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Comparison of Factors Affecting on KDML 105 Rice Production According to GAP Standard of Individual and Group Farmers in Mahasarakham Province

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The purpose of this research was to study the comparison of factors affecting on KDML 105 rice production according to GAP standard of individual and group farmers in Mahasarakham province. The populations in this research were 120 individual farmers and 55 group farmers. Data were collected through structured questionnaire interview. Data analyzed by using frequency, percentage, mean, standard deviation and t-test. The results showed that the comparison of some factors between individual and group farmers were significant differences in the promotion and supporting services in KDML 105 rice production according to the GAP standards, the opinions on the implementation of the GAP guidelines for production and the satisfaction on the enhancement of knowledge skills in rice production technology according to GAP standard. Group farmers were promoted and supported in rice production according to GAP standards better than individual farmers. Also they had better opinions than individual farmers. But in contrast to individual farmer was more satisfied with the improvement of their knowledge skills on rice production technology according to GAP standards than group farmer.

Keywords: Good Agricultural Practices (GAP), KDML 105 rice production

Introduction

Rice is a major economic crop in Thailand, with high production potential, the environment is suitable for growing rice. Rice is a major export commodity, generating revenue for the country. Thailand has a total of 63.20 million rais of paddy and paddy fields in the whole country in 2015 with a yield of 27.42 million tons and an average yield of 456 kilograms per rai. Most of the rice growing area in the Northeast was 36.19 million rais, yield 12.23 million tons, but the average yield per rai was only 358 kilograms per rai (Office of Agricultural Economics, 2016). Although, Thailand can be produce a lot of rice but the average rice yield in Thai is still very low (in-season rice field of 431 kg

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per rai and off-season paddy field of 645 kg per rai) when compared to other countries. The main cause of low rice yield as the most of the area (80%) is in rainwater area. Some time, area is face with the rainfall, water shortage, lack of soil abundance. Point is important that farmers also use the wrong rice production technology. Because of the most of them lacked the knowledge to grow rice from the rice seed, soil improvement, the right time to grow rice, fertilizer using, harvesting, using of traditional production methods with the use of inputs higher than recommended and unnecessary, which is not consistent with yield per rai. It became a liability. And it combines with the deterioration of the environment, the occurrence of more severe natural disasters (Rice Department, 2015). When Thai rice has low yield per rai, the cost per rai is high. The export price of Thai rice must be higher than that of competitors. This affects the competitiveness of the world market of rice is very much. It is therefore necessary for Thailand to accelerate its development including knowledge, development and transfer of effective and appropriate rice production technology in each area. Which approach will solve the long-term problem to help farmer. Need to focus on improving production efficiency to improve product quality and reduce production costs. The rice department has a policy to promote rice production in order to develop and encourage farmers to be aware of the improvement of the rice production process by using appropriate technologies for the area. To increase productivity Raise Thai rice standard and safe for consumers in terms of quality and safety. Create trust in both domestic and international trade and to maintain the competitiveness of Thai rice. The Government has made continuous efforts to encourage farmers to grow rice under the Good Agricultural Practice (GAP) (National Bureau of Agricultural Commodity and Food Standards, 2009).

Mahasarakham has accelerated the development of quality and productivity of KDML 105 rice in the province with the GAP system based on the provincial strategy. It is aimed at inspection and certification of Good and suitable agricultural production systems or GAP and organic farming systems. In 2011, there were about 2,329,364 rai of paddy fields, accounting for 80% of total agricultural land (2,714,271 rai). Total yield of 984,266 tons of paddy, average yield was 455 kg per rai, 168,596 households were farmers. Rice yield is enough to meet the consumption demand of the people and left to sell 700,000 ton of paddy per year. It can make revenue of 8,400 million baht per year. The production conditions are in both irrigation and rainwater but most of the area is located in the rainwater. The major production problems are the variability of precipitation, rainfall, lack of water resources, soil fertility, seed shortage, Insect pests, high cost of production, most of the farmers lack knowledge, lack of proper rice production technology, the problem of

processing, packaging, to add value and marketing issues. Farmers are able to sell their products at lower prices and with higher production costs. (Mahasarakham Agricultural Extension Office, 2014)

