
Factors Affecting Adoption of Organic Rice Farming in Sustainable Agriculture Network, Chachoengsao Province, Thailand

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The trend towards consuming organic rice is increasing among consumers in Thailand, while organic rice cultivation was only 0.2 % of total rice agricultural areas in the year 2015. The government focuses on establishing organic rice farming network, and aims at promoting sustainable organic farming. Organic rice farming in Sanam Chai Khet District, Chachoengsao Province under the alternative agricultural network is well known as the successful organic rice network in Thailand. Therefore, this study aimed to 1) investigate the socio-economic characteristics of organic rice farmers who are members of the sustainable agricultural network, and 2) identify factors affecting adoption of organic rice farming under sustainable agricultural network. The study selected organic rice farmers under the sustainable agricultural network in Sanam Chai Khet District, Chachoengsao Province, which is organic agricultural areas in the study area, consisting of approximately 1,500 Rai with 130 farmers as sustainable agricultural network members. Data were collected from survey and from purposively selected interview with 30 organic rice farmers. The descriptive statistics and multiple regression analysis were employed to analyze the data. The results revealed that most respondents were female, aged between 51-60 years old, and graduated from elementary education level. Participants had 4-5 members' family and had one household workforces. On average, the organic rice cultivation area was 10 rai. Regarding the land tenure status, farmers cultivated their farm land by themselves. Additionally, farmers participated in trainings relating to organic rice farming about 10-12 times per year. Majority of rain fed of irrigation availability was 73.3%. The regression results pointed out two factors: the number of training, and gender as the main determinants of organic rice farming adoption among farmers under the sustainable agricultural network.

Keywords: organic rice, Organic Rice Farming, sustainable agricultural network, organic adoption

Introduction

Nowadays consumers tend to purchase high-quality safety food for their

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life. Consumer behavior is changing towards the purchase of organic food products because of their perception that organic food products are healthy and safe, nutritious and environment-friendly. (Mohamed *et. al.*, 2015 and Sivathanu, 2015). Moreover, many research studies revealed that consumers increasingly aware of health protection by consuming organic products instead of the conventional food products (Nie and Zepeda, 2011; Ozguven, 2012, and Paul and Rana, 2012).

Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system." (FAO,1999:). The organic product is gaining acceptance among consumers, who believe that these products can help them healthier and these products are more environmentally friendly. With the increasing of the severity awareness of a domestic problem, as well as the increasing of pressure from international trading partners complying with international standards. The Thai government has overhauled its approach to food safety (Roitner-Schobesberger *et al.*, 2008). Organic agriculture can be categorized into two groups: self-reliance organic agriculture, and standardized organic agriculture for commerce (Green Net, 2016). Organic market began in early 1990, and main organic agricultural products are rice, vegetables, and fruits.

In Thailand, organic rice farming is a majority organic product accounting for 30.4% of total organic products. The expansion of organic rice production in Thailand can be noticed from the increase in cultivated areas from 52,182 Rai in 2004 to 131,502 rai in 2014 which are more than half of total organic agricultural areas in Thailand. The organic rice production area covering for 0.2% of total rice agricultural land. (Panyakul, 2016). Local farmers have practiced traditional farming for hundreds of years. Such practices have been developed and enriched through farmers' knowledge of local agroecology and environmentally sustainable ways of farming. Around the early 1980s, many farmers and local non-government organizations (NGOs) worked together to establish the Alternative Agriculture Network to foster sustainable agriculture activist in Thailand. Meanwhile, there was also a rise of awareness concerning negative health effects by agrochemicals, both for farmers and for consumers.

The Alternative Agriculture Network provided a discussion forum for experience sharing and policy advocacy for sustainable agriculture in organic

farming. Thus, the Alternative Agricultural Network was established to foster sustainable farming practices in organic agriculture (Thai Organic Trade Association, 2011).

From the above mentioned situations, organic farming in Thailand, is encouraged by the government and many private initiatives, which consistent with the first issue of the Organic Agriculture National Strategic Plan (2008-2011) focusing on strengthening, as well as knowledge in order to support research knowledge, and promote knowledge generation, as well as to provide accurate understanding regarding organic agriculture for producers, entrepreneurs, and consumers. It is also in line with the organic agriculture strategic development for local wisdom in order to improve production and create a self-reliance network. (Organic Agriculture National Strategic Plan No.1, 2008)

NGOs worked together to establish the Alternative Agriculture Network called as Sustainable Agriculture Network (SAN) to foster sustainable agriculture activist in Thailand. The network member was selected around Kwae Robom-Siyad Development Project, Snam Chai Khet Chachoengsao organic agricultural group as an organic producer listed in the central of Thailand. Organic rice growing mainly consists of farmers who are members of the SAN more than 10 years an organic agricultural networking program for 130 members and cultivated area 1,500 rai. Organic rice farming member under SAN are will to share knowledge among the member searching for sustainable solutions in organic agriculture However, the group also face problem in increasing the number network members. SAN membership renewal by the aforesaid reasons, researchers want to study factors affecting adoption of organic rice farming in sustainable agriculture network, Chachoengsao Province.

