

Adoption of Good Agricultural Practices by Durian Farmers in Koh Samui District, Surat Thani Province, Thailand

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ABSTRACT

Durian (*Durio zibethinus* Murr.) is famous as the “king of fruits” and Thailand’s economically important fruit for export. As consumer demand for high quality and safe food products increased, Good Agricultural Practices (GAP) were adopted by durian farmers in Koh Sumui district, Surat Thani province, Thailand to produce safe and wholesome fruits. The purposes of this research were to study the adoption of GAP and to determine factors affecting GAP adoption of durian farmers. Structure interview was used to collect data from 129 farmers who cultivated durians under GAP. The results revealed that the farmers had the average age of 52.71 years, completed elementary education level and had the average experience of 19.89 years in durian farming. The average number of farm labourers was 3 persons while the average size of durian farm was 4.33 hectares. The average cost of durian farming was 62,092.56 bath/hectare. The source of investment came from the farmers’ own fund whereas the average income from durian productions was 141,418.80 baht/hectare. The farmers had been trained in the GAP at an average of 1.68 times/year, contacted by the extension officers and other farmers at an average of 0.02 and 0.15 times/year respectively and received GAP information at an average of 0.31 times/year. The knowledge and GAP adoption were classified at the moderate level and agreeable attitude respectively. Hypothesis testing showed that the variable factors which significantly ($p < 0.01$) affected the adoptions of GAP were as follows: knowledge on GAP, contact with other farmers, cost of durian farming and GAP training experience. The farmers suggested that extension officers need to supervise durian GAP closely. Moreover, they should also accelerate market expansion by raising the price of the GAP durian products so that they are higher than those of conventional products.

Keywords: good agricultural practice (GAP); durian

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1. Introduction

Durian (*Durio zibethinus* Murr.), known as the “King of Tropical Fruits”, is a highly prize fruit in Southeast Asian countries. Thailand is the world’s largest producer and exporter of durians, followed by Malaysia and Indonesia (Somsri, 2007; Yahia and Singh, 2009). The major production areas of durian are in the eastern and the southern parts of Thailand. The planted area in 2012 was 102,038 hectares with the total production of 527,327 tons. Of this amount, 351,124 tons of fresh durian and its products were exported at the value of US\$ 197.61 million; equivalent to 33.41% of total production. (OAE, 2012).

Thailand, as a member of the World Trade Organization (WTO) has adopted the Agreement on the Application of Sanitary and Phytosanitary Measures and the Agreement on Technical Barriers to Trade. In response to international food safety and quality concerns, the Ministry of Agriculture and Cooperative (MOAC) has implemented Good

Agricultural Practice (GAPs) programmes of food crops as the first step towards food safety and trade facilitation. Under MOAC, the Department of Agriculture (DOA) as the Certification Body develops the GAP guideline and inspects the farmers that register for certification. The Department of Agricultural Extension (DOAE) is mandated to promote GAP among smallholder farmers. Since 2006, DOAE has launched the project “Promotion of Safe Agricultural Products” in 31 kinds of crops nationwide to assist farmer so as to understand the principle and framework of GAP including durian fruit (Wannamolee, 2008).

Koh Samui district, Surat Thani province, southern Thailand had 11,037 rais (1,765.92 ha.) of durian plantation (Surat Thani Provincial Agricultural Extension Office, 2009). There were 189 durian orchards which received GAP certification, accounting for 254 plots from 288 plots or 90 percent of GAP-registered growers (Office of Agricultural Research and Development Region 7, in 2009). Furthermore, Koh Samui has several advantages in durian production towards market

standardization including available physical factors, available local wisdom, skilled and experienced growers, and various market channels. In order to encourage durian growers to adopt durian GAP. The objectives of this research were to study the adoption of GAP, to determine factors affecting GAP adoption of durian farmers, and to provide consulting advice to the government. It is hoped that this study will aid in promoting GAP to durian farmers.

2. Methodology

The study was conducted in Koh Samui District, Surat Thani Province, southern Thailand. The population was durian growers in Kho Samui district, Surathani province who were registered and their durian orchards had been certified for durian GAP by DOA, MOAC in the crop year 2009/2010.

The population consisted of 189 durian farmers whose orchards had been certified by DOA. The sample size of 129 durian growers was calculated using the formula developed by Yamane (1973). The respondents were selected through a simple random sampling technique of certified orchards in Kho Samui district and a proportional stratified sampling technique based on the size of the population in each sub-district in the area.

The data were collected in the seasonal crop year 2009/2010 by structure interview. The questions covered the socio-demographic background of the respondents and their knowledge, attitudes and durian GAP adoption. The structure interview was tested with 30 durian growers in Nasan District, Surathani Province.