As a result of the problems, the Provincial Agriculture Office of Mahasarakam Province has pushed for the development of quality and production of rice in the province with the GAP system. It focuses on solving such problems, to support the rice management project in Mahasarakham with the GAP system to help farmers in the group strength (Folk Technology, 2014), to develop and raise the capacity of competition of major economic crops and to link to the ASEAN Economic Community, and increase the marketing of KDML 105 rice in the province in the country, to maximize the benefits both manufacturers and operators in production, quality and price. From the grouping of farmers, participation in the production management system is common by learning, search for new knowledge, exchange of experiences and opinions regularly in the production of KDML 105 rice according to the GAP is correct and appropriate together. The learning of KDML 105 rice production is standardized in terms of the extension of the learning outcomes of individual and group farmers with different resource and conceptual backgrounds. The researcher is interested to compare the difference of individual and group farmers in some factors affecting the production of KDML 105 rice in accordance with GAP standard in Mahasarakham province. To be used in the development of the promotion of the production of quality and safe agricultural products in the area and sustainable production of GAP KDML 105 rice.

Materials and methods

Study area and sample size

The study was carried out during February to April 2016, and conducted in 12 Districts (excepted Chuen Chom District) of Mahasarakham Province, where GAP KDML 105 rice production is predominant, covering approximately 5,239 rai. Farmers of GAP KDML 105 rice production were listed in farmer registration database with Mahasarakham Agriculture Office in year 2014, were selected by purposive sampling method to provide the data and used proportionate stratified sampling in order to select according to the district ratio and then sampling in each districts by using the simple random sampling in order to receive the proportionate amount in each district. Researcher had specified it to be the sampling frame and then specified the size of the sample group by using Taro Yamane (1967)'s formula which had the sample size of 120 individual farmers and 55 group farmers of GAP KDML 105 rice production.

Data analysis

Data were analyzed using SPSS program. The statistics used in analyzing the data were descriptive statistics which was used to find the basic static value including frequency, percentage, standard deviation and means of minimum value and maximum value. As for analysis of the comparison of factors affecting on the GAP KDML 105 rice production of individual and group farmers in Mahasarakham province including problems in rice production according to GAP standards, total yields of GAP KDML 105 rice, knowledge, opinions, and satisfactions in KDML 105 rice production in GAP standards were used to test the hypothesis in the research using t-test for comparing the difference.

Results

Characteristics of GAP KDML 105 rice farmer in the study area

Individual farmers

Table 1 showed the characteristics of GAP KDML 105 rice farmer in the study area from the total of 120 individual farmer respondents. The result showed that the most of GAP KDML 105 rice farmers were male (57.2%) with the ages between 51-60 years old (37.5%). The mean age of the respondents was 54 years old. In term of education level of the respondents (59.2%) graduated from primary school. The majority of the respondents (97.5%) were married. More than half of the respondents (54.2%) were community leadership. The result on the number of the respondents (55.0%) was the big household size between 4-5 persons, and the mean household size of the respondents was 4 persons. Their household labors (55.0%) were less than 4 persons, and the mean household labor of the respondents was 3 persons. A greater percentage of the respondents (90.8%) were land owner for GAP KDML 105 rice production. The result also revealed that most of the GAP KDML 105 rice farmers (75.8%) had shorter growing GAP KDML 105 rice experience at least than 1 year and the mean experience of respondents was 1.3 years. The most of the respondents (54.2%) showed that their GAP KDML 105 rice production area was less than 6 rai or 0.96 hectares, and the mean area of respondents was 6.5 rai. The most of their total yields of GAP KDML 105 rice (43.6%) were less than 300 kilogram per rai, and the mean total yield of respondents was 374.4 kilogram per rai.

Table 1. Characteristics of GAP KDML 105 rice farmer in the study area.

