COMPARING OPINIONS AND ATTITUDES OF ORGANIC AND NON-ORGANIC FARMERS TOWARDS ORGANIC RICE FARMING SYSTEM IN NORTH-EASTERN THAILAND

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Abstract

Organic farming is becoming popular in Southeast Asia as part of sustainable agriculture systems. This study aims to compare the opinions and attitudes towards organic farming systems by organic rice farmers (OF) and non-organic rice farmers (NOF) in Surin province, north-eastern Thailand. The comparison was drawn from opinions of OF and NOF interviewees who are engaged in jasmine rice farming. The data presented were based on information collected from 100 OF interviewees and 100 NOF interviewees. The interviews enabled us to compare their attitudes towards organic farming based on four aspects, namely: organic farming knowledge, environment, marketing, and costs and benefits. Comparisons were made not only of socio-economic indicators, but also their opinions. Chi-square and t-test were employed to quantify correlations in this study. It was found that there was a correlation of attitudes of both OF and NOF interviewees in the four aspects examined. Additionally, educational level, farm holding and extension-worker contact affected opinions and attitudes of OF interviewees. Among NOF interviewees, their farming experiences affected their attitude towards organic farming.

Keywords: Comparison, farmers, organic farming, north-eastern Thailand, sustainability

Introduction

Organic farming is being promoted and is gaining acceptance all over the world, especially in Southeast Asia, as part of the latest efforts to encourage agriculture systems that are both socially and ecologically sustainable. The system is based on minimising the use of costly external inputs, such as synthetic fertilisers and pesticides, by increasing and efficiently utilising farm-based resources (Ramesh *et al*. 2005). Organic methods have been adopted more rapidly in most industrialised countries (Lampkin and Padel 1994) than in the Third World (Scialabba 2000).

In Thailand, five different farming systems are perceived by the government as being sustainable: integrated farming, organic farming, natural farming, agro-forestry, and 'New Theory Farming' (Jitsanguan 2001, Suksri *et al*. 2008). Integrated, organic, natural and agro-forestry farming systems have been slowly gaining acceptance among Thai farmers. This has resulted in multiple socio-economic benefits to farmers, and has contributed to environmental protection (Tipraqsa *et al*. 2007). The so-called 'New Theory Farming' was first proposed in 1993 by His Majesty the King Bhumiphol Adulyadej, with the explicit goal of improving agricultural self-sufficiency. The concept is aimed towards helping disadvantaged farmers with limited farm sizes, and lacking access to irrigation facilities, by introducing farm crop diversification in order to lessen dependence on single crops, thus ensuring a more steady income. The details of this revolutionary royal scheme have been outlined by Suksri *et al*. (2008) and Chainuvati and Athipanan (2001). Taken together, these five sustainable systems aim at improving soil fertility, ecosystem services and the wellbeing of people within systems characterised by harmonious co-existence of man and the environment. They rely on natural ecological processes, local biodiversity and regulated anthropogenic inputs that are adapted to local conditions, rather than on the use of ecologically incompatible inputs with generally adverse effects. The use of organic farming involves both basic and advanced knowledge in science, coupled with traditional know-how that emphasises the promotion of a better quality of life (IFOAM 2008).

Since the 1990s, the global market for organic products has continuously and rapidly grown at around 20 – 25% per year, reaching an estimated US$33 billion in 2005 (Ellis *et al*. 2006). Consumers worldwide have come to regard organics to be superior overall compared to conventionally grown produce (Byrne *et al*. 1991). In the urban centres of Thailand, organics are gaining acceptance among consumers, who believe such produce to be healthier and more environmentally friendly (Roitner-Schobesberger *et al*. 2008). The resultant increasing demand has driven a similar increase in the growth of organically managed farmlands. Approximately 306,000 square kilometres (30.6 million hectares) worldwide have been devoted to organic farming, representing about 2% of the total world farmland. In addition, in 2005 organic wild products were produced on about 62 million hectares of farms (Willer and Yussefi 2007).

