cropping	0.0	10.0	90.0
Using animal manure for organic fertilizer	10.0	0.0	90.0
Using inoculum for nitrogen fixing	30.0	20.0	50.0
Using plant waste for making organic fertilizer	0.0	30.0	70.0
Using organic manure	10.0	10.0	80.0
Using kitchen waste	20.0	20.0	60.0
Mulching, types of mulching	37.0	20.0	43.0
Green manuring or planting cover crop	20.0	50.0	30.0
Using kitchen waste	60.0	30.0	10.0
Using drip irrigation	40.0	10.0	50.0
Using trap method (light trap) to control pest	20.0	10.0	70.0
Using sticky board for pest control	20.0	20.0	60.0
Using marigold or other plants for pest control	50.0	20.0	30.0
Using insect predator to control pest	50.0	20.0	30.0
Using other biological pests	80.0	10.0	10.0
Applying rouging	53.0	20.0	27.0

manure) to fertilize their plants at least in the last 12 months. It is essential to make farmers aware of the benefits of organic vegetable production. Knowledge on organic vegetables especially at a high level is required to understand the systematic management of organic vegetables and for good practice which currently is totally unsatisfactory in this area.

From the above discussion, it is recommended that farmers should: be given skill-based training on the principles of organic vegetable production; be conveyed the right information from other developed countries about pest management systems; receive training on managing organic matter and making compost; assisted in building groups for cooperation and sharing knowledge; be shown the comparable benefits from reducing undesirable attitudes; and be shown that good prices are a sound outcome from the good practice of organic vegetable farming.

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