Characteristics	Categories	Individual		Group	
		Frequency (n=120)	%	Frequency (n=55)	%
Gender	Male	69	57.5	19	34.5
	Female	51	42.5	36	65.5
Age of farmer	≤ 50 years	42	35.0	19	34.5
	51-60 years	45	37.5	18	32.7
	> 60 years	33	27.5	18	32.7
		$\bar{x}$ = 54 years old		$\bar{x}$ = 53 years old	
Education level	Primary school	71	59.2	35	63.6
	Junior secondary school	15	12.5	5	9.1
	Senior secondary school	30	25.0	12	21.8
	Diploma degree	2	1.7	2	3.6
	Bachelor degree	2	1.7	1	1.8
Marital status	Single	2	1.7	3	5.5
	Married	117	97.5	52	94.5
	Widow	1	0.8	-	-
Community Leadership Status	Yes	65	54.2	22	40.0
	No	55	45.8	33	60.0
Number of household member	≤ 3 persons	32	26.7	8	14.5
	4-5 persons	53	44.2	25	45.5
	> 5 persons	35	29.2	22	40.0
		$\bar{x}$ = 4 persons		$\bar{x}$ = 4 persons	
Number of household Labor	≤ 3 persons	66	55.0	26	47.3
	4-5 persons	44	36.7	22	40.0
	> 5 persons	10	8.3	7	12.7
		$\bar{x}$ = 3 persons		$\bar{x}$ = 4 persons	
Land owner	Owner	109	90.8	50	90.9
	Owner and rent	10	8.3	5	9.1
	Rent	1	0.8	-	-
GAP KDML 105 rice experience	At least 1 year	91	75.8	27	49.1
	2-3 years	26	21.7	27	49.1
	> 3 years	3.0	2.5	1	1.8
		$\bar{x}$ = 1.3 years		$\bar{x}$ = 1.7 years	
GAP KDML 105 rice production area	≤ 5 rai	65	54.2	19	34.5
	6-10 rai	49	40.8	28	50.9
	> 10 rai	6	5.0	8	14.5
		$\bar{x}$ = 6.5 rai		$\bar{x}$ = 7.9 rai	
Total yields of GAP KDML 105 rice (n=117)	< 300 Kg./rai	51	43.6	9	16.4
	300-500 Kg./rai	47	40.2	37	67.3
	> 500 Kg./rai	19	16.2	9	16.4
		$\bar{x}$ = 374.4 Kg./rai		$\bar{x}$ = 381.1 Kg./rai	

Source: Computed by the authors from survey data; Note: 1 rai = 0.16 ha

Group farmers

Characteristics of GAP KDML 105 rice farmer in the study area from the total of 55 group farmer respondents showed that the most of GAP KDML 105 rice farmers were male (34.5%) with the ages between 51-60 years old and over 60 years old (32.7%). The mean age of the respondents was 53 years old. In term of education level of the respondents (63.6%) graduated from primary school. The majority of the respondents (94.5%) were married. The respondents of 40.0% were community leadership. The result on the number of the respondents (45.5%) was the big household size between 4-5 persons, and the mean household size of the respondents was 4 persons. Their household labors (47.3%) were less than 4 persons, and the mean household labor of the respondents was 4 persons. A greater percentage of the respondents (90.9%) were land owner for GAP KDML 105 rice production. The result also revealed that most of the GAP KDML 105 rice farmers (49.1%) had shorter growing GAP KDML 105 rice experience at less than 4 year and the mean experience of respondents was 1.7 years. The most of the respondents (50.9%) showed that their GAP KDML 105 rice production area was between 6-10 rai, and the mean area of respondents was 7.9 rai. The most of their total yields of GAP KDML 105 rice (67.3%) were between 300-500 kilogram per rai, and the mean total yield of respondents was 381.1 kilogram per rai (Table 1).

GAP KDML 105 rice production

Individual farmers

From the table 2, it was found that most farmers have experience in growing KDML GAP 105 rice less than 1 year, average of 1.3 years. The average production area was 6.5 rai, flat area and sandy loam. There was moderate soil abundance, good drainage, rainwater in production. Most farmers received seeds from other sources, followed by own the collection for propagation and agriculture extension officer. Farmers were prepared soil by plowing and tillage. The average rate of manure for soil improvement was 129.70 kg/rai, average rate of bio fertilizer was 1.15 kg/rai, average rate of organic fertilizer was 9.75 kg/rai, average rate of chemical fertilizer was 8.30 kg. /rai and average rate of other fertilizer was 29.00 kg/rai. There were farmers of 9.2% which planted rice by transplant rice seedlings method. The average rate of chemical fertilizer 16-16-8 was 6.75 kg/rai and organic chemical fertilizer was 42.86 kg/rai for seedling growing. However, most farmers cultivate the sowing dry seed and 3.3% of sowing wet seed. The most commonly used chemical fertilizer formulas during the growing were the other chemical fertilizers, 16-20-0, 15-15-15 and 46-0-0. The rate of fertilizer at 100