In Thailand, organic farming following the traditional definition is not really a recent phenomenon, as Thai farmers have been practicing traditional farming for years. Such practices have been developed based on environmentally sustainable ways of farming; and this has been enriched through farmers' local agro-ecological knowledge handed down through the generations. Despite the rapid expansion of modern agricultural technology, traditional farms have existed and are solidly grounded based on the local knowledge of sustainable farming. These farms can be considered as the precursors of the revitalised, modernised organic farming systems seen today. Since the 1980s, modern Thai organic agriculture has become a large movement initiated by farmers and local non-government organisations (NGOs). Since then, the movement has been strongly supported by consumers' preferences for organics. One of the positive outcomes was the establishment of the Alternative Agriculture Network (AAN) in 1984 as a national network providing lessons through experiences, as well as advocating policy for the establishment of sustainable agriculture, including organic farming. In 2003, it was estimated that 8,958 ha of farmlands were under organic management throughout the country (Panyakul 2003). This represents around 0.04 % of the country's total farmlands. Thus, organic farming in Thailand is still at an early developmental stage. The main organic products are rice and fresh vegetables (Panyakul 2003).

Agriculture is the primary economic driver in north-eastern Thailand, generating around 22% of its gross regional product (DOAE 2008). This is much higher than the country's average, which is 8.5% of the gross domestic product. Beneath this seemingly glossy statistic, however, is the reality of the poor agronomic and socio-economic situation of the region. Soil in north-eastern Thailand is generally sandy, saline and acidic, with low organic matter content and low water retention. Soil erosion is common as a result of uncontrolled deforestation activities. Unstable rainfall patterns falling on sloping terrain make irrigation impractical; therefore rain-fed agriculture is often the only option (Mitsuchi *et al*. 1986).

It is widely acknowledged that agriculture in Thailand has continuously reduced its importance in economic terms since the 1970s due to low agricultural productivity. Unfortunately, no significant manufacturing investments can be set up in the north-eastern region, primarily because it is far from the main seaports (Suksri *et al*. 2008). The maintenance of economic and social infrastructures also lags behind other regions, resulting in widespread poverty among its inhabitants. The small household farmers in north-eastern Thailand are subjected to conditions of environmental restrictions and rapid economic change. They have to rely on many external inputs, which impact on the agricultural productivity, while per capita income of the region remains far below the national average of 62,300 Baht (approximately 35 Thai Baht [ThB]=US$ 1, citing 2008 figures; DOAE 2008).

In the middle of the 20th century, high yielding varieties (HYV) and intensive use of mineral fertilisers for increasing production and raising productivity have been introduced throughout the country. These 'green revolution' technologies bring benefits to a limited number of farm households. However, for poorer farmers, who rely on a few improved crop varieties, the inefficient and misguided use of the external financial inputs, such as credit facilities, makes them vulnerable to market realities. As a result, they incur increasing debt burdens (Tipraqsa *et al*. 2007). To earn the money needed to pay the rising costs for procuring external inputs, farmers often leave their families for several months to work off farm. There are many farmers who take up loans to buy fertilisers and pesticides, only to subsequently renege on their financial obligations. When they fail to harvest, the loans often cannot be repaid. Such is the reality facing many Thai farmers in the north-eastern region today. The increasing need for money for sustaining daily subsistence and farm productivity has forced a large number of farmers to move from the countryside to the cities (Chouichom 2001).

A voluntary shift to a sustainable agricultural scheme like organic farming is expected to solve some of the problems of the small-scale farmers who are using external inputs. Some farmers have perceived the many advantages of organic farming system via various information sources, while some still have negative opinions towards it. Such opinions are influenced by a variety of factors. In most developed countries in Europe and North America, environmental concerns have been the most compelling influence on farmers' opinions (e.g., Dubgaard and Sorensen 1988, Svensson 1991, Milder *et al*. 1991). These are grounded in well-publicised information, specifically on the positive effects of organic systems, as well as on the multiple deleterious environmental effects brought about by unsustainable farming practices. The shift from conventional to organic systems in these countries is often guided by ethical concerns. In less developed countries, on the other hand, economic considerations are among the strongest factors shaping farmers' opinions (e.g., Scialabba 2000, Jitsanguan 2001, Bonny and Vijayaragavan 2001, Isin *et al*. 2007). In these countries, the practice of agriculture is often deeply rooted in age-old farming traditions that form the backbone of rural societies there. Greater resistance to change and innovation can be reasonably expected, and it usually requires a more vigorous effort for new knowledge and practices to gain a foothold. Set against

a backdrop of rural poverty, any effort toward change must be based on tangible economic returns, as well as other benefits.

