

OPPORTUNITIES AND CONSTRAINTS OF ORGANIC AGRICULTURE IN CHIANG MAI PROVINCE, THAILAND

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The application of chemicals in conventional agriculture to increase productivity can result in environmental degradation, bring about economic problems and cause harmful effects on farmers, labourers and consumers. Responding to these problems, a number of non-governmental organizations and government agencies have been promoting organic agriculture in the province of Chiang Mai in order to assure food safety and at the same time alleviate the poverty of farmers. The present study discusses the organic agriculture movement in Chiang Mai and compares organic agriculture with conventional agriculture in terms of yields, socio-economic considerations and human health aspects. The findings show that organic agriculture could generate significant benefits. However, constraints inherent to organic farming practices and other factors, including off-farm works and perceptions of organic agriculture, complicate the process of organic certification and standards, and to some extent weaken extension efforts in promoting organic agriculture. In order to improve organic farming, there is a need for all stakeholders, namely, government agencies, non-governmental organizations, consumers and farmer organizations, to work together.

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The present study was funded by the Ministry of Agriculture and Cooperatives, Thailand, and is based on the Ph.D. dissertation of the first author (Arpaphan Pattanapant), also entitled "Opportunities and constraints of organic agriculture in Chiang Mai Province, Thailand".

I. INTRODUCTION

Food is crucial to human life. The rapid growth of populations, which in turn entails increased demand for food, has led to changes in agricultural systems. Traditional agricultural techniques were replaced by the monoculture approach that became mainstream agriculture. Modern agricultural systems have been widely practiced in many countries, including Thailand, with the aim of increasing competitiveness. In Thailand, such systems have been adopted for growing rice, sugarcane, cassava and other cash crops (Jitsanguan 2001; Manarungsan 2002). Although conventional agriculture has many large-scale positive effects, such as high yields in crops and increased food supply through the adoption of new technologies, the intensive use of chemicals and mechanization has led to the destruction of the soil and water resources, and has damaged the important supporting ecosystems. The consequences, therefore, of conventional systems are environmental degradation, economic problems and increased health risks (Jitsanguan 2001; Sharma 2006; Uphoff 2002; Sununtapongsak 2006; Tancho 2006).

Organic agriculture has emerged as an innovative, sustainable approach to solving the problems encountered in conventional agriculture (Jitsanguan 2001; Unno 2003). Organic agriculture is defined by its input supply and the agricultural practices used. It involves the use of natural, non-chemical materials that can be collected on farms and/or in households; in organic agriculture, efforts are made to avoid the use of chemical inputs. The advantages of organic agriculture can include increased productivity and enhanced biodiversity of the farmlands and surrounding areas. It increases the quality of the water, is safer for animals, and is beneficial to plants. And, of course, organic agriculture is generally more advantageous for the well-being of farmers and consumers than conventional agriculture is (Jitsanguan 2001; Liebhardt 2003; Sununtapongsak 2006). Thus, organic agriculture is economically viable, environmentally sound and socially acceptable (Jitsanguan 2001; Dabbert 2003; Liebhardt 2003; Wood and others 2005).

This paper aims to raise awareness of the benefits of organic agriculture as well as examine the impacts and limitations of organic agriculture for small farmers in the province of Chiang Mai, in northern Thailand. Most of the province is covered by forest and agricultural farms, found in the foothills of the mountains at its centre. Due to its favourable climate (an average temperature of 25.4°C and average relative humidity of 71 per cent), Chiang Mai is considered one of the country's major sources of agricultural products, and its agricultural area is the second largest in the northern region of the country. Many kinds of plants can be grown in the province, with rice, soybeans, tobacco, longan, lychee, oranges, garlic, onions, and shallots among its major agricultural crops; temperate-climate

vegetables and flowers are also grown. The agricultural products of the province are for domestic consumption as well as for export.

It has been noted that conventional agricultural practices have led to various problems, such as decreased prices of agricultural products, increased costs of inputs and low productivity, and the farmers who adopt such practices are often reported to be perpetually in debt. At the same time, health risks from the use of agrochemicals have also increased considerably among farmers practicing conventional agriculture. In 1997, the Bureau of Epidemiology at the Department of Disease Control under the Thai Ministry of Public Health reported that Chiang Mai was among the country's top 10 provinces with a high number of patients having health problems related to pesticide application (Sununtapongsak 2006). The Northern Regional Agricultural Extension Office (cited in Food Safety Chiang Mai 2007) reported that in 2002, pesticides were applied by most farmers in Chiang Mai (97 per cent); 77 per cent of the farmers used herbicides. A cholinesterase¹ level test conducted by the Chiang Mai Provincial Health Office in 2003 on blood samples taken from consumers showed chemical traces that were considered dangerous (Food Safety Chiang Mai 2007).

In Thailand, organic agriculture was initially introduced by non-governmental organizations (NGOs) in order to minimize the costs of agricultural inputs and increase the income of farmers. It was also aimed at reducing the health risks farmers and consumers faced when producing and consuming chemically contaminated food products. Now, organic agriculture, in general, is widely supported by NGOs, government agencies, farmers' groups, and consumers who are concerned about the effects of chemicals on human health. Although the promotion of organic agriculture in Chiang Mai has been bolstered by the NGOs and government agencies concerned, its adoption still remains at an initial stage. Thus, there is a need to examine the current situation of organic agricultural practices and ways of promoting and supporting organic farmers on a regular basis, and to further enhance the adoption of such agricultural practices. It is hoped that the findings of the present study will be useful in developing agricultural strategies and policies to successfully promote organic agriculture in Chiang Mai in particular, and in Thailand in general.

¹ Cholinesterase is an enzyme which breaks down acetylcholine, a neurotransmitter in the human nervous system. When cholinesterase is blocked by chemicals, such as organophosphate and carbamate in pesticides, acetylcholine will increase and affect the neurons (Pornpanuwit 2007; Sangkamol 2007).

II. METHODOLOGY

The data used in the present study were obtained from farmers in five districts of Chiang Mai, namely: Mae Taeng, Mae Rim, Doi Saket, Sankampaeng and Hang Dong, which have rice and vegetables as their main crops. Mae Taeng and Mae Rim are in the northern area, Doi Saket is in the northeast, Sankampaeng is located in the east, while Hang Dong is situated in the southern part of the province. The secondary data used in the study were sourced from the various agencies of the Ministry of Agriculture and Cooperatives and other relevant organizations. The study areas were selected after consultation with the Chiang Mai Land Development Station (under the Land Development Department) and local NGOs.

To be qualified as an organic operator, a farmer must have practiced only organic farming for at least three years. On the basis of such criteria and the results of the reconnaissance survey conducted in the study areas, it was noted that only a small number of farmers had adopted organic practices. It appeared that many farmers have rejected the adoption of an organic approach due to various concerns that include: (a) the labour-intensive approach; (b) possible losses in income associated with decreasing yield; (c) a potentially lower quality of products in terms of size and shape; (d) a prolonged growing period leading to delayed harvesting; and (e) crop failure.

Conducted from February 2007 to August 2007, the study employed both qualitative and quantitative methods to collect and analyse the data. In order to assess the characteristics of the organic households in Chiang Mai, 37 organic farmers were selected as respondents. In addition, 35 conventional farmers were involved in the study; they were also asked to compare organic farming with conventional farming in terms of their respective impacts on productivity and the economy. All 72 respondents were included in the questionnaire survey. Questionnaires were pre-tested and modified with an earlier pilot survey. Information, including household characteristics, farming practices, agricultural extension approaches, and perceptions of organic agriculture, were collected from all respondents during the questionnaire survey. However, the questionnaire for the organic farmers placed more focus on organic practices and marketing aspects.