kg/rai by divided into 2 times per production season. There was human labor in weed control and hire harvester. In the past year, farmers had produced GAP KDML 105 rice average of 374.40 kg/rai. There were 8 barriers to producing KDML 105 rice according to GAP standards. Most farmers had water shortages and marketing problems, followed by rice pests, soil problems and lack of fertility, labor shortage, harvesting and storage capacity problems, supply factors problems and transportation problems, respectively.

Table 2. Production status of GAP KDML 105 rice farmers in the study area.

GAP KDML 105 rice production	Individual	Group
1. Experience of GAP KDML 105 rice growing	1.3 years	1.7 years
2. Size of production area	6.5 rai	7.9 rai
3. Slope of production area	Plain	Lowland
4. Soil types of production area	Sandy loam	Sandy loam
5. Soil abundance in production area	Moderate	Moderate
6. Soil drainage in the production area	Good	Good
7. Production season	Rainy season	Rainy season
8. Seed source of KDML 105 rice	Other source	Extension officer
9. Water source for production	rain	rain
10. Soil preparation for production	plough	plough
11. Soil improvement for production		
11.1 Manure	129.70 kg./rai	490.77 kg./rai
11.2 Bio fertilizer	1.15 kg./rai	15.00 kg./rai
11.3 Organic fertilizer	9.75 kg./rai	31.13 kg./rai
11.4 Chemical fertilizer	8.30 kg./rai	30.95 kg./rai
11.5 Other fertilizer	29.00 kg./rai	35.18 kg./rai
12. Planting method used in production	Sowing dry seed	Sowing dry seed
13. Chemical fertilizer formula for during planting	Other formula	Other formula
13.1 Fertilizer rates	100 kg./rai	Other rate
13.2 Fertilizer application frequency	2 time	2 time
14. Weed control methods for production	Human labor	Human labor
15. Harvesting method form production	Hire harvest	Hire harvest
16. Tool used in harvesting	Harvester	Harvester
17. Total yield of KDML 105 rice	374.40 kg./rai	381.10 kg./rai

Group farmers

Most farmers have experience in growing KDML GAP 105 rice between 1-3 years, average of 1.7 years. The average production area was 7.9 rai, lowland, sandy loam. There was moderate soil abundance, good drainage, rainwater production. Most farmers received seeds from agricultural agriculture extension officers, followed by own the collection for propagation, neighbors and other sources, respectively. Farmers were prepared soil by plowing and tillage. The average rate of manure for soil improvement was 490.77 kg/rai, average rate of bio fertilizer was 15 kg/rai, average rate of organic fertilizer was

31.13 kg/rai, average rate of chemical fertilizer was 30.95 kg. /rai and average rate of other fertilizer was 35.18 kg/rai. There were farmers of 9.1% which planted rice by transplant rice seedlings method. The average rate of organic chemical fertilizer was 25 kg/rai and chemical fertilizer 16-16-8 was 5 kg/rai for seedling growing. Most of farmers cultivate the sowing dry seed and 1.8% of sowing wet seed. The most commonly used chemical fertilizers during cultivation were the other chemical fertilizers, 16-20-0 and 46-0-0, respectively. The rate of fertilizer applied during planting was the other rate than 25 kg/rai, rate of 50 kg/rai and rate of 100 kg/rai by divided into 2 times per production season. There was human labor in weed control and hire harvester. In the past year, farmers had produced GAP KDML 105 rice average of 381.10 kg/rai. There were 8 barriers to producing KDML 105 rice according to GAP standards. Most farmers had marketing problems and water shortages, followed by soil problems and lack of fertility, rice pests, labor shortage, harvesting and storage capacity problems, supply factors problems and transportation problems, respectively (Table 2).