Most rice-growing societies are concentrated in the tropical regions of South and Southeast Asia. In many of these regions, rice production volume often dovetails with rice consumption figures, leaving little surplus each year for export or for security against episodes of crop failure. With the growing demands for farm products grown under environmentally friendly conditions, and the burgeoning organic food market that creates yet another economic niche, rice producers everywhere are being challenged to meet these demands, albeit in a slow and calculated manner. In these rice producing countries, the important role of technology transfer and agricultural extension cannot be overemphasised. The crucial role of extension agents has undergone critical changes lately, from the classical 'bringer of messages' to a more pro-active role as catalyst and partner for farmers (Phillips-Howard 1994). The success of any adoption program relies to a large extent on this dynamic partnership between farmers and extension workers, as documented by previous studies.

In view of the above, farmers' attitudes and opinions towards organic farming systems (OFS) should be evaluated to identify their actual perceptions about OFS. Both their viewpoints and decision-making patterns for adopting organic farming, whether positive or adverse, should be determined for developing effective extension methods in the delivery of sustainable agricultural practices. Hence, the specific objectives of this study were designed to analyse and compare the opinions of organic farmers (OF) and non-organic farmers (NOF) towards organic farming, and also to determine the relationship between both groups of farmers' opinions and their socio-economic profiles towards OFS in north-eastern Thailand.

Methods

Study area

The survey was conducted in three districts of Surin province, north-eastern Thailand: Maung, Srikhonrapoom, and Kwaosinnarin districts. The province has a total land area of 8,124.056 km^2. In 2008, the area devoted to rice farming amounts to 3,172,132 *rai* (1 *rai* = 1,600 m^2), or around 71.52 % of the entire provincial agricultural land (3,631,421 *rai*). Surin ranks 10th in terms of human population among the 76 provinces of Thailand, with a total population of 1,404,252. The province is divided into 17 districts (*amphoe*) with 158 Sub districts (*tambon*) consisting of 2,119 villages (*moobaan*). The number of farming households is estimated at 189,139. About 92.8 % of the total population lives in the rural area, and most of them do rice farming. The above-mentioned three districts were selected for this study because of their extensive cultivation of organic rice (DOAE of Surin 2008).

Data collection

The research was carried out in September 2008 after a pre-test conducted in August. Yamanae's formula (1973) was adopted to acquire the appropriate sample size for this research, which involved 400 farmers engaged in rice cultivation. As of 2008, these farmers had at least three years experiences of rice cultivation. As a sub-sample, 200 out of 400 farmers were selected, consisting of 100 practitioners in each of OF and NOF, so as to compare their opinions of organic farming. OF interviewees, in this study, used no chemicals on their farms. The study employed a semi-structured and structured questionnaire. In order to complement both quantitative and qualitative data, more information was collected through focus group discussions. This study used a population-based survey to determine the opinions of farmers about organic farming. Interviews were conducted both on the farm-sites and in their households. The 400 respondents were classified in terms of areas and numbers as follows: Maung district (243 farmers), Srikhonrapoom district (121 farmers) and Kwaosinnarin district (36 farmers). The interviews included both open-ended and closed questions, and some questions also elicited quantitative data. The modified interview details include four main aspects of opinions regarding organic farming. The responses were scored on a five-point Likert's scale ranging from 'strongly agree (5)' to 'strongly disagree (1)' (Likert 1932).

Data analysis

All data were analysed with the SPSS (Statistical Package for the Social Sciences) for Windows. Descriptive statistics was applied to analyse percentage, arithmetic mean and standard deviation. To test the differences between opinions in organic farming of both OF and NOF farmers, T-test and chi-square statistics were conducted. A significance of $p < 0.05$ was set for statistical significance.