In order to obtain additional data for the analysis, interviews were conducted with key informants comprising present and former organic group leaders and group committees (17 of the 37 sampled organic farmers were considered key informants), as well as with eight officers from organizations that supported the organic movement and its promotion in the province, including the Chiang Mai Land Development Station, the Institute for a Sustainable Agriculture Community

(ISAC), the Foundation for Education and Development of Rural Areas (FEDRA), the Earth Net Foundation, Suan Pakasit, the Northern Organic Standard Organization (NOSO), the Chiang Mai Organic Agricultural Cooperative and the Agricultural Development Cooperative. Information related to services available to the farmers and technical support received were also obtained from the key informants. The leaders of organic groups and committees who served as key informants were also included in the questionnaire survey.

After the interviews with the key informants and upon completion of the questionnaire survey, group discussions for the respondents involved in organic agriculture were held to acquire more information regarding their attitudes towards organic agriculture and the problems they encountered during the adoption of organic farming practices. Participatory observation techniques were adopted to investigate group activities, including trading and training.

III. RESULTS AND DISCUSSION

The organic agriculture movement in Chiang Mai Province

In the past, subsistence agriculture in Chiang Mai was part of a traditional system in which farmers produced commodities mainly for family consumption and exchanged the surplus with their neighbours (Chatchawan and Sairokham 2004). Following the implementation of the National Economic and Social Development Plan in 1961, there was a shift in policy towards an emphasis on the promotion of agricultural products for export. Infrastructure, such as irrigation and road networks, and agricultural technologies were developed and improved to support agricultural production. The expansion of infrastructure and the increasing demand for food crops, which provided economic incentives, led to the conversion of more land for cash crops such as, among others, rice, soybeans and tobacco. Thus, the focus had shifted to commercial production and agribusiness (Gypmantasiri 2002; Chatchawan and Sairokham 2004). In order to maximize yields, farmers started to use chemical fertilizers, insecticides and pesticides in large quantities. This led to increasing problems related to economics, health hazards, and environmental issues.

In the late 1980s, NGOs in the northern region of Thailand started promoting sustainable agricultural systems as alternatives to conventional agriculture in order to address the problems emanating from conventional agriculture practices. Such efforts were based on the results of studies conducted by many NGOs, which showed that successful sustainable agricultural systems could consist of integrated farming, natural farming, agro-forestry farming and organic agriculture (Unno 2003). In 1990, the Alternative Agriculture Network in northern Thailand organized seminars

on the promotion of sustainable agriculture, which also provided an avenue for discussing ways and means to mitigate the problems in the development of sustainable agriculture. As a result, alternative agriculture networks at the provincial level were established throughout the country to facilitate the exchange of information between farmers and consumers, and to promote the production of chemical-free vegetables in each province.

In a related study conducted in 1991 by the Institute for a Sustainable Agricultural Community, a local NGO, the organization concluded that organic agriculture was suitable for small farmers in Chiang Mai as an alternative to mainstream agricultural systems. Moreover, the study also confirmed that organic agriculture: (a) is appropriate to the small farmlands and limited on-farm resources; (b) draws on the wisdom and knowledge of local farmers; and (c) contributes to efforts to establish a self-sufficient economy. Although organic agriculture has been promoted and supported in Chiang Mai since 1993, to date only limited groups of farmers have made the switch.

A critical point in the promotion of organic agriculture was reached after the Alternative Agriculture Network movement convinced the Government of Thailand to include sustainable agriculture principles in the Eighth National Economic and Social Development Plan (1997-2001). Subsequently, the Ministry of Agriculture and Cooperatives of Thailand started focusing on research and extension of sustainable agriculture. In 1997, the Ministry also committed to provide funds to conduct the Pilot Project on Sustainable Agriculture Development for Small Farmers, which by 1999 was administered by local organizations in 34 provinces, including Chiang Mai. Currently, organic agriculture and various types of sustainable agriculture approaches are being promoted and practiced extensively in the province.

Along these lines, more and more government agencies in Chiang Mai have focused attention on organic agriculture, which was a major element of the country's National Agenda of January 2005. In this connection, one of the strategies of the provincial government of Chiang Mai was to promote safe agricultural practices, including organic agriculture, for sustainable economic development. Local government agencies put in practice the provincial plans and development projects related to organic agriculture.

Support organizations

NGOs have played an important role in the promotion of organic agriculture in Chiang Mai, particularly among small farmers who utilize local on-farm resources. NGOs have been instrumental in providing services and support in terms of establishing organic certification and standards as well as in creating sustained

markets for organic products. Government agencies have provided assistance through additional practical demonstrations on the adoption of organic agriculture. However, government agencies have focused more on agricultural technology transfer and providing inputs, and less on providing marketing support.

In Chiang Mai, both local and national NGOs, including ISAC, FEDRA and the Earth Net Foundation, have been promoting organic agriculture. The main activities of these NGOs include training sessions on the application of organic agriculture techniques. In order to encourage farmers to adopt organic farming, NGOs have also facilitated the development of certification programmes and standards as well as markets for organic products. In addition, the Royal Project Foundation and Suan Pakasit (an organic agriculture project under the Crown Property Bureau) have been a source of technical support, including the provision of cultivated land and farm inputs as well as certification and marketing of organic produce, specifically for hill tribe farmers.

As the main agency coordinating the development and application of bio-fertilizers, the Chiang Mai Land Development Station encouraged the establishment of an organic farmers' group in each village. Other government agencies, such as the Chiang Mai Provincial Cooperative Office, Chiang Mai Provincial Agricultural Extension Office, Chiang Mai Provincial Agriculture and Cooperatives Office, Chiang Mai Provincial Public Health Office, as well as the Chiang Mai and Mae Jo Universities, also conduct training courses and provide technical support services.

Organic certification

Three organic-certification bodies, namely, NOSO, the Organic Agriculture Certification Thailand (ACT) and the Organic Crop Institute, are registered in Thailand and operate in Chiang Mai Province. The first two are private organizations, while the third is a government agency under the Department of Agriculture. NOSO is a locally registered body and the products it certifies are sold mainly in Chiang Mai and other provinces in the northern region of the country. ACT and the Organic Crop Institute are nationally registered, and the organic products that are certified by these bodies are sold widely in domestic and foreign markets.

NOSO certified 55 small organic farmers in 2006; its membership of organic farmers increased to 67 in 2007. ACT certifies mainly farmers' groups and cooperatives. Currently, two cooperatives have been certified by ACT, namely, the Agricultural Development Cooperative in the Mae Rim district and the Mae Tha Sustainable Agriculture Cooperative in the Mae On district. The Organic Crop Institute certifies all organic producers, including individual farmers, farmers'

organizations, private companies, the royal projects, one agency under the Veterinary and Remount Department in Chiang Mai (which produces organic rice and sweet corn) and universities in Chiang Mai.

According to the information collected during the interviews of key informants, the annual fee for NOSO certification is 1,000 baht (B) (\$26.30),² of which B 700 (\$18.40) is shouldered by the Chiang Mai Organic Agricultural Cooperative (CMOAC), and B 300 (\$7.90) is paid by the individual farmer. While ACT certification is subsidized with funds from the Green Net, certification by the Organic Crop Institute is free of charge in line with a related Government policy.

In their responses to the field survey, many organic farmers expressed their apprehension that organic certification would only increase their production costs. Thus, organic certification could adversely affect the promotion of organic farming practices in the near future if support from the government or other organizations is not provided.

Organic production

Organic production systems in Chiang Mai are divided into two categories: (a) self-reliance organic agriculture; and (b) commercial organic agriculture.

