

FACTORS AFFECTING THE IMPLEMENTATION OF GAP AMONG BANANA (GROS MICHEL) GROWERS IN BAN LAT DISTRICT, PHETCHABURI PROVINCE, THAILAND

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Abstract:

Banana (Gros Michel) or Kluai Hom Thong (*Musa acuminata*, AAA Group) is an economic crop in Thailand and it is an important product to export under the standard of good agricultural practice (GAP). This study aims to investigate factors affecting the GAP implementation among banana (Gros Michel) growers who adopt GAP for practice in Ban lat district, Phetchaburi province. This study revealed that most of farmers encountered water scarcity but they realized the importance of recording the data during the GAP practice. Gender, number of family members and farming organization membership were the factors highly impacting the implementation of GAP among these banana growers. The results from this study should direct the staffs in the relevant organizations to focus on these three key issues to improve growing banana with GAP certification.

Keywords: Gros Michel banana; Good agricultural practice; Ban Lat; Phetchaburi

Introduction

Gros Michel banana or Kluai Hom Thong (*Musa acuminata*, AAA Group) is an economic crop in Thailand. It is widely grown in several provinces including Saraburi, Pathum Thani, Phetchaburi and Chumphon. In Phetchaburi, Ban Lat district is famous for banana (Gros Michel). The banana from this district has been exported to Japan, Hong Kong and Singapore under management of Ban Lat Agricultural Cooperative since 1999. At present, about 12 tons of banana (Gros Michel) have been exported to Japan every week, with the prospect of the increased demand in the future. To prepare for this expectation, the Cooperative and the banana growers have to collaborate to produce banana (Gros Michel) based on GAP standard. This standard is globally accepted as the minimum requirement which guarantees that the produces are certified for export (Amekawa, 2010). However, Thai banana (Gros Michel) growers are still having problem implementing GAP due to issues such as lack of technical knowledge and experience in practicing GAP.

GAP adoption is the issue which have been studied in various crops and locations in Thailand. The studies indicated that factors influencing the implementation of GAP in each region are diverse. For example, Fakkhong & Suwanmaneepong (2017) reported that level of education, land ownership and membership to the farming organizations significantly influenced GAP implementation for rice production in the eastern part of Bangkok. Suwanmaneepong *et al.* (2016) found that farming experience and participating in GAP training positively related to the implementation of GAP by fruit growers in Rayong province. At Chumphon province, Pongvinyoo *et al.* (2014) found that self-confidence of the growers positively affected GAP practice, while farming experiences had negative impact to the farmers' understanding of GAP among coffee growers. The diversity of crops, locations and

growers requires that to promote GAP successfully, it is very important to understand the socio-economic characteristics of the growers in each specific area. Thai grower, like growers in other developing countries, are recalcitrant to change and this situation is a challenge for agricultural officers to promote GAP practice. On top of the behavioral issue, knowledge gap hindered the growers to implement GAP in the past as well (Amekawa, 2010).

The purpose of this study aims to study the factors affecting the GAP implementation among banana (Gros Michel) growers which have never been investigated before.

Materials and Methods

The study area and sample size

The study was carried out in Ban Lat district, Phetchaburi province, located in the western region of Thailand. Ban Lat district covers 29831.36 hectare, in which 16328.32 hectare is an area use for agricultural production (<http://banlat.phetchaburi.doae.go.th/>, 2019). Within this area, 1287.84 hectare have been used to grow banana (Gros Michel).

There are 69 banana growers, who were registered and practiced GAP under DOAE supervision in the years 2019-2020. They were subjected to the questionnaire and this study was conducted from January to March 2020 using semi-structured questionnaires.

Data analysis

The primary data was collected to identify the main variables that influenced the implementation of GAP. Descriptive statistics, including frequency distribution, percentages, means, standard deviations, multiple regressions and correlation coefficients, were used for statistical analysis. Some characteristics of farmers were selected as independent variables, while dependent variable of GAP implementation was a practice score that was the cumulative total of GAP practices applied in producing banana (Gros Michel).

The levels of GAP practice are as follow:

0.00-1.49	None
1.50-2.50	Low
2.51-3.50	Moderate
3.51-4.00	High

Results and Discussion

Characteristics of banana (Gros Michel) growers in the study area

The socio-economics characteristics of the respondents are shown (Table 1). The respondents were almost equal between male (57.8%) and female (42.2%). Most (91%) of their ages were 41 years to over 60 years old. This is consistent with a report of DOAE (2017) that indicated that the age of the head of households belonged to the old age group. Forty seven percent of the respondents graduated from primary school or lower, which the remaining received education at the higher levels.

Table 1: Socio-economic characteristics of respondents (n=69).