Being in the situation of the demand for organic foods is expected to continue growing especially in developed countries (Tranter et al., 2009; Hjelmar, 2011 and Jierwiryapant et al. 2012), while the organic food supply is limited. In order to encourage farmer to practice organic food, particularly, network strengthening. Farmers who switch to join organic agricultural networks in order to have stronger market security and receive further training. (Jierwiryapant et al. 2012). Therefore, this study aimed to 1) investigate the socio-economic characteristics of organic rice farmers who are members of the Sustainable Agricultural Network, and 2) identify factors affecting the adoption of organic rice farming under sustainable agricultural network. The results from this research were expected to be applied to relevant organizations which can make use of beneficial information of socio-economic variables on the adoption

of organic rice farming, and can be useful for developing a plan for encouraging organic rice production in the country.

Materials and methods

The study area

Sanam Chai Khet Chachoengsao organic rice farming group under SAN as a target farmer of this study. This group consists of farmers who are members of the SAN more than 10 years with 130 members and cultivated area 1,500 rai, within three districts of Chachoengsao province (Sanam Chai Khet, Tha Takiap, Phanom Sarakham) and in two districts of Prachin Buri province (Prachantakham, Kabin Buri). Sanam Chai Khet district, Chachoengsao province was selected as the study area during the crop year 2015/16.

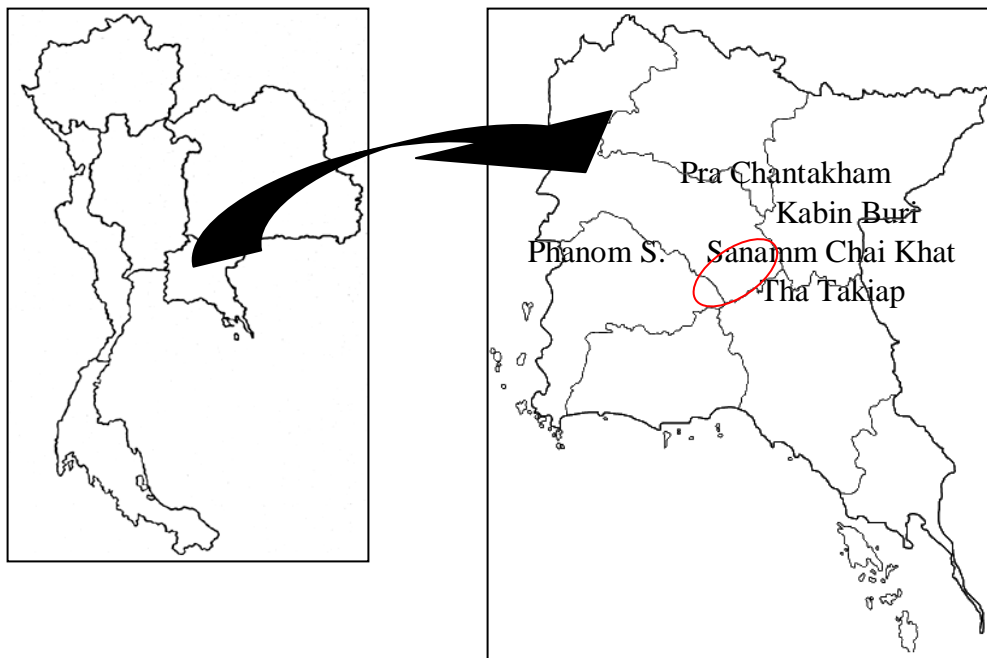


Fig.1 Map of Sanam Chai Khet district of Chachoengsao province

Population and Sample Size

The population in this study consisted of farmers who are members of the Sustainable Agricultural Network in 2015. The lists of farmers were collected from the lead group of an organic sustainable agricultural network. From the three district of Chachoengsao province (Sanam Chai Khet, Tha Takiap, Phanom Sarakham) and in two districts of Prachin Buri province.(Prachantakham, Kabin Buri) totally 130 farmers (Table 1). The purposive sampling technique was used to collect data from organic rice farmers. The study involved 30 farmers of the Sustainable Agricultural Network members in Sanam Chai Khet district, Chachoengsao province, Thailand as the study area.