The major motivations in the adoption of self-reliance organic agriculture were related to the aspects of food safety and health issues. The farmers, after having experienced health problems related to the use of chemicals, changed their agricultural practices. Moreover, since a large amount of organic produce is consumed in the farmers' households and the surplus is sold in local markets, the farmers wanted to ensure that their produce was safe for consumption. Furthermore, buyer confidence in the origins of organic food is increased when products are certified by NOSO as organic.

The desire to decrease production costs without applying chemicals was also an important factor for farmers who adopted commercial organic farming. Many such farmers have entered into agreements with private companies and/or NGOs, and manage their farmlands according to the national organic agriculture standards. The prices of organic produce are agreed upon by the farmers and the companies or NGOs before or during harvest. The companies or NGOs support the farmers in the areas of improved know-how, production techniques, farm inputs, certification and marketing. Generally, the organic products from commercial organic agriculture are sold both in domestic and international markets.

² Unless otherwise indicated, currency conversions in this paper are based on the average exchange rate of 2007: \$1=38 baht.

Although organic agriculture has been practiced in Chiang Mai for more than a decade, exact data and information on the number of organic farmers and production areas are not available. The data available from NOSO, ACT and the Organic Crop Institute, however, showed that in 2007, about 4,536 rai (about 725 hectares)—0.34 per cent of the total farmland in the province—were used for certified organic crops. During the pilot survey and interviews of the key informants, respondents confirmed that some farmers practiced organic agriculture (no chemicals used in any farming processes) but were not members of any organic farmers' groups and had not applied for organic certification. The perception is that such farmers consider membership in farmers' groups and the certification process difficult and a hindrance to their farming practices. Thus, information on those farmers, specifically regarding the area utilized for organic farming, could not be collected by the organic farmers' groups and relevant agencies, and was therefore not included in the present study.

Currently, the dominant organic products in the study areas are rice, both glutinous and non-glutinous, and vegetables. The glutinous rice varieties are RD-6 and Sanpatong 1, while the non-glutinous rice includes Khao Dawk Mali 105 (KDML 105 or jasmine rice), Hom Nin rice (black fragrant rice) and red rice. In the rain-fed areas of the upland farms in Mae Taeng and Mae Rim, organic rice is grown once during the rainy season, followed by crops such as soybeans, potatoes, maize and others in the dry season. Rice cultivation in the irrigated areas of the Doi Saket and San Kamphaeng districts yields two harvests per year.

Organic vegetables are grown primarily for household consumption to reduce the households' expenses. They are planted in small beds, with a mixture of varieties that are suitable to the local climate and soil conditions, with a mind to avoiding or minimizing pest problems. Many organic farmers plant vegetables in their home gardens, among fruit trees in an orchard, and on earthen dikes around the paddy fields. Primarily indigenous and Chinese vegetables that can grow throughout the year are planted.

Marketing

Market channels

Organic products are channelled through domestic and export markets. Domestic markets are mainly organic markets and health-conscious retailers. Non-certified organic products are generally sold at local markets, while certified organic products are sold with support from cooperatives and NGOs that have established distribution chains through health-conscious stores, supermarkets and international companies. Certified organic products are also sold at organic markets

organized by ISAC and the Foundation for Education and Development of Rural Areas in the city of Chiang Mai and its districts.

Prices

Prices have an important influence on the financial performance of organic agriculture. In the survey, 40 per cent of conventional farmers consulted stated that they expected to receive higher prices following conversion to organic agricultural practice. This is based on an understanding that the prices for certified organic products are generally higher than those of conventional products by approximately 20 to 25 per cent. The prices of organic paddy rice are determined by the supporting organizations; in the Mae Rim and Hang Dong districts, for example, the prices are set before the harvesting period by the Green Net Cooperative and its organic farmer members. Prior to reaching an agreement on the price of organic paddy rice, the price of conventional paddy rice and logistical management costs, which include sacks, transportation and labour, are considered. In establishing its prices, CMOAC considers the Green Net Cooperative price for paddy rice as the basic price, and adds B 1 (about \$0.03) per kilogram.

The farmers themselves also help determine the prices for certified organic vegetables after consultation with CMOAC during its bi-monthly meetings, taking into consideration the current market prices of conventional vegetables. For example, the prices of organically grown Chinese and seasonal vegetables are usually higher than those of conventional vegetables when sold in organic markets in the city of Chiang Mai and neighbouring districts. However, while the price of certified organic produce sold at local (conventional) markets is usually still a bit higher than conventional produce, the mark-up is less. The prices for some local organic vegetables can be in the same range as conventional vegetables that are collected from the wild or grown in the home gardens and backyards of most local people. Nevertheless, for the purpose of certification, all local, Chinese and seasonal vegetables are investigated and certified.

Impacts of organic agriculture on small farmers

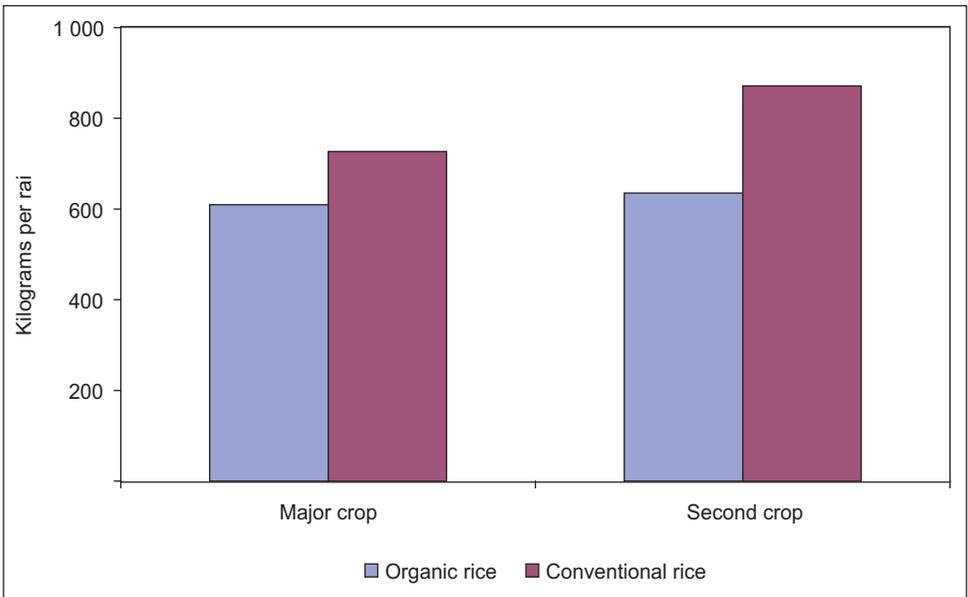
In the present study, the impacts of organic agriculture on small organic farmers are assessed with regard to the aspects of yields as well as economic, social and human concerns.

Yields

Figure 1 shows the difference in the yields of two crops (major and second) of organic and conventional rice in 2006. These findings were in line with previous

studies in terms of lower productivity in organic agriculture (Kim 2003; Nieberg and Offermann 2002; Carambas 2005; Murphy and others 2007). Compared with those from conventional agriculture, the yields from the organic system were approximately 16 per cent lower in the major crop and 27 per cent lower in the second crop. However, it should also be noted that the yields from organic agriculture could have been affected by the agricultural practices used on the land prior to conversion, which may have altered the soil fertility (Dabbert 1994; Halberg and others 2006; Parrott and others 2006). Nonetheless, some organic farmers indicated that they produced higher yields; this could be due to the fact that they had used traditional agricultural practices with low inputs before converting to organic agriculture. In fact, about 60 per cent of the organic farmers who responded to the survey reported that their yields had been the same as those who had been applying conventional agricultural systems. Although yields over the long term were not significantly different when organic practices were adopted, 85.7 per cent of the conventional farmers believed that yields would dramatically decline if they converted to organic agriculture.