Testing of the reliability of knowledge on durian GAP used the Kuder-Richardson reliability coefficient (KR-21) with the reliability value of 0.816. (Kuder & Richardson, 1937). The semantic differential scaling methods of durian GAP adoption and attitude towards durian GAP were obtained by internal consistency using Cronbach's alpha with the values of 0.741 and 0.708 respectively (Cronbach, 1951).

The data analysis utilized both descriptive and inferential statistics. Frequencies, percentages, arithmetic means, and standard deviations were used to describe socio-demographic, farm characteristics, farmers' attitude, knowledge, and adoption of durian GAP. The stepwise multiple regression analysis (MRA) was applied for some factors of the respondents related to their adoption towards durian GAP.

3. Results

3.1 Socio-demographic backgrounds and farm characteristics

The majority of respondents was male (82.2%), had an average age of 52.71 years, completed primary school level and had the average experience 20 years in durian farming. The average number of farm labourers was 3 persons while the average size of durian farm was 27.08 rais (4.33 ha.) The average cost of durian farming was 9,934.81 bath/rai (62,092.56 bath/ ha) whereas the average income from durian productions was 22,627.01 baht/rai (141,418.80 baht/ha). The farmers had been trained the GAP at an average of 1.68 times/year, contacted by the agricultural officers and other farmers at an average of 0.02 and 0.15 times/year, respectively, and received GAP information at an average of 0.31 times/year. The most received information on GAP by the farmers way from newspapers (7.7%), TV (3.1%) and journal or book (2.3%). Most farmers have been members of agricultural groups (96.9%). The topography was mountainous with soil group 62 (Slope > 35 %) that not suitable for agricultural land use. Additionally, the majority of water resource was from natural canal (98.4%)

3.2 Farmer attitude towards durian GAP

The results indicated that the overall farmer attitude agreed to all GAP requirement (\bar{x} =3.51). More than the mean score 3.51 were determined to agree with durian GAP. The top priority was determined to be the farmers' need to regularly check the orchards such as disease and insect pests (\bar{x} =4.24), followed by the appropriate storage of chemical containers (\bar{x} =4.17), the record of chemical application detail every time (\bar{x} =4.00), durian orchard under GAP for reducing chemical residual in the environment and safety for growers and consumers (\bar{x} =3.93), chemical application under GAP guideline (\bar{x} =3.79), necessary GAP training from DOA (\bar{x} =3.78), and pruning techniques, canopy control, flowering management, improving productivity and quality management (\bar{x} =3.59), fertilizer application under GAP (\bar{x} =3.53), respectively (Table 3.1). The findings on farmers' attitude indicated that there was an opportunity to implement durian GAP with the growers involve in the study.

3.3 Farmers' knowledge of durian GAP

The results revealed that the majority (68.22%) had medium level of GAP knowledge (Grand mean=30.41) (Table 3.2). The finding indicated that GAP training and advisory service should be provided for the farmers continuously

3.4 Farmers' adoption of durian GAP

The results on the study of the farmers' adoption of durian GAP within 17 main items are presented in Table 3.3. The overall of farmers' adoption rates of durian GAP was moderate with the mean score of 33.39 points, maximum score of 53 points and minimum score of 25 points from the overall score of 72 points. Consideration of each item revealed that the adoption to durian GAP at a high level included variety, pruning and canopy control, post harvest management, transportation, orchard hygiene and environmental management. On the other hand, the farmers' adoption at a low level included plantation area, watering, fertilizing, supporting tree for flowering, inducing flowering setting, fruiting development and quality fruit and data recording.

3.5 Factors affecting farmers' adoption of durian GAP

Table 3.4 illustrates the results of stepwise multiple regression analysis. The results revealed that out of 17 variables, only 4 variables factors significantly influenced ($p < 0.01$) durian GAP adoption. There were as follows: knowledge on GAP, contact with other farmers, cost of durian farming and GAP training experience. They were

also capable of explaining the dependent variable by 55.7 percent ($R^2 = 0.557$) with positive relationship. The analysis result helps confirm that the more knowledge on GAP, the more training experience, the more contact with others durian growers and the more cost of durian farming were able to make adoption on durian GAP. The results found that GAP knowledge was the most affecting adoption followed by contact with other farmers, cost of durian farming and GAP training experience respectively.

3.6 Constraints of durian GAP

The constraints of durian GAP production in farmer opinions were as follows: 1) high input costs (89.15%); 2) lacked of market in domestic demand and low price sell including bargaining power (63.57%); 3) lower confidence by substitute organic substance for chemical substance (42.60%); 4) GAP promotion by extension officer was not continuous (41.09%) and 5) no responding feedback information of soil analysis from extension officer (40.31%). Additionally, 10.08 percent pointed out that the quality of durian production decreased through transportation by ferry boats (Figure 3.1). All constraints should be addressed if improvements are to be achieved.