Table 1 Summary of the population

Province	District	No. of member	No. of member of organic rice
Chachoengsao	Sanam Chai Khet	41	30
	Tha Takiap	5	5
	Phanom Sarakham	1	1
Prachin Buri	Prachantakham	65	29
	Kabin Buri	18	2
Total		130	67

Data Collection and Data Analysis

As organic rice farming was practiced by the Alternative Agriculture Network. A total of 30 farmers adopting organic rice farming practice were selected by the purposive sampling technique. The primary data were collected from sampled farmers using interview schedule consisting of both open and closed ended questions. Questions emphasized on factors that affect farmers' adoption on the organic rice and asked farmers to impart socio-economic information including, gender, age, education level, family size, family labor, farm size, land tenure status, participation in training, and irrigation availability. All data were analyzed based on frequencies of responses and information to the open-ended questions. The data collected were analysis by using descriptive statistics namely frequency and percentage. An inferential statistical tool and multiple regression analysis adopted from Kafle (2011) were employed in data analysis.

The multiple regression model was

$$Y = f(X_1, X_2, X_3, \dots, X_9)$$

Details for all variables involved in the regression analysis are demonstrated below:

Adoption (Y) = Sum of two parameters:

- Farmer's experience on OF (years) and
- Number of organic rice farming technologies adopted (1= bio-fermented juice, 2= organic fertilizer, 3= phytochemical bio pesticides)

Socio-economic Variables

Gender (X_1) = Gender of respondent (Male = 1, Female = 0)

Age (X_2) = Age of household head (years)

Education (X_3) = Household head education level (Years in school)

Family size (X_4) = The number of members in the family

Family labor (X_5) = The number of members in the family labor

Farm size (X_6) = Farm size (Rai)

Land tenure status (X_7) = Owner operator or land lease

Participation in trainings (X_8) = The number of trainings (per year)

Irrigation availability (X_9) = (1 = Year round available, 2 = Seasonal available, 3 = rain fed)

Results

Socio-economic Characteristics of farmers

The socio-economic characteristics of the respondents in this study relevant to respondents' factors affecting adoption of organic rice farming include gender, age, education level, family size, family labor, farm size, land tenure status, participation in training, and irrigation availability.

The results revealed that the majority (60 %) of the respondents were female. Most respondents aged between 51 – 60 years (43.3%), and the further result revealed that 66.6% of respondents graduated with primary education, 20.0% of them graduated with secondary education, 6.7% of respondents graduated with tertiary education, and 6.7% graduated from non-formal education. The number of family members ranged from 4 to 5 persons and had one household workforces (43.3%). On average, the number of organic rice cultivation area was 10 rai (53.3%). Regarding the land tenure status, farmers cultivated their farmland by themselves (96.7%). Additionally, farmers participated in training related to organic rice farming more than 11 times per year (76.7%). The majority of cultivation land was in rain-fed of irrigation

availability (73.3%). In addition, demographic of the respondents was summarized in Table 2.

Table 2 Socio-economic Characteristics of the organic rice farmers (N = 30)

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	12	40.0
Female	18	60.0
Age (Years)		
≤ 30 years	1	3.3
31 – 40	2	6.7
41 – 50	12	40.0
51 – 60	13	43.3
Above 60 years	2	6.7
Educational level		
No formal education	2	6.7
Primary education	20	66.6
Secondary education	6	20.0
Tertiary education	2	6.7
Family size (persons)		
≤ 3	13	43.3
4 – 5	15	50.0
≥ 6	2	6.7
Family labor (persons)		
1	13	43.3
2	10	33.4
3	4	13.3
4	3	10.0
Farm size (Rai*)		
≤ 10	16	53.3
11 – 20	6	20.0
21 – 30	7	23.3
≥ 31	1	3.3
Land tenure status		
Land owner	29	96.7
Land rent	1	3.3
Participation in trainings (Time per Year)		
≤ 5	3	10.0
6 – 10	4	13.3
≥ 11	23	76.7
Irrigation availability.		
Year round available	2	6.7
Seasonal available	6	20.0
Rain fed	22	73.3

*Note: 6.25 Rai = 1 hectare

Factors affecting adoption of organic rice farming

The determination of factors affecting adoption of organic rice farming in sustainable agriculture network was the second objective of the study. Multiple regression analysis was applied to determine the specific contribution of each independent variable and the total variance explained by all variables on factors influencing the adoption of Organic Rice Farming in Sustainable Agriculture Network. There were nine independent variables entered in the model, out of which only two variables had significant influence at the 5% level on farmers of organic rice farming in sustainable agriculture network.