Figure 1. Comparison of yields from organic and conventional rice farming Chiang Mai Province, 2006



Source: Field survey, 2007.

Note: 1 rai = 0.16 hectares.

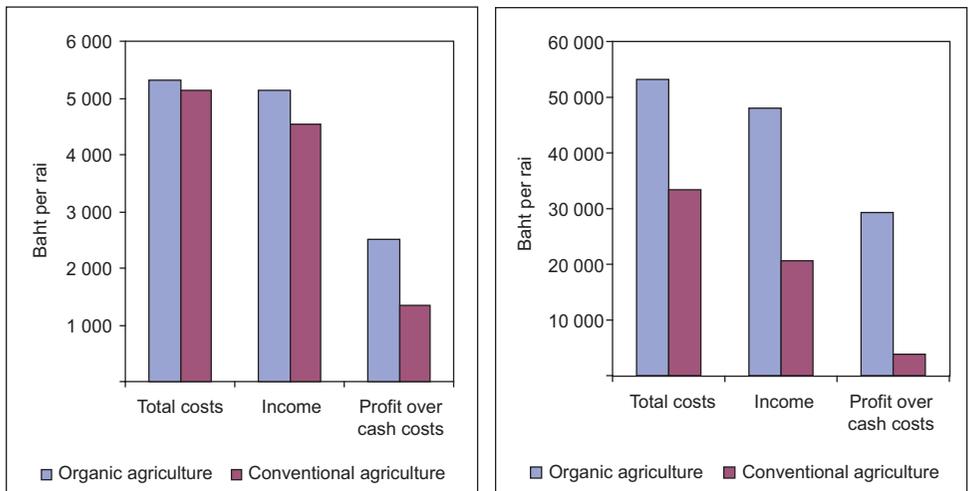
Economic impact

Costs and income

As shown in figure 2, the total production costs of organic agriculture per unit of farmland are higher than those in the conventional cultivation of rice and vegetables. This is similar to the findings from the studies of Sribang (2001); Kim (2003); and Carambas (2005). On the other hand, the data also indicated that organic agriculture earned higher income and profit over cash costs than conventional agriculture in both crops, as established in the studies of Hanson (2003); Pacini and others (2003); Setboonsarng and others (2005); and Carambas (2005).

“Costs” comprises both cash and non-cash costs, based on the results of the survey, cash costs were the ones that directly affected the farmers’ financial conditions. High cash costs could disrupt farm production activities and put many farmers in debt. Although the overall total costs for organic agriculture were

Figure 2. Comparison of total costs, income, and profit over cash cost



A) Organic and conventional rice production

B) Organic and conventional vegetable production

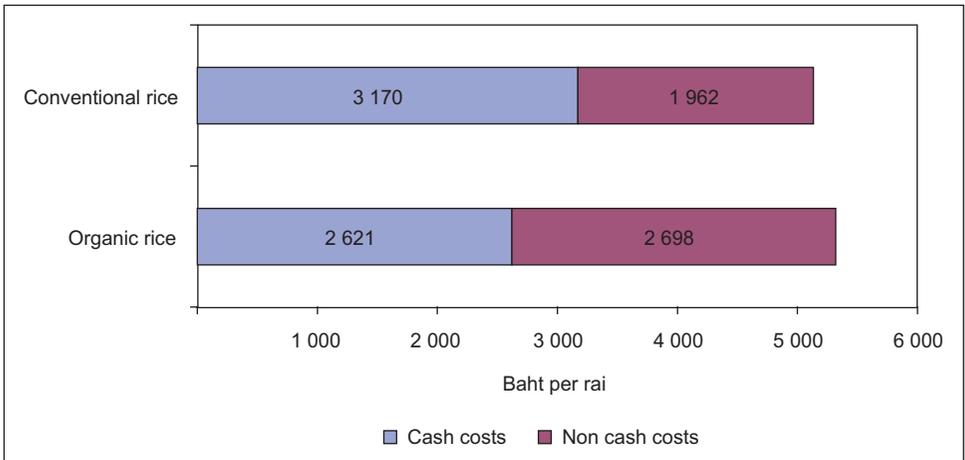
Source: Field survey, 2007. Prices used in the calculations were based on data provided by farmers.

Notes: \$1 = Baht 38, based on average exchange rate in 2007.

1 rai = 0.16 hectares.

higher, it is also clearly shown that conventional rice production initially entailed higher cash costs of about B 3,170 per rai, or three-fifth of the total expenditures (figure 3). In contrast, the cash cost involved in organic rice was B 2,621 per rai. It was noted from the survey that a major cash cost for rice production under both organic and conventional practice was the cost of labour. The second largest proportion of the cash cost for conventional rice was the cost of chemical fertilizers and pesticides (figure 5A). A reduction of the cash costs in organic rice production could be due to the replacement of external inputs with on-farm inputs, such as animal manure and crop wastes.

Figure 3. Comparison of cash and non-cash costs in rice production



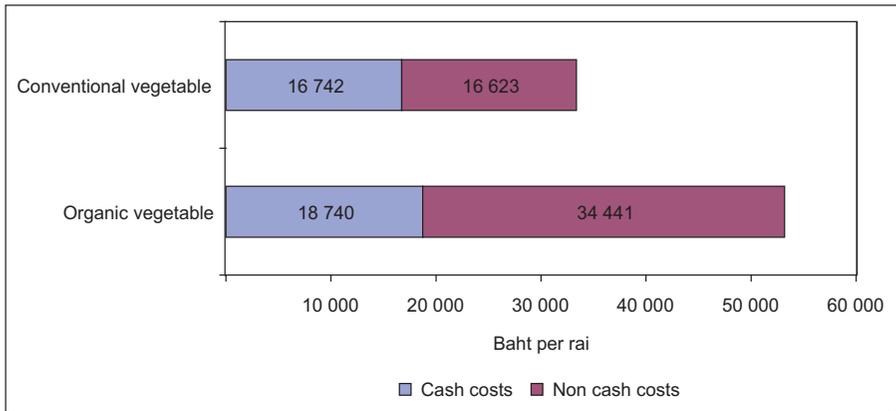
Source: Field survey, 2007. Prices used in the calculations were based on data provided by farmers.

Notes: \$1 = 38 baht, based on average exchange rate in 2007.

1 rai = 0.16 hectares.

However, as shown in figure 4, conventional vegetable farming incurred lower cash costs than organic vegetable farming, at B 16,742 and B 18,740 per rai, respectively. As illustrated in figure 5B, the highest proportion of cash costs for organic vegetable farming came from other costs, such as market space rental and transportation to organic markets for direct sales. Thus, it can be said that the extra costs could become major barriers for organic conversion. Although some studies have noted that certification costs for organic farmers are high (Wynen 2003), this was not the case in Chiang Mai, as such costs were being subsidized by support organizations. In the case of conventional vegetable farming, two thirds of the total cash costs went to labour and chemicals.