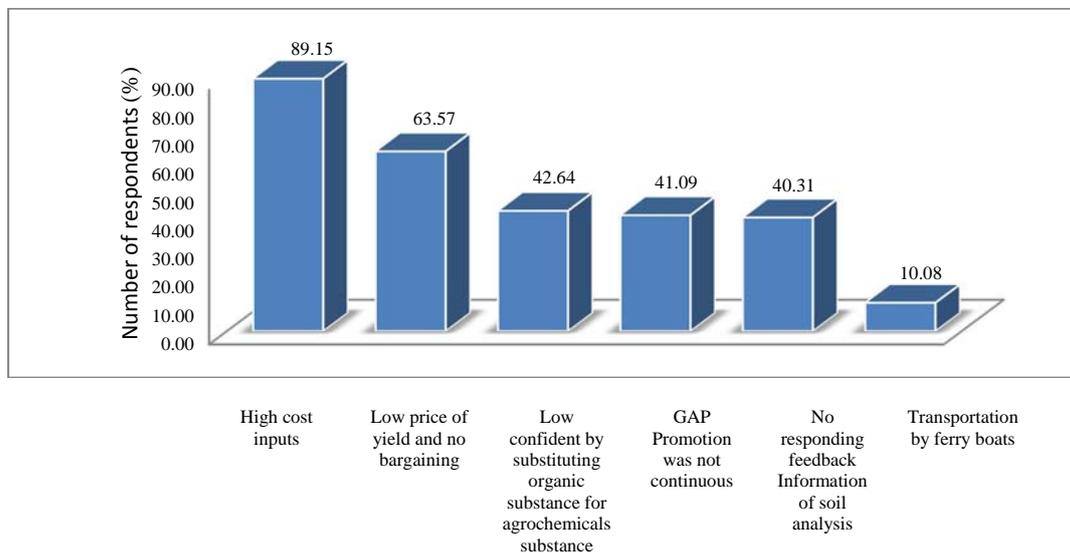


Figure 3.1 Constrains to improve durian GAP production

Table 3.1 Durian GAP attitude of farmer (n=129)

Item	Frequency Scale (%)					\bar{X}	SD	Attitude Meaning
	Strong Agree	Agree	Un-decided	Dis-agree	Strongly disagree			
1. Farmers agree all statement of durian GAP guideline	-	30.2	4.7	65.1	-	2.65	0.92	Undecided
2. Necessary GAP training from DOA	2.3	83.7	3.9	10.1	-	3.78	0.65	Agree
3. Durian orchards certified GAP must be less than 3 rais (0.48 ha).	-	60.5	14.7	24.8	-	3.36	0.86	Undecided
4. Durian varieties grown for commercial production under GAP were 4 varieties: Monthong, Chanee, Kanyao and Kradumtong	-	62.5	24.8	13.2	-	3.49	0.72	Undecided
5. Pruning techniques, canopy control, flowering management, improving productivity and quality management	1.6	57.4	39.5	1.6	-	3.59	0.55	Agree
6. The farmers need to regularly check the orchard such as disease and insect pests	30.5	65.9	1.6	2.3	-	4.24	0.60	Agree
7. Fertilizer application under GAP	0.8	62.0	27.1	10.1	-	3.53	0.69	Agree
8. Chemical application under GAP guideline	1.6	85.3	3.9	9.3	-	3.79	0.62	Agree
9. Durian orchards under GAP for reducing chemical residual in the environment and safety for growers and consumers	3.1	89.1	5.4	2.3	-	3.93	0.42	Agree
10. Chemical container must be kept in appropriate storage	17.1	82.9	-	-	-	4.17	0.38	Agree
11. The record of chemical application detail every time	3.9	92.2	3.9	-	-	4.00	0.28	Agree
12. The record pest survey, operation and management for quality product	0.8	25.6	14.0	59.7	-	2.67	0.89	Undecided
13. Durian under GAP, reducing production cost	-	17.1	45.7	37.2	-	2.80	0.71	Undecided
14. Durian product under GAP for market demand	0.8	46.5	48.8	3.9	-	3.44	0.59	Undecided
15. Durian GAP process not complicate	0.8	65.9	13.2	20.2	-	3.47	0.82	Undecided
16. Durian GAP manual to be easily understand	-	41.1	58.1	0.8	-	3.40	0.51	Undecided
Grand Mean						3.51	0.64	Agree