Comparison some factors between individual and group farmers

Comparative analysis of some factors between individual and group farmers was found that individual and group farmers had incomes from agricultural sector, total yields of GAP KDML 105 rice production, barriers to production of KDML 105 rice according to GAP standard, perspectives of the recommendations for producing KDML 105 rice according to GAP standards and problems in the implementation of GAP guidelines for the production of KDML 105 rice between individual and group farmers were not significantly different (Table 3). However, there were differences in the promotions and supporting services for KDML 105 rice production in accordance with the GAP standard ($P<0.01$), opinions on the implementation of the GAP guidelines for KDML 105 rice production ($P<0.05$) and the satisfaction with the enhancement of knowledge skills about the technology of producing KDML 105 rice according to GAP standards ($P<0.01$). Group farmer was promoted and supported in the production of KDML 105 rice in accordance with GAP standard more than individual farmer. In addition, group farmers had better practices of GAP recommendations for KDML 105 rice production than individual farmer. But on the contrary, individual farmer was more satisfied with the improvement of their knowledge skills on KDML 105 rice production technology according to GAP standards than group farmer.

Table 3. Comparison of some factors between individual and group farmers in GAP KDML 105 rice.

Factors	Individual (n = 120)		Group (n = 55)		t-value
	Mean	S.D.	lean	S.D.	
1. Agriculture income of farmer (Bath/year)	80,893.62	11,166.50	93,194.54	80,733.62	-0.733
2. Yield of GAP KDML 105 rice (kg./rai)	374.40	192.09	381.10	144.49	-0.231
3. Barriers in production according to GAP standards	1.30	0.14	1.33	0.15	-1.594
4. Promoting and supporting in GAP production	1.55	0.144	1.57	0.12	-1.164**
5. Perspectives and Practices of GAP guidelines	2.49	0.76	2.89	0.62	-3.390
6. Barriers in following GAP guidelines	1.20	0.28	1.20	0.166	-0.096
7. Opinions to GAP guidelines for production	3.32	1.01	3.32	0.36	-0.046*
8. Satisfactions to enhancement of knowledge skills for production	3.42	1.64	3.20	0.56	1.281**

* Significantly different at P < 0.05 ** Significantly different at P < 0.01
Source: Computed by the authors from survey data

Discussion

Characteristics of GAP KDML 105 rice farmer in the study area

Farmers produce KDML 105 rice in individual and group farmers. There were very similar social and economic fundamentals. Most farmers were 53-54 years old, married of marital status, primary school of education level, leadership and position in community. There were 4 persons of members in the household. This is consistent with the general characteristics of Thai farmers. The documentary by FAO (2000) stated that only the old generation is staying with the rice farming. It was noticed that the farmers in the study area had an average age higher than the average age of those in Thailand (54 years old) (Kumpa, 2015). There were the area of agricultural holdings for farming, field farming, animal husbandry and fishing and most of them own the land. The number of laborers aged 15-65 in the household is 3-4 persons. For income from agriculture will be different, depending on the amount of agricultural land held in the operation of agricultural production. As well as non-farm income,

farmers may have different occupations and activities, such as having a regular job, a career, etc. However, the two types of farmers have the same debt from the same source of loans; Agricultural Bank of Agriculture Cooperatives (BAAC), Village fund and Commercial Banks.

GAP KDML 105 rice production

Individual and group farmers had the conditions of producing Jasmine rice according to the GAP standard which were not different in the soil type, soil fertility, soil drainage in seasonal production areas, soil preparation, planting methods, chemical fertilizers used during planting, weeds control methods, harvesting methods and the tools used to harvest. However, it found the different in experiences of KDML 105 rice cultivation, size of area production, slope of area production, seed sources of KDML 105 rice, soil improvement and amount of yields. Moreover, the farmers faced many difficulties in producing GAP equivalent KDML 105 rice in terms of supply factors, rice pests, labor shortage and the harvesting and storage capacity problems. In addition, individual and group farmers got the problems of water shortage, marketing problems, soil problems and lack of abundance and transportation problems.