Figure 4. Cash costs and non-cash costs in vegetable production

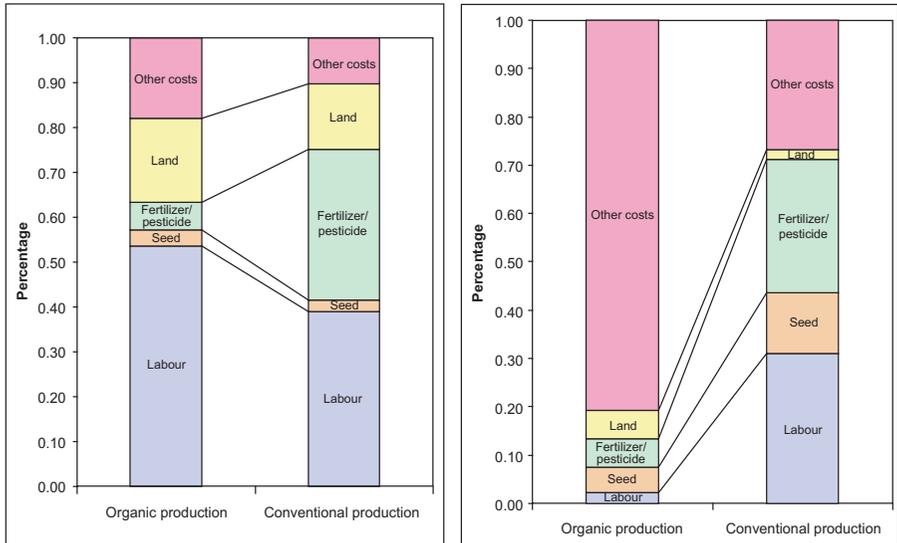


Source: Field survey, 2007. Prices used in the calculations were based on data provided by farmers.

Notes: \$1 = 38 baht, based on average exchange rate in 2007.

1 rai = 0.16 hectares.

Figure 5. Comparison of cash costs, organic and conventional agriculture



A. Cash costs in rice production

B. Cash costs in vegetable production

Source: Field survey, 2007

Note: "Other costs" includes depreciation, fees of certification, market place, transportation, water, and electricity.

In order to assess the economic viability of organic and conventional agriculture, benefit-cost ratios (total benefit per total cost of production) were calculated from the data provided by the farmers during the survey. In both types of agriculture, the benefit-cost analyses gave ratios of less than one (table 1). However, the benefit-cost ratios of organic rice and vegetables, which were nearly equal to one, were greater than that of conventional agriculture, specifically when a higher, or premium, price was offered for the organic produce (scenario 1). This implies that, under those circumstances, organic production would be more financially viable than conventional production. However, the benefit-cost ratios could decrease if premium prices for organic produce were not offered (scenario 2); in that case, particularly with regard to rice production, organic agriculture would be less practical than conventional agriculture (table 1).

Table 1. Benefit-cost analysis of organic and conventional agriculture

	<i>Benefit (Baht/rai)</i>	<i>Cost (Baht/rai)</i>	<i>Benefit-cost ratio</i>
Rice			
Scenario 1: Organic rice with price premium			
Organic rice	5 137	5 319	0.97
Conventional rice	4 527	5 132	0.88
Scenario 2: Organic rice without price premium			
Organic rice	3 191	5 319	0.60
Conventional rice	4 527	5 132	0.88
Vegetables			
Scenario 1: Organic vegetables with price premium			
Organic vegetables	48 048	53 181	0.90
Conventional vegetables	20 609	33 365	0.62
Scenario 2: Organic vegetable without price premium			
Organic vegetable	36 050	53 181	0.68
Conventional vegetable	20 609	33 365	0.62

Source: Author's calculation based on field survey data.

Notes: \$1 = 38 baht, based on average exchange rate in 2007.

1 rai = 0.16 hectares.

Family labour

Farmers' families have been the major source of labour in all agricultural systems, even with the increasing role of hired labour in farm practices. As organic agriculture is labour-intensive, family labour is used for farm activities as much as possible in order to minimize the need for hired labour. As shown in table 2, the total and average numbers of family members engaged in farm labour were higher in organic operations than in conventional practice. In addition, labourers in the organic farming system dedicate themselves full-time to their farms, while about one half of labourers in the conventional system work only part-time on their farms. Conventional farmers also usually work off the farm, such as in the wood carving industry and factories, to earn supplementary income after the planting and harvesting seasons. In organic agriculture, which requires full-time labour for farm activities such as planting, harvesting, and weed and pest management, labourers cannot afford to take an off-farm job. Moreover, other family members, often women, take care of selling the produce in organic markets one to three times a week. The employment opportunity for labour in the organic system is evenly distributed in on-farm and marketing activities throughout the year. Thus, family labourers on an organic farm would have no time to take off-farm jobs.

In order to evaluate the rate of profitability of farming practices with respect to family labour, an analysis of the rate of return to family labour was conducted. The rate of return to labour is defined as the portion of the net farm income paid to personal labour (Kay 1981). This rate should be at least as great as the opportunity cost on labour in non-farm jobs. In the present study, the rate of return to labour was compared with the standard minimum wage rate in the study areas. As indicated in table 2, organic farming received a higher rate of return to family labour compared with conventional practice, at about B 128 and B -43 per person-day, respectively. Furthermore, the rate of return to family labour on organic farms was higher than the minimum wage (B 120/day) in the Mae Taeng and Mae Rim districts. However, the return is slightly lower in the Hang Dong, Doi Saket and Sankumpaeng districts, where the minimum wage is nearly the same as the minimum wage in Chiang Mai City, which is approximately B 140 to B 160 per person-day. In contrast, the rate of return to family labour on conventional farms showed that the net farm income was not sufficient to pay for the family labour. The negative sign of the rate shown in table 2 implies that earnings from conventional agriculture cannot cover the capital investments of a farmer, including family labour and their own assets, and as a result farm production does not generate a profit. Thus, working full time on the conventional farms is not attractive for farmers, who consequently take off-farm jobs.

Table 2. Types of labour and return to labour in organic and conventional agriculture, Chiang Mai Province, 2006

Type of farm	Total family labour (persons)	Average family labour (persons per household)	Type of labour (Percentage of total labour)		Return to family labour (baht per person-day)
			Full-time	Part-time	
Organic	74	2.0	76	24	128
Conventional	60	1.7	52	48	- 43

Source: Author's calculation based on field survey data.

Note: \$1 = 38 baht, based on average exchange rate in 2007.

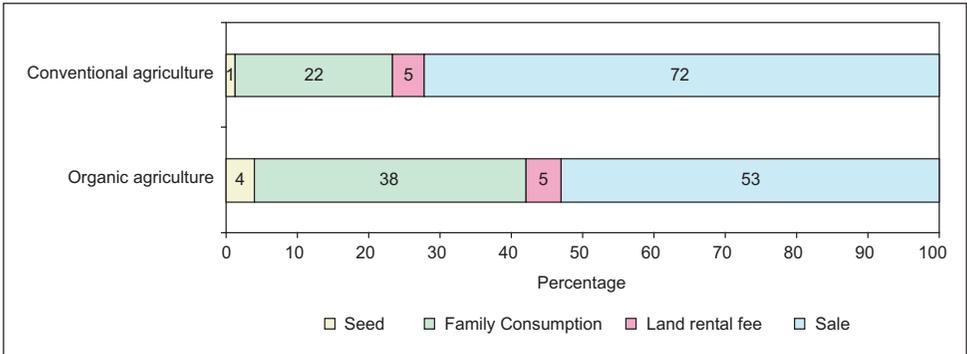
Food security

An important concern relating to organic farm productivity is food security, or a family's access to sufficient food. This concern is based on the general assumption that organic agriculture produces low yields, which could lead to inadequate food supply. Although yields from organic agriculture could be lower, this does not have a negative effect on food security (Halberg and others 2006), as organic farmers are able to allocate sufficient quantity of their products to fulfil their families' food demand. The organic farmers in the present study confirmed that about 38 per cent of their produce is kept for family consumption, while 53 per cent is sold. In comparison, the farmers who apply the conventional methods indicated that they could set aside only 22 per cent of their produce for family consumption, while 72 per cent is sold (figure 6). This may be because under the concept of organic production, family consumption, rather than commercial sales, is the priority.