Note: 1.00-1.49 = strongly disagree
1.50-2.49 = disagree
2.50-2.39 = undecided
3.50-4.49 = agree
4.50-5.00 = strong agree

Table 3.2 Overall knowledge level of durian GAP (n=129)

Knowledge categories	Durian farmers	
	No.	%
1. Low (up to 25.25)	16	12.40
2. Medium (25.26 to 35.56)	88	68.22
3. High (35.57 and above)	25	19.38
Grand mean =30.41, SD = 5.16		

Table 3.3 Farmers' adoption degree of durian GAP

Item of durian GAP	\bar{X}	SD	Max	Min	Farmers' adoption degree
1. Plantation area (0-1 points)	0.00	0.00	0	0	poor
2. Variety (0-1 points)	1.00	0.00	1	1	good
3. Cultivation techniques (0-4 points)	1.48	0.61	3	1	moderate
4. Pruning and canopy control (0-1 points)	0.95	0.23	1	0	good
5. Watering (0-2 points)	0.10	0.30	1	0	poor
6. Fertilizer application (0-1 points)	0.05	0.21	1	0	poor
7. Pesticides application (0-3 points)	1.02	0.20	3	1	moderate
8. Supporting tree for flowering (0-3 points)	0.81	0.71	3	0	poor
9. Inducing flowering (0-3 points)	0.61	0.58	2	1	poor
10. Fruit setting (0-2 points)	0.04	0.19	1	0	poor
11. Fruit development and quality fruit (0-4 points)	0.69	0.70	2	0	poor
12. Yield increasing and improving quality (0-6 points)	1.42	0.75	5	0	poor
13. Harvesting handling (0-2 points)	1.16	0.36	2	1	moderate
14. Post-harvest management (0-1 points)	0.98	0.15	1	0	moderate
15. Transportation (0-1 points)	1	0	1	1	good
16. Hygiene and environmental management (0-16 points)	21.51	2.25	28	16	good
17. Data records (0-6 points)	0.58	1.15	6	0	poor
Grand mean (0-72 points)	33.39	4.80	53	25	moderate

Table 3.4 Stepwise multiple regression analysis estimated factors affecting durian GAP adoption

Attribute	B	Std. Error	Beta	t	Sig.
Constant	9.557	3.128		3.055	.003**
GAP Knowledge	.381	.064	.410	5.994	.000**
Training experience	.519	.182	.185	2.851	.005**
Contact with others durian growers	1.758	.435	.267	4.037	.000**
Cost of durian farming	1.233	.345	.229	3.573	.001**
<i>Multiple R</i>	= 0.746	<i>F</i>	= 38.940		
<i>Multiple R²</i>	= 0.557	<i>Sig. F</i>	= 0.000		
<i>SE_{est}</i>	= 3.249	<i>Durbin Watson</i>	= 1.800		

** significance at level 0.01

4. Discussion

The research found that GAP farmers' knowledge was moderate because most farmers' knowledge passed from their ancestors an average 20 years. However, GAP was developed by the eastern part of Thailand which was rather new for them and knowledge was not adequately conveyed to farmers. Besides, most farmers received less GAP training and contact with extension officer.

There were four factors affecting the GAP adoption i.e knowledge on GAP, contact with other farmers, cost of durian farming and GAP training experience. The results showed that knowledge had high influence. This study was consistent with the findings of Sri Lai (2006) and Theerapan (2005) who found the case of the citrus GAP and the adoption of natural farming, respectively.

5. Conclusion

This paper investigated farmers' adoption of durian GAP in Koh Samui district, Surat Thani province, southern Thailand. The research discovered that the overall level of farmer adoption and knowledge of durian GAP were moderate and agreeable attitude respectively. Hypothesis testing showed that the variable factors significantly ($p < 0.01$) affecting the adoption of GAP were as follows: knowledge on GAP, contact with other farmers, cost of durian farming and GAP training experience. The GAP adoption constraints were high inputs cost, lack of market in domestic demand and low price selling including no bargaining power, lower confidence by substituting organic substance for chemical substance, no continuing of GAP promotion by extension officer, no responding feedback information of soil analysis from extension officer and decreased quality of durian production through transportation by ferry boat.

6. Recommendations

1. GAP training and advisory service should be provided to both individual growers and grower groups continuously.

2. The concerning agencies should concentrate on working with progressive farmers so that they can demonstrate the success outcome of the GAP to neighbors.

3. The government should establish the price scheme through GAP to be higher than those from conventional practice.

4. Related agencies should promote chemical reduction in order to reduce cost and environmental degradation.

5. According to high slope planted area (slope > 35 %), involved extension agencies have to promote and create environmental awareness.

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