Results and discussion

Demographic characteristics of OF and NOF interviewees

The comparison between socio-economic and demographic characteristics of OF and NOF by mean values is shown in Table 1. The average age of OF interviewees (48.6) was higher than for NOF interviewees (43.7); and OF interviewees also had higher level of education than NOF interviewees. Thai farmers with higher education levels tend to adopt OFS more readily, as has been found in most other countries (Lampkin and Padel 1994). Among the Thai farmers surveyed, it is likely that a combination of longer farm experience (partly evidenced by higher age) and higher educational experience are strong factors supporting OFS adoption. Isin *et al*. (2007) underscored the important role of education as the most influential social factor in the adoption of organic agriculture, although the educational attainment of Thai farmers is still lower than the current Thai national compulsory education of 9 years (OBEC 2009). Illiteracy can certainly affect decision-making patterns associated with OFS adoption anywhere.

Moreover, both OF and NOF interviewees employed almost equal number of combined family and hired labourers, 7.7 and 7.6 persons, respectively, but OF cultivated a smaller farming area of 14.97 *rai*, whereas NOF planted on 18.41 *rai*. This would indicate that OFS are more labour intensive. NOF interviewees used more convenient agricultural machinery, such as two wheeled tractors and small water pumps, than OF interviewees. This could be because of the declining access to agricultural labour experienced in countries like Thailand (Hussain and Doane 1995); this may have resulted in labour-intensive activities such as animal herding to be abandoned in some areas (Tipraqsa *et al*. 2007).

Based on our findings, the total agricultural annual income and monthly savings of OF interviewees was found to be ThB 54,049.24 and ThB 2,835.75, respectively, whereas NOF interviewees earned an annual income of ThB 43,305.57 and saved ThB 1,480.24/month. This is supported by the fact that most OFS require less financial input, but they are more dependent on available manpower and local natural resources (Scialabba 2000). However, OFS, on average, require more hand labour than conventional farms, but the labour is spread out more evenly over the growing season (Pimentel *et al*. 2005, Badgley *et al*. 2007).

From this field survey, which compared the costs and output of rice farming using conventional and organic methods, we discovered that organic farming costs were ThB 24,450.36/*rai*, whereas conventional methods were more expensive at ThB 30,741.91/*rai*. Comparing harvests and market prices, however, the results are not significantly different: conventional farmers harvest 454 kg/*rai,* which fetches a market price of ThB 16/kg for unmilled rice (ThB 7,264), whereas organic farmers realise 448 kg/*rai,* which is sold at ThB 19/kg (ThB 8,512). Although differences in rice market prices do not vary greatly between organic and conventional rice, it seems that the difference in farming costs cited above is one of the factors that influenced these farmers' decision to farm organically.

Additionally, most of the OF interviewees have had more experience in ordinary rice farming (28.7 years), whereas NOF have had less experience (21.4 years). With respect to OFS, OF interviewees had 8 years experience, whereas NOF interviewees had not had this amount of experience. The OF interviewees surveyed in this study had more contact with agricultural extension officers concerning OFS issues relating to rice farming (6.5 times) than the NOF interviewees (merely 3.8 times). The training courses offered by extension workers are quite effective for OFS dissemination in the study area. However, we found that the NOF dealing with general rice farming topics did not pay much attention because they were not ready to transform their rice farming towards OFS, and also they were concerned about the low rice productivity in the first and second years when farmers are starting OFS. In addition to obtaining technical information from field extension agents, Wheeler (2007) observed that this can also be obtained from cooperatives, unions and other organisations. Extension worker contact can generally help reduce the risks brought about by change, provide better assurances and solve some agricultural problems due to lack of some specific knowledge and know-how (Hawkins and Ban 1996).

Table 1. Demographic and socio-economic profiles between organic farming (OF) and non-organic farming (NOF).