Moreover, in organic agriculture, more diversified varieties of vegetables are planted (table 3) for household utilization and for distribution to relatives, with the surplus usually sold in organic markets. In the case of conventional vegetable farming, mono-cropping is practiced, or only a few varieties of vegetables are planted. Thus, some conventional farmers reported that they still have to buy other kinds of vegetables for family consumption.

Storing rice for future consumption and diversifying vegetables cultivated in farms would guarantee an adequate supply of food and reduce expenses in terms of family consumption. Furthermore, food security could also be linked to household income. As noted above, the household income of organic families could be increased through the implementation of a premium price for organic produce. The improved income could enhance purchasing power, to prevent farmers

Figure 6. Rice distribution in organic and conventional agriculture



Source: Field survey, 2007.

Table 3. Organic vegetables produced in the study area

Type	Variety
Indigenous	Eggplant, tomato, coriander, lemongrass, galanga, ginger, <i>Cytrus hystrix</i> , lime, kitchen mint, chilli pepper, bird pepper, Welsh onion, shallot, garlic, plate brush, sweet basil, hoary basil, sacred basil, water mimosa, star gooseberry, Indian spinach, ivy gourd, angled loofah, snake gourd, cha om (<i>Acacia pennata</i>), kood (a fern of the <i>Polypodiaceae</i> family), chengda and e-hin, among others
Chinese	Chinese kale, bok choy, lettuce, green lettuce, Chinese ipomoea, Chinese radish, Chinese chive, chayote, okra, yard-long bean, cowpea, green pea, cucumber, corn, celery
Temperate	Cauliflower, cabbage, broccoli, Brussels sprouts, carrots, pumpkin

Source: Field survey, 2007.

from encountering problems in terms of access to other commodities. Thus, food security is related not only to productivity, but also the financial conditions of the farmers’ families.

Social impact

Community participation

Based on the information collected during the field survey, conventional vegetable farmers are busy throughout the year, as their activities include watering the plants, spraying pesticides and hormones until crops are harvested and taking jobs in factories after their work in the fields has been completed. This leaves

such farmers with little time to participate in community activities. On the other hand, organic farmers work only in the villages and on farms, and their flexible schedules enable them to participate in community activities. According to the field survey, about 73 per cent of the farmers participated more in community activities following their conversion to organic agriculture: 27 per cent did not perceive any change in their participation following conversion. Participation in community activities could provide some benefits to farmers, specifically in terms of the exchange of labour, and the sharing of information and knowledge on production, marketing, and possible sources of funds (Bubolz 2001; Yai Muang 2004).

Relationships

In the present study, two kinds of relationships are being referred to: (a) within the family; and (b) between producers (farmers) and consumers. With respect to family relationships among those practicing the conventional system, while men work in cities after the planting season, women take over the farm activities, such as the application of pesticides and chemical fertilizers. In organic operations, spouses work only on the farmland, and due to the additional labour required, the children also take part in the farm activities during school breaks. Thus, in the case of organic farming, closer family relationships develop during work, which also instils agricultural loyalty in the children. In the end, the benefits outweigh the lost opportunity to earn additional income from off-farm jobs in the urban areas. According to the field survey, 65 per cent of the farmers spent more time with their families after converting to organic agriculture. However, about 3 per cent expressed that they were spending less time with their families because of the increased labour requirements in organic farm management.

Relationships between farmers and consumers also vary according to the type of agricultural system practiced. The role of organic farmers actually extends beyond the trading of products in organic markets, as such farmers also establish a certain relationship with consumers that goes beyond buyer-and-seller roles. Such a relationship could be rooted in the face-to-face interaction between organic farmers and consumers, which could be different in the conventional food supply chains. Farmers and consumers in organic markets usually exchange knowledge and information on organic supply and demand as well as on the benefits and limitations of organic production (Sage 2003). This provides better mutual understanding; organic farmers are also able to create networks and consumers are able to gain greater awareness of the health risks related to chemical residues in foods as well as of the quality and value of organic products. This kind of relationship has also played a crucial role in strengthening the promotion of organic

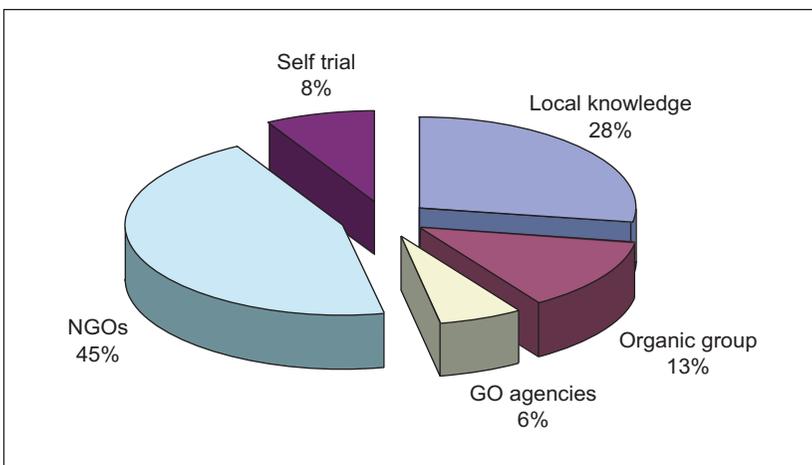
agriculture in Chiang Mai, considering that external factors, such as consumer demand, influence the development of agricultural systems (Dixon and others 2001). It is not surprising then, that many studies report that the growth of organic agriculture is affected by consumer demand (Tate 1994; Saunders and others 1997; Panyakul and Sukjirattikarn 2003; Sittiwong and Varinrak 2004).

Human impact

Knowledge development

Knowledge is one of the key factors affecting the development of organic agriculture. Based on the field survey, organic farmers in Chiang Mai obtained knowledge on organic agriculture techniques and skills through various sources, primarily from NGOs (figure 7). Certain developments, however, have been adopted by organic farmers through a process of combining local knowledge and modern technologies, in order to respond to the requirements of agricultural production and environmental conditions. In examples of practices based on local knowledge, citronella and African marigold are grown in the vegetable beds, and eggshells are placed on a wood branch and pitched on the beds; the strong odours limit possible insect infestations. Another local practice includes placing papaya leaves in the water of paddy fields to eliminate golden apple snails (the snails stay on the leaf to feed, and thus can be easily collected). Farmers also use botanical pesticides, such as neem and wood vinegar, which are sprayed when insect outbreaks occur.

Figure 7. Sources of organic knowledge and information



Source: Field survey, 2007.

Training and study-visit programmes are major extension methods. As one of the requirements for membership in an organic group, farmers must attend training programmes arranged by support organizations on the concepts and techniques of organic agriculture as well as on gender roles, and must also participate in farm visits. Approximately 81 per cent of the organic farmers consulted had attended more than 10 training programmes, while about 14 per cent had joined three to five training courses within the last three years. The participation of farmers in training sessions and attendance at the Farmer Field School programme offered in the study area are forms of knowledge development. Knowledge of organic farming, obtained through observations, analysis of the field situation and problems, and the exchange of experiences, was a factor that convinced farmers to go into organic farming. The farmers then adapted this knowledge to their farmland; a process that enhances not only self-reliance, but also the production of organic commodities.