As shown in Table 3, the result revealed that the adjusted R^2 had a value of 0.501 indicating that 50.1% of variation in adoption of technologies was explained by the characteristics. Participation in training and gender were found to have a positive influence on respondents' adoption of the selected of organic rice farming in sustainable agriculture network.. The women farmer were like to adopt organic rice agriculture, and participate in training were likely to adopt organic rice farming as well.

Table 3: Regression analysis of adoption of organic rice production

Independent variables	B	Std.Error	t	Sig
Constant	3.035	1.845	1.644	.166
Gender		.904	.413	2.190
Age		.251	.282	.891
Education		.001	.049	.981
Family size		-.159	.307	-.519
Labor		-.192	.188	-1.017
Farm size		.009	.017	.520
Land tenure status		-.517	.954	-.542
Participation in trainings	.678	.280	2.420	.025*
Irrigation availability	-.266	.272	-.120	.417

* Significance at .05 level of probability $F = 4.432$
 $R^2 = 0.656$ Adjusted $R^2 = 0.501$

Discussion

From the overall summary of 30 organic rice farmers interviewed, the results revealed that the majority of respondents were female. On average, organic rice cultivation areas were 10 rai or 1.6 hectares representing the smallholder farmer. This means that the rice organic farmer under the Sustainable Agriculture Network is small-scale farmer. This result is consistent

with the report of FAO (2012), stated that the support groups, such as NGOs' network prefer to work with small-scale farmers on organic projects. Organic rice farmers participated in trainings relating to organic rice farming more than 11 times per year. This indicates that participated in training will enhance farmers' knowledge and gain better understanding regarding organic farming.

The regression results pointed out two factors: the number of training and gender as the main determinants of organic rice farming adoption among farmers under the sustainable agricultural network. Gender were significant at 0.05 probability level. This result is in the line with Adebayo and Oladele (2013) who revealed that gender significantly influences adoption intensity of organic agricultural practices in southwest Nigeria. In this study, female is the majority gender for organic rice farming, it can imply that female farmers always focused on the consumption of organic products, and concerned on healthy food. Female were likely to engage in organic rice farming. This result was consistent with the result of Kaya and Atsan (2013) that rural women were more likely to engage in organic farming in eastern Anatolia. Moreover, the result from regression pointed out that participation in training were significant at 0.05 probability level. It was widely accepted that participated in training will help a farmer to acquire knowledge relating to organic rice. Accordingly, farmers participated in training were likely to adopt of organic rice farming. This result was similar to those from the study of Singh (2015) that farmers' participation in organic farming related to training as the main determinants of adoption of organic farming among farmers which is similar to the research result of Kaya and Atsan (2013) that farmers participating in the training are more likely to engage in organic farming. This result confirmed the statement of Jierwiryapant *et. al.* (2012) that farmers who switch to organic farming to join organic agricultural networks will receive the training for organic rice farming.

Conclusion

The aims of the study were to investigate the socio-economic characteristics of organic rice farmers who are members of the sustainable agricultural network (SAN), and identify factors affecting adoption of organic rice farming under SAN. Questionnaires were administered to 30 organic rice farmers in Sanam Chai Khet district, Chachoengsao. The study showed some of the socio-economic characteristics of the organic rice farmers. The results revealed that most respondents were female, aged between 51-60 years old, and

graduated from elementary education level. Participants had 4-5 members' family and one household workforces. On average, the organic rice cultivation area was 10 rai. Regarding the land tenure status, farmers cultivated their farmland by themselves. Additionally, farmers participated in training relating to organic rice farming about 10-12 times per year. The majority of farmers were farming organic rice in rainfed or irrigation availability.

The result from analyzed determinants of factors affecting adoption of organic rice farming under SAN found only two factors: gender and participation in the training were significant. Farmer's participation in training will acquire knowledge and understanding of organic farming. Hence, by providing training on organic rice farming to the adopters of conventional farming can motivate farmers to adopt organic rice farming practices. The majority (60.0%) of respondents in the study area were females. This implied that woman farmers dominate in organic rice production than male counterparts. The female farmers had their own roles to play, especially, in maintenance, training and processing of organic rice production. Farmers who were members can be obtained general farmers information from the training. Exchange information on rice production management can deploy the solution on their own plots, can increase productivity as well as increase the number of farmers to change to do organic rice production to more sustainable production, and can respond to consumers' requirements for safe products. This finding recommended that, in order to expand the organic rice program in eastern region of Thailand, group leaders, network committee, network coordinator should be encouraged to participate in training sessions that can teach them how to apply organic agricultural methods, such as how to find quality seeds, product management, water management which were sustainable way to increase the future of organic rice production in Thailand.

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