Characteristics	OF (n=100)	NOF (n=100)
Age (years)	48.6	43.74
Education (year)	8.5	6.3
Hired labour (persons)	4.5	3.2
Family labour (persons)	3.2	4.4
Farm holding (1 *rai* = 0.16 hectare)	14.97	18.41
Two wheeled tractors (number)	0.54	0.97
Small water pumps (number)	0.74	0.91
Total annual farm income (ThB/year)	54,049.24	43,305.57
Saving (ThB/month)	2,835.75	1,480.24
Total cost rice production all year (ThB/year)	24,450.36	30,741.91
Rice farming experience (years)	28.74	21.42
Extension worker contact (times/month)	6.5	3.8
Average rice product (Kg/*rai*)	448	454

Opinions of OF and NOF interviewees towards organic farming

Farmers' opinions towards OFS were analysed based on four aspects: organic farming knowledge (OFKA), environmental effects (EA), marketing (MA), and cost and benefit aspects (CBA). The levels of opinions of these aspects and sub statements were measured on a five-point scale with the interpretative meanings of '5' strongly agree, '4' agree, '3' somewhat agree or disagree, or neutral, '2' disagree, and '1' strongly disagree.

Organic farming knowledge aspect (OFKA)
Significant differences between OF and NOF interviewees concerning six expressions of general OFS knowledge are shown in Table 2.

These indicated that organic farming knowledge is virtually tied to favourable opinions towards sustainable farming development. The OF interviewees thought that OFS had become less complicated because they had received more training, knowledge and practice in organic farming. In contrast, the NOF interviewees believed that the OFS is really an intricate agricultural system with a corresponding economic risk during conversion. It was indicated that some OFS production processes were ineffective in enticing NOF interviewees to start organic farming.

Moreover, most of the NOF interviewees thought that organic farming requires more organic fertilisers and tedious procedures for soil treatment. The OF interviewees need to select and use the best quality rice seed for cultivation in their organic farms. The OF interviewees did not use chemical and pesticides in their rice farms, whereas the NOF interviewees use these products frequently, and any shift is likely to encounter resistance. The thought that NOF have to enhance soil conditions by using only organic fertilisers and natural materials for at least three years left the respondents concerned about income instability and other uncertainties. As a result, NOF interviewees developed a lukewarm attitude and were not interested in OFS, particularly in relation to the management of water and soil resources, and in the use of organic fertilisers. These are some of the reasons given as to why NOF show a reluctance towards adopting OF immediately. In a study of alternative rice farming in southern Philippines, Baconguis and Cruz (2005) found that large inputs of technology among alternative farmers are widely regarded as being essential if profits are to be maintained. Thangata and Alavalapita (2003) observed that NOF may not have learned from the experiences of successful and contented OF. One underappreciated aspect is the reduced use of chemical fertilisers that cuts down farm production cost. Since wealthier households can afford using costly chemical fertilisers, there is less pressure for them to adopt OFS technologies. More established farmers using conventional rice farming methods do not see the need for greater and more modern technology inputs (Baconguis and Cruz 2005).

The OF interviewees had more access to special training courses and activities concerning the promotion of OFS. These courses and activities had been conducted by governmental agencies and NGOs in the form of field trips, seminars, trade fairs, and exhibitions outside the community. In this way, these farmers can acquire farming know-how to better manage and harvest organic rice products through their enhanced agricultural knowledge. Programs focusing on technological advances and environmentally friendly practices generally have greater acceptance (Baconguis and Cruz 2005). The research of Ghanim and Panell (1999) found that farmers who can access more technical information through their contact with extension workers

have more accurate knowledge on the techniques of OFS. The statistical tests in this research showed that agricultural extension-worker contact was significantly correlated with the organic farming knowledge aspect (OFKA) of the OF interviewees at the 1% level (Table 3). It could be inferred that the OF interviewees who received more organic farming information from agricultural extension workers gained more organic knowledge to improve their farms. Yet another important result showed that there is a difference between OF and NOF interviewees' opinions in OFKA at the 5% level (Table 5). This could be interpreted that the two groups of farmers have different opinions in OFKA, and they would therefore also have differences in organic farming awareness and level of organic farming knowledge.