Health

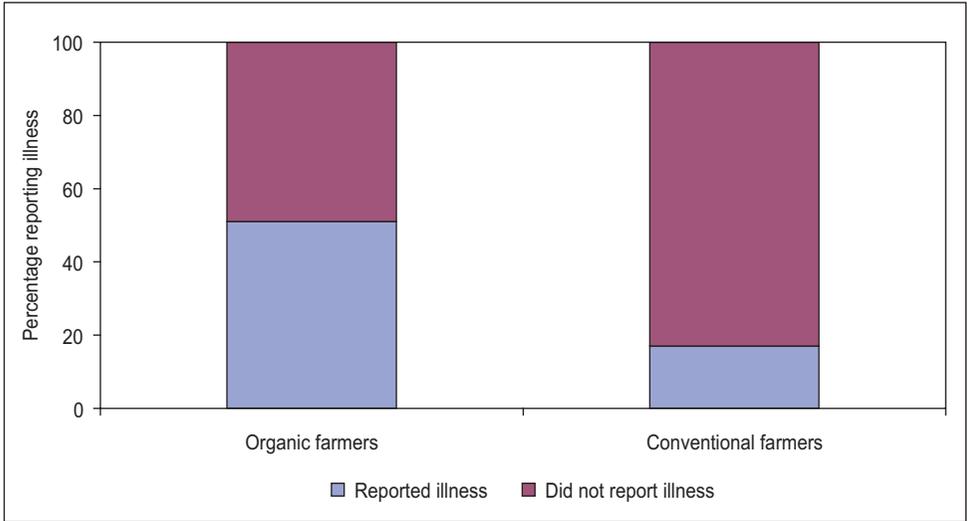
The ill effects on one's health due to chemical applications, as experienced by the farmers and their families, is one of the reasons given by farmers for their conversion to organic practices (Hutranuwatr and Hutranuwatr 2004; Carambas 2005). As illustrated in figure 8, about 51 per cent of the farmers who had converted to organic agriculture had experienced sickness prior to conversion. Some organic farmers who had experienced sickness prior to conversion—and even some who had not—stated that their health condition had improved following their conversion. However, a few farmers reported no change in their health; those farmers tended to be ones who had been practicing traditional or low-input agriculture or working in off-farm jobs before converting to organic agriculture.

Of the conventional farmers who did not switch to organic farming, only 17 per cent reported having experienced illness. However, most conventional farmers who did not experience sickness reported that they hired labourers to spray pesticides and hormones on their farms in order to avoid the effects of the chemical substances. As shown in table 4, most conventional farmers believed that chemical inputs had negative impacts on health, and that adopting organic agriculture practices could help reduce such problems.

Constraints on organic agriculture in Chiang Mai Province

As reported by Rigby and Cáceres (2001), Wynen (2003), Sittiwong and Varinrak (2004), Singpornpong (2005), Pornpratansombat (2006), Kerselaers and others (2007) and Wheeler (2008), the progress in organic agriculture development has been slow, due to many barriers, which include: (a) lack of information and

Figure 8. Occurrence of illness emanating from use of chemical substances



Source: Field survey, 2007.

Note: Illness reported by organic farmers refers to sickness experienced prior to switching to organic agriculture.

Table 4. Perception of the negative effects of chemical application on health

<i>Believe that application of chemicals can have a negative effect on health</i>	<i>Organic farmers</i>		<i>Conventional farmers</i>	
	<i>n</i>	<i>Percentage</i>	<i>n</i>	<i>Percentage</i>
Yes	36	97.3	25	71.4
No	1	2.7	10	28.6
Total	37	100.0	35	100.0

Source: Field survey, 2007.

support from extension agencies; (b) negative perception of organic agriculture; (c) improper management of weeds and pests; (d) decreases in yields; (e) lack of organic inputs; (f) insufficient labour supply; (g) insufficient research and development; (h) weak infrastructure; (i) complications in organic standards; (j) lack of awareness of existing standards and certification; (k) ineffective organic markets; (l) inadequate information on organic products on the part of the consumers; and

(m) pricing problems. In the case of organic agriculture development in the province of Chiang Mai, the constraints can be classified into four major areas: the characteristics of farmers, organic production processes, organic certification, and extension services for the promotion of organic agriculture.

According to the survey, organic farmers perceived that conventional farmers preferred uncomplicated agricultural practices that required shorter time in production and that had a quick turnover. Organic farmers also noted that, in their view of conventional agriculture, farmers do not spend much time in the field, as their work consists mainly of spraying herbicides and pesticides in the paddy fields once the rice seedlings have been transplanted, after which they take up work in factories or perform other off-farm jobs. The farmers also believed that in vegetable planting, more pesticides and hormones are required to control insects, accelerate growth and enhance harvests. Thus, the conventional farmers believed that yields would be reduced following conversion to organic agriculture, and that organic products would be of lower quality in terms of size, shape and colour. In their opinion, therefore, organic agriculture could not provide satisfactory economic returns.

With regard to organic production processes, the organic farmers noted that many problems could occur, such as growth of weeds, especially in the rainy season. Thus, they spent more labour and time on weed management, resulting in higher labour costs. In addition they were faced with other problems, such as plant diseases and insect infestations. They also stated that off-season vegetables could not be grown due to the unfavourable environmental conditions. Such concerns had contributed to the limited production of organic vegetables, which could not meet the market demand. Moreover, the farmers also noted that organic vegetables had longer reproductive stages which could prolong the production period and delay harvesting.

Furthermore, the farmers also indicated that organic certification would be a major constraint on the development of organic agriculture. Since most farms in the province of Chiang Mai are small (on average 8 rai or 1.28 hectares, per household), farmers have developed the practice of constructing narrow dikes to increase the planting area. However, in accordance with organic standards, the dikes must be at least one metre wide to create a buffer zone between organic and conventional farms. This not only implies smaller planting areas, but also runs counter to the local agricultural culture and practices. Another concern related to organic certification is the high processing cost. At present, support organizations have been providing subsidies for certification, but many organic farmers do not rely heavily on such organizations for fear that they might withdraw the subsidy or

cancel payment of the certification fee. The farmers foresaw that, in such cases, they would have to bear the full burden of certification costs.

Another concern regarding organic agriculture development in the province of Chiang Mai is the agriculture extension services of government agencies. For some time, organic agriculture has been strongly promoted and supported by NGOs. A few years ago, government agencies joined the promotion, bringing with them extension activities that focused on organic fertilizers. However, farmers observed that many extension officers still believed in the positive impacts of conventional agriculture, and that such officers continued to promote the application of chemicals to reduce production risks. Moreover, some extension workers complained of the insufficient budget for the extension activities, which aggravated the situation and exacerbated the problems related to the lack of a monitoring and evaluation system.

The impacts and limitations, opportunities and constraints of organic agriculture in the province of Chiang Mai are summarized in table 5.

Table 5. Analysis of the strengths, weaknesses, opportunities and constraints of organic agriculture in Chiang Mai Province

<i>Strengths</i>	<i>Weaknesses</i>
<ul style="list-style-type: none"> • Based and built on local knowledge • Similar to traditional or low-input practices • Makes use of on-farm and local resources • Dependent on family labour, incurring low labour cost • Reduces health risk from harmful pesticide application and chemical substance contamination in agriculture commodities • Reduces debt since expenditure on inputs is lower • Reduces the consumption expenditure of families • Promotes food security and provides additional income from sale of surplus products 	<ul style="list-style-type: none"> • Insufficient labour inputs, especially with regard to weed management • Off-season vegetables cannot be grown • Longer production cycle and slow production turnover • Organic products are not as attractive as conventional products • Perception that organic production leads to decline in yield, and that it is not beneficial for land owners or farmers who are in debt • High cost of and complicated certification process • Lack of demand in community and local markets due to high prices • Insufficient support from government extension services, which also often promote conventional and good agricultural practices, as well as the use of some chemicals in agriculture production

- Provides consistent income throughout the year
- Provides opportunities for farmers to develop their knowledge and skills on farm production techniques
- Commands high prices when products are certified

<i>Opportunities</i>	<i>Constraints</i>
<ul style="list-style-type: none"> • Enhances self-reliance among local farmers • Facilitates sustainable use of environmental resources • Government promotes organic agriculture as part of the national agenda • Non-governmental organizations have been promoting organic agriculture as a opportunity for poverty alleviation • Strong relationships among farmers and strengthened networks among farmers and consumers 	<ul style="list-style-type: none"> • Many conventional farmers view organic agriculture as an absurd technique • Conventional farmers still believe that monoculture or mainstream agriculture leads to high income • Conventional farmers believe that conventional products are of higher quality than organic products • Labour shortage in the agricultural sector • Lack of support from local organizations • Lack of coordination between governmental organizations and non-governmental organizations • Governmental organizations have a limited budget for regular training courses and relevant activities • Lack of proper monitoring and evaluation system on the part of the government's extension services

Source: Group discussion and key informant interviews, 2007.