The problem of labor shortage in KDML 105 rice production according to GAP standard reported that the Northeast is a region with a large area of agricultural land and agricultural workers or farmers. However, the proportions of agricultural workers decreased as well as the other sectors of the country are likely to decline as well. This reduction cause from the part of that comes from limited farming areas, while the population increasing, and although agriculture has grown a lot over the past. But farmer households are not well. Farmers find the way out is to pursue other careers such as personal business, labor, send your children to higher education and encourage them to work other than the agricultural sector. The adaptation of these farm households is to survive. (National Statistical Office, 2011). In consistent with the reports of Borrisut and Kaewkhata (2015) agriculture is the first choice of farmers or children of farmers but if higher education or restrictions on agriculture. Farmers will be more detached from the agricultural sector. It is also consistent with reports from Sathuthum *et al.* (2011), who report that shortages of agricultural successors are a matter for many agencies needs to focus and find solutions urgently. The factors that cause the new generation do not want to work in agriculture. There are both internal factors, which mean parents who are farmers themselves want their children to have a good job, want children to pursue a career other than agriculture, because it is a hard work, low income, no

honor, so push the children to study in the city. And external factors include educational systems that offer courses and disciplines that entice children and youth to enter other careers, industrial boom that draws on agricultural workers to the industrial and service sectors. In addition, the society cultivates modern values that drive new generations away from the agricultural sector.

Compare some factors between single and group farmers.

Individual and group farmers had income from agricultural sector, total yield of GAP KDML 105 rice production, barriers to production of KDML 105 rice according to GAP standards, perspectives of GAP recommendations for KDML 105 rice production and problems to compliance with the GAP standard for producing KDML 105 rice were not different. Because of individual and group farmers were limited in area for GAP KDML 105 rice production cannot exceed 5 rai per case. In the registration of GAP KDML 105 rice farmers had no income difference. It may be because the two types of farmers were affected by the problems of agricultural production in the past year due to drought and floods in Mahasarakham. As a result income in the agricultural sector was no different. In addition, all farmers registered as GAP-certified KDML 105 rice farmers had received the knowledge and understanding of the GAP standard for KDML 105 rice production. This makes no difference in this issue. As a result, the barriers to compliance with the GAP guidelines for KDML 105 rice production were not different.

Individual and group farmers had been promoted and supported in the production of KDML 105 rice, opinions on the implementation of the GAP recommendations for KDML 105 rice production and satisfaction with the increase about knowledge of KDML 105 rice production technology in accordance with GAP standards were different. Group farmers will be promoted and supported in the production of KDML 105 rice according to the GAP standard. They will also be able to follow GAP guidelines for better production of KDML 105 rice than the individual farmers. However, in contrast to the satisfaction with the enhancement of knowledge skills in KDML 105 rice production technology according to GAP standards. Consistent with the provincial policy to promote the potential of rice production in accordance with the GAP standards can be seen from the promotion of individual farmers to be integrated in the production. By supporting factors include KDML 105 rice seed and organic chemical fertilizer for the group farmers, to encourage farmers to produce KDML 105 rice according to GAP standards. The integration will help members in the group to help each other in the production process, the exchange of ideas and experiences in the production process and it has the

power to bargain, increase production and distribution. The farmers in the group had positive opinions and had a good attitude towards the implementation of the GAP recommendations for KDML 105 rice production. The farmers were expected to respond to the high. But in fact, the response was not as expected. Therefore, the satisfaction of farmers was lower than that of individual farmers. The farmers agree that KDML 105 rice was the good quality rice. It comes from a standard production process and production integration will have the power to determine prices. The price of Jasmine rice is expected to be higher than that of Jasmine rice. In fact, the respondents found that the price of Jasmine rice, GAP and KDML 105 rice was not the same. The market is a non-GAP market. Consumers still lack confidence in the consumption of KDML 105 rice. The price of KDML 105 rice is not available. The group farmer expects that when participating in a government-funded project by grouping. It should be fully supported in all aspects of the production of GAP KDML 105 rice. But supporting and services in some cases and not fully. Possibly by limiting the budget of government agencies to promote support and services. As a result, the level of satisfaction of the group of farmers towards the enhancement of the knowledge of KDML 105 rice production technology was lower than that of the individual farmer.

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