Environmental aspect (EA)

Regarding the environment, the OF interviewees' ideas were more favourable than those of the NOF interviewees towards OFS, especially with respect to the environmental effects of farming practices (Table 2). The OF interviewees considered that adopting OFS would lead to better soil conditions in their farms. They also stressed that soil condition in farms is a finite natural resource that is easily vulnerable to deterioration due to agricultural activities such as the application of pesticides and chemicals. Moreover, these inputs were quite expensive and have long-term detrimental effects on the wellbeing of the farms. A number of OF interviewees believed that they could enhance the soil quality of their farms by shifting to organic farming, a belief shared by rice farmers in southern Philippines (Baconguis and Cruz 2005). Pimentel *et al*. (2005) also indicated that soil organic matter (soil carbon) and nitrogen were higher in OFS, providing many benefits to the overall sustainability of organic agriculture.

In addition, the OF could conserve water resources on their farms and, at the same time, maintain a healthy environment by reducing the use of chemical fertilisers and pesticides. As a result, non-target farm organisms such as fish and edible plants are more likely to increase when some of the NOF reduce their chemical use and instead use organic and natural fertilisers, as practiced by OF. Most NOF interviewees complained about the poor quality of their soil; because they did not understand the real effect and indirect results of chemical fertilisers. However, the NOF interviewees were not concerned about the conservation of natural resources, as most of them focused more on mass agricultural production, plus increasing productivity to better meet market demands.

It is noteworthy that there was a correlation between educational levels of the OF interviewees and their opinions on organic farming at the 1% level (Table 3). This means that the OF who have higher levels of education tend to have more OF knowledge, and they want to conserve the environment around their rice farms. McCann *et al*. (1997) noted that organic farmers have a better awareness of, and concern for, environmental difficulties associated with agriculture than conventional farmers. Organic farmers also articulated their concern about some effects of pesticide residue on food, air pollution, pesticide drift, and their lack of control over these dilemmas. There was also a difference between the opinions of the OF and NOF interviewees concerning environmental aspects (EA) at the 5% level (Table 5). It could be inferred that the two groups of farmers have different opinions and point of views in EA in which they would also have differences in environmental awareness and concern for organic farming.

Marketing aspect (MA)

According to the survey (Table 2), we found that the OF interviewees could get a slightly higher price for their organic rice (ThB 2-3/Kg more than the ordinary price) than the NOF interviewees got for their rice (ThB 15/Kg in the Surin City Market in 2008). The NOF interviewees claimed that whereas their conventional rice products were sold only in wholesale markets, the OF products could be sold directly to supermarkets in big cities, where they fetch higher prices. Pimentel *et al*. (2005) confirmed that organic foods fetch higher prices in the marketplace, with the net economic return per hectare often equal to or greater than that of the crop from conventional farms.

However, a large number of NOF farmers still thought that there was not a large gap in terms of farm-gate price between organic and non-organic rice, so they did not have a strong motivation and preference to cultivate organic rice. Both the OF and NOF interviewees expected that the government would establish a policy for promoting organic agriculture production with increased financial support for all of them. One way to support rice marketing at the community level in Surin province is the national program to identify and promote unique and indigenous products, called OTOP (One Tambon One Product). Hom Mali rice from Surin province, being a top-rated agricultural commodity throughout Thailand, was chosen as the banner-product for Surin under the OTOP program. This innovative OTOP branding of organic rice puts an indelible trademark of product excellence that serves to jump-start Hom Mali rice reputation and sales, and one that encourages tourists to preferentially seek out this type of rice.

Statistical analysis found that there was a correlation between farming experience of NOF interviewees and their opinions toward OFS at the 5% level (Table 4). This indicated that the NOF interviewees who have

more farming experience tend to be more interested in OFS, specifically for organic rice. Moreover, the results of our survey illustrated that there is a difference between OF and NOF interviewees' opinions in MA at the 5% level (Table 5). Both OF and NOF interviewees had different opinions in MA, and they probably access different marketing channels. The study of Roitner-Schobesberger *et al*. (2008) explained that organic products in Bangkok are still marketed by targeting both the upper classes and foreigners. Therefore, it is necessary to cause the distribution of more information on organic products to consumers in the middle and lower social classes in order to improve and broaden the local market base. There is a growing trend worldwide towards organic products due to the many environmental and health benefits that these products bring to consumers (Byrne *et al*. 1991, Magnusson *et al*. 2003).