VI. CONCLUSION AND IMPLICATIONS

Conventional agriculture has been promoted in Thailand to support economic development based on the market system, providing good quality crops at low prices and increasing the food supply. However, conventional agriculture has also contributed significantly to environmental degradation, bringing about economic problems and health risks to both farmers and consumers. Thus, organic

agriculture has been promoted as a sustainable way of reducing the application of chemicals and as a means of addressing the aforementioned problems.

In Thailand, the province of Chiang Mai has the highest rate of economic and health problems related to conventional agriculture practices. A number of NGOs have been making efforts to promote organic agriculture in the province for more than a decade as a means of addressing such problems, alleviating poverty and encouraging self-reliance on the part of the farmers. In recent years, government agencies have also turned their attention to promoting organic systems, as evidenced by the inclusion of organic agriculture in the national agenda.

The Ninth and Tenth National Economic and Social Development Plans (2002-2006 and 2007-2011) supported the concept of agricultural economy to attain self-sufficiency. Under the Plans, measures to enhance the ability of farmers to compete as well as to provide improved support for efficiency and sustainable production processes were considered necessary in order to produce safe and high-quality commodities while meeting acceptable standards at competitive prices. In addition, having as a fundamental pillar the sufficiency economy philosophy developed by His Majesty King Bhumibol Adulyadej, the Plans also promoted the implementation of sustainable agricultural systems. Under this concept, sufficiency is based on three significant aspects, namely: moderation, reasonableness, and the need for sufficient protection from impacts arising from internal and external changes (Sufficiency Economy Working Group 2003). The sufficiency economy philosophy encourages people to: (a) know what is enough for them; (b) learn to be satisfied with what they can have; and (c) try to be more self-reliant and self-sufficient without being extravagant.

Under sufficiency economy frameworks, organic agriculture was considered to be an approach that could facilitate self-reliance among small farmers, given that it could reduce the risks associated with the usage of external resources. In organic agriculture, the use of on-farm resources is emphasized, most agricultural products are consumed in the farmers' households, and the surplus can be sold in local markets at prices higher than conventional produce.

In areas covered by the study, organic agriculture provides farmers with incomes throughout the year from the production of vegetables, rice, soybeans and fruit, increasing the reliability of the farmers' household incomes. In addition, since organic agriculture is a holistic system, farmers learn more about the ecosystems in their fields and sustainable farm management. Organic agriculture also requires networking among farmers and consumers, and group work and discussion to exchange knowledge, experience, technology and information on aspects related to the adoption of organic agriculture practices. Consequently, the

know-how of farmers is enhanced, social relationships are established, and sustainable agricultural practices that are less harmful to the environment are adopted, thereby facilitating the balance and sustainable growth of an economy that supports the principles of the sufficiency economy philosophy.

Organic agriculture has the potential to help small farmers achieve sustainable development. However, most conventional farmers are still resistant to switching to organic farming, as they have negative perceptions of organic systems, which include fears of low yield and quality, high production costs and delayed income. Farmers who are land tenants and in debt believed that their families' fundamental needs could not be met through the practice of organic agriculture. In order to counter such views, the government should implement policies that would intensify the promotion of organic agriculture among farmers.

One difficulty noted in the promotion and development of organic agriculture in Chiang Mai is the lack of information. Although there may be some information on organic agriculture in the province, such information seemed to be scattered. Thus, sources providing lists of organic farmers' groups or producers, information on areas planted with organic commodities and technology, marketing advice, and knowledge should be compiled and updated regularly. There is also a need for cooperation and collaboration between the Ministry of Agriculture and Cooperatives and Ministry of Commerce as the main agencies in charge of this mission and directly involved in the production and marketing of the organic products. Available, up-to-date information is useful for development planning, training courses, marketing analysis and the enhancement of support services.

A policy should be developed that would take into consideration different types of organic farming, such as self-reliance and commercial organic farming. In self-reliance farming, food safety and the reduction of household expenditures should be highlighted. In addition to the existing indigenous knowledge, the dissemination of new agricultural innovations and technologies should also be priorities, as farmers require such innovation in order to produce higher yields. Farm and household accounts should also be established, as they are necessary financial management tools. As in other government projects, keeping track of such accounts has been promoted among farmers but not often monitored or evaluated. Thus, more follow-up actions on the management of such accounts and related farm activities should be carried out by the government agencies concerned.

For trade-oriented or commercial organic farming, a price policy should be established, as this is necessary to guarantee that the price of organic produce is higher than the price of conventional products. Based on the findings from the survey, organic farmers earned higher incomes due to the high prices obtained for

organic products. The prospect of higher prices for organic commodities could therefore be an attractive reason for conventional farmers to convert to an organic system. As organic farming is largely affected by natural conditions, crop insurance should also be made available and promoted, and the government or supportive organizations should consider providing a partial subsidy for crop insurance premiums in order to mitigate the risk and at the same time assure farmers of a stable income from organic farming.

With regard to the marketing of organic commodities, the government, relevant agencies, and organic farmers' groups should provide more market channels by cooperating with the private sector, such as shops and supermarkets, to designate space for organic products or to establish direct organic markets. Moreover, promotional campaigns should be intensified to raise consumer awareness of the harmful effects of chemical residue in farm produce and the positive effects of organic products. Such actions will encourage more consumers to purchase organic products, leading to increased demand and a greater likelihood that they will accept the higher prices charged for organic products.

The most important factor in organic development is awareness of organic agriculture. As stated above, conventional farmers still have negative perceptions of organic agriculture. Hence, an education policy should be established which incorporates environmental and agricultural issues in the curriculum at all educational levels, and awareness of organic agriculture should be raised by outlining the hazards of conventional agriculture as well as the philosophy and benefits of organic agriculture. Moreover, a policy should also be developed to promote the practical experience of organic agriculture in schools, in order to enhance awareness and the perception of the younger generation regarding organic farming. Involvement of the younger generation in organic gardening at school could lead to the spread of organic knowledge from children to their parents and family members, and on to the community. At the university level, a curriculum for degrees in organic agriculture should be developed to support research and development in organic innovation and technology.

In addition to the formal education system, organic training programmes are also necessary to the adoption of the organic system by farmers. Participatory training courses, organic farm visits, and on-farm trials should be provided by government agencies and NGOs to enhance the awareness of farmers and encourage them to adopt organic farming. Farm planning and management should also be included in the training courses for commercial organic farmers, particularly to equip them with the skills and know-how to produce appropriate seasonal vegetables and meet market demands. Follow-up and evaluation programmes

should also be promoted, as these could help farmers solve the problems they encounter and motivate them to continue practicing organic agriculture.

Furthermore, organic certification should be split into two levels: local and national. Local certification, with lower costs, should be developed as a requirement for self-reliance farmers wishing to sell their organic products in local organic markets. Such certification could increase the confidence of local consumers in the organic products. Certification at the national level should also be established as a requirement for products from commercial organic farming that are sold in domestic markets as well as those that are exported. This would make organic products more competitive.

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