Cost and Benefit aspect (CBA)

We found that most OF interviewees could reduce farm operating expenditure by using their own organic fertilisers, and also by employing green manures (Table 2). Furthermore, employing family labourers and hiring labourers from their communities could decrease their farming costs. Two-wheeled tractors could reduce the needs for hired manpower, i.e., they could involve their children and other family members in using farm animals such as buffaloes to work on their farms. Pimentel *et al*. (2005) found that although labour inputs average about 15% higher in OFS, they are more evenly distributed over the year than in conventional production systems.

Table 2. Opinion and attitude towards organic farming.

Statements	Mean score*		t-test ($p < 0.05$)
	OF (n=100)	NOF (n=100)	
Organic farming knowledge			
OF is more complicated than chemical farming	3.21	3.57	2.65
OF requires prior soil treatment	4.23	3.91	5.37*
Water resources have to be clean and without any pollutants if OF should be adopted	4.49	4.13	6.46*
Only good quality seeds of known source can be used in organic farming	4.35	4.11	4.19*
OF requires adding organic fertiliser	4.16	3.98	2.99*
OF does not require the use of pesticides and herbicides in the farm	4.29	4.10	4.05*
Environmental aspect	4.11	3.73	5.23*
OF will result in better soil conditions			
OF will conserve water resources compared to ordinary farming	4.05	3.77	4.58*
OF does not generate poisonous fumes in the air	4.05	3.78	5.31*
Organic fertiliser used in farm does not affect one's health	4.03	3.75	5.24*
NOF will destroy soil, water and natural resources surrounding farm	3.81	3.55	2.79*
Marketing aspect			
Consumers tend to buy more organic agricultural products than products farm using chemical	4.15	3.84	4.83*
Consumers can buy organic agricultural products readily from the farm	2.75	2.67	2.69
Consumers from both inside and outside their communities like to buy organic products from you	3.93	3.72	3.39*
Agricultural products and marketing gain more support from the government	4.19	3.88	5.24*
Organic rice product is cheaper than ordinary rice product (How many ThB/Kg?)	3.22	2.89	4.21*
Benefit and cost aspect			
Total OF cost is higher than chemical farming cost	2.93	2.72	1.97
OF can give more profit than products from chemical farming	3.34	3.37	2.86*
OF can translate into decreased expenditure by using own organic fertiliser and own family labour	3.86	3.64	2.73*
OF and NOF products are the same prices	2.93	2.69	3.58*
Total	3.62	3.41	2.78*

* 4.50-5.000= strongly agree, 3.50-4.49=agree, 2.50-3.49=neutral, 1.50-2.49=disagree and 1.00-1.49= strongly disagree (John 1963)

We found that chemical rice farming costs are higher than OF costs (Table 1). Examining the operation costs among NOF, the highest production cost was allocated for chemical fertilisers, as it is easier to utilise them thereby bringing a higher yield even if production cost is expensive. For example, in European field experiments, it was found that the yield of organic wheat and other cereal grains averaged 30% to 50% lower than for conventional cereal grain production (Mäder *et al*. 2002). These lower yields appeared to be caused mainly by lower nitrogen (N) inputs into the OFS. In New Zealand, yields of wheat were reported to average 38% lower than those in conventional systems (Nguyen and Haynes 1995).

In our survey, all of the OF interviewees planting organic rice generally received a greater price for their rice products than did the NOF. Similarly, the marketplace price for organic corn and soybeans frequently ranged from 20% to 140% higher than for conventional corn, soybeans, and other grains (Dobb 1989, Bertramsen and Dobb 2002, New Farm Organization 2003). Therefore, when the different market prices were factored in, the net difference between the organic alternative and conventional crops would be relatively small; in most cases the return on the organic crops would be slightly greater. Most of the OF interviewees in our survey were able to obtain more farm cash supplemental benefits from planting and harvesting some Thai culinary herbs, such as lemon grass (*Cymbopogon* sp.) and galangal (*Alpinia* sp.), which were cultivated on the levee of their farms.

Compared to OF, many NOF used, and consequently paid more for, harvesting device rental (around ThB 700/*rai* excluding fuel costs). Tillage can lead to a decrease in the use of herbicides, but may cause an increase in the use of diesel fuel for operating tractors. The recent increase in the cost of diesel has made traditional tillage unprofitable in farming systems in the north-western USA (Nail *et al*. 2007). This same situation can be expected in farm systems in other parts of the world, especially when farmer-owned machinery, as opposed to rented machinery, incurs repairs and depreciation costs (Padel and Lampkin 1994).

Farm size of OF was significantly correlated to the cost and benefit aspect (CBA) at the 5% level. Those farmers who have larger farms are likely to receive more benefits and incur decreased expenditure as a result of organic farming (Table 3). The research conducted by Selfa *et al*. (2008) supported this observation that the farmers who are concerned about conserving farmland were more likely to practice organic farming or sustainable agriculture. Nevertheless, there was a difference between the opinions of OF and NOF in terms of CBA at the 5% level (Table 5). OF will possibly incur higher costs, but derive greater benefits in the end by realising higher rice production.

Table 3. Organic farmers' personal traits and their attitude (n=100).

Variables	Education level	Farm size	Total annual income	Farming experience	Extension worker contact
	p	*p*	*p*	*p*	*p*
1. OF knowledge	1.78	1.22	1.87	2.74	10.60**
2. Environment	9.16**	2.00	1.87	3.21	2.65
3. Marketing	1.78	1.65	1.35	1.83	2.11
4. Cost & benefit	1.97	4.87*	1.98	2.91	2.78

* $p < 0.05$ and ** $p < 0.001$ (based on Pearson Chi-Square test)

Table 4. Non-organic farmers' personal traits and their attitude (n=100).

Variables	Education level	Farm size	Total annual income	Farming experience	Extension worker contact
	p	*p*	*p*	*p*	*p*
1. OF knowledge	0.65	0.72	1.14	1.48	0.53
2. Environment	0.74	1.11	2.57	2.34	1.12
3. Marketing	0.61	0.40	2.34	3.96*	1.32
4. Cost & benefit	1.21	0.58	1.13	1.25	1.34

* $p < 0.05$ (based on Pearson Chi-Square test)

Table 5. Overall comparison of opinions between organic and non-organic farmers.

Variables	Opinion (mean)		t-test
	Organic farmers	Non-organic farmers	* $p < 0.05$
1. OF knowledge	4.06	3.27	6.93*
2. Environmental	3.97	3.06	5.39*
3. Marketing	3.83	2.98	4.11*
4. Cost & benefit	3.67	3.01	3.32*

Conclusions

This project investigated some essential factors influencing the opinions of farmers towards OFS. By comparing the opinions and attitude of OF and NOF interviewees, we found that there were remarkable differences regarding levels of knowledge about OFS, its environmental effects, marketing outcomes, and costs and benefits. The OF interviewees showed a greater favourable attitude towards organic farming, whereas the NOF interviewees showed somewhat reluctant attitudes, mainly because of their general lack of motivation. The statistical tests showed that the OF interviewees, with their higher educational levels, larger farms, and greater contact with extension workers, were more likely to adopt and develop organic farming methods on their farms, grounded in their knowledge of OF systems, market costs and dynamics, and the environmental benefits to the farm. Additionally, the statistical test showed that the NOF interviewees who had more rice farming experiences tended to have positive attitudes towards applying organic rice farming on their farms, especially when considering advantageous marketing and rice production. The most interesting result of this study resides in the observed differences between OF and NOF interviewees' opinions in all of the four aspects. NOF interviewees generally lacked the essential awareness concerning the multiple benefits of OFS. This study has gained some inroads into the socio-economic factors that have shaped the opinions and attitudes of farmers towards organic agriculture. It would be enlightening to study the socio-cultural aspects affecting the adoption of organic farming, as they are likely to play a significant role in the same manner as found by Baconguis and Cruz (2005) among rice farmers in southern Philippines. The important role of technical information dissemination and extension agents is highlighted in this study.

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