Attributes	Characteristics	Frequency	Percentage
Gender	Male	27	42.2
	Female	37	57.8
Age of farmer	20-30 years	0	0
	31-40 years	6	9
	41-50 years	23	34.3
	51-60 years	29	43.3
	> 60 years	9	13.4
Education level	Lower than primary school	2	2.9
	Primary school	30	44.1
	Junior secondary school	6	8.8
	Senior secondary school	20	29.4
	Bachelor's degree	6	8.8
	Master's degree	4	5.9
The number of family members	Doctoral degree	0	0
	1-3 persons	34	53.1
	4-6 persons	24	37.5
The number of family laborers	> 6 persons	6	9.4
	1 person	8	14.8
	2 persons	25	46.3
	3 persons	12	22.2
	> 3 persons	9	16.7
Farming experience	< 10 years	12	20.7
	10-20 years	20	34.5
	> 20 years	26	44.8
Membership of farming organization	Yes	37	66.1
	No	19	33.9
Cultivated area	< 1.6 hectare	36	54.5
	1.6-3.2 hectare	22	33.3
	> 3.2 hectare	8	12.1
Land ownership status	Owner	30	56.6
	Rent	23	43.4
Financial support	Government project	3	4.7
	Bank	7	10.9
	Own funds	54	84.4
Income/year	<100,000 Baht	34	52.3
	100,001-200,000 Baht	22	33.8
	200,001-300,000 Baht	8	12.3
	300,001-400,000 Baht	1	1.5
	400,001-500,000 Baht	0	0
GAP training/year	>500,000 Baht	0	0
	At least 1 time	16	23.5
	(>2 times)	37	54.4
	Never	15	22.1

The family was characterized as small-sized (1-3 persons) (53.1%) with about two persons (46.3%) involved in farming activities. About 44.8% had farming experience of more than 20 years, which invariably positively impacted agricultural productivity (Anigbogu *et al.*, 2015). The long experience in farming by these farmers might influence and strengthen their perceptions about certain farming practices such as applications of fertilizers and pest control measures (Farouque, 2007). About 66.1% were members of farming organizations. This helps them to manage their farm with modern technologies and integrated financial services.

Most respondents owned less than 1.6 hectare (54.5%). Growers who had land ownership (56.6%) were more than those who rented the land (43.4%). Most (84.4%) of the respondents used their own funds to manage their farm and about 52.3% had income less than 100,000 Baht per year. Most respondents (77.9%) indicated that they attended GAP training programs organized by DOAE at least once a year.

GAP perception among Gros Michel banana farmers

The banana (Gros Michel) growers primarily received GAP information from the agricultural extension officers (59.4%) and made their decision to practice GAP in growing banana. This makes them qualify to receive GAP certificate. The remaining respondents included growers who received information about GAP from TV (11.6%), social media (8.7%), friends (8.7%), radio (5.8%), newspaper (2.9%) and family member (2.9%).

The market, which is sensitive to quality and the customers who prepare to pay at the higher prices for environment and health, should advocate the adoption of GAP. Berdegué *et al.* (2003) reported that the growers were motivated to adopt GAP when the increased prices were expected from the exported product. This is consistent to our study as the approximately 28% of the growers adopted the GAP in producing banana based on customer preference, product price (25.4%), concern about health (19.4%) and care of the environment (14.9%). Hobbs (2003) also stated that the farmers should understand more about agricultural standard, they will possibly improve farming practices to gain access to a market which can offer high price. Hobbs (2003) work corresponded with our study that about 51.4% of the farmers tended to replace conventional farming with GAP when under market offered high price, about 24.2% were responsive to high demands, about 22.7% were sensitive to high prices, and about 4.5% were responsive to access to multiple sale channels.

The hindrance for the growers to adopt GAP included water source and availability (32.1%), usage of chemical substances (30.4%), farming practices before harvest (12.5%), data collection (8.9%), farm location (7.1%), practices during harvest and post-harvest (5.4%), personal hygiene (3.6%), and transportation was not their constraint. Source and availability of water for irrigation was the major constraint because the growers in Phetchaburi accessed to irrigation canals in which the water may be contaminated with hazardous or prohibited substances. Growers were comfortable with delivering the banana because the Ban Lat Agricultural Cooperatives provided pick-up service at their farms. This service is one of the reasons that most of the growers (55.3%) have sold their banana to Ban Lat Agricultural Cooperative (Table 2).

Table 2: GAP Gros Michel banana grower's opinions.

GAP Gros Michel banana grower's opinions	Frequency	Percentage
Where do you get the information about GAP?		
TV	8	11.6
Radio	4	5.8
Social Media	6	8.7
Newspaper	2	2.9
Friend	6	8.7
Agricultural officer	41	59.4
Family member	2	2.9
Why do you prefer to use the GAP system?		
Customer preference	19	28.4
Community agreement	5	7.5
Concern about health	13	19.4
Product price	17	25.4
Care to environment	10	14.9
Other	3	4.5
High price	15	22.7
No effect to the environment	16	24.2
High demand	16	24.2
No or less deleterious effect to consumer's health	9	13.6
Good production	7	10.6
Other	3	4.5
What are the major constraints for you in the GAP regulation?		
Water source	18	32.1
Agricultural chemical	17	30.4
Harvest and post-harvest	3	5.4
Personal hygiene	2	3.6
Farm location	4	7.1
Production management before harvest	7	12.5
Data collection	5	8.9
Where do you sell the product?		
Local market	17	36.2
Supplier	26	55.3
Own shop	4	8.5

GAP Implementation level of Gros Michel banana farmers

Most growers in the study area implemented GAP on their farms at a moderate level (Table 3). Most (54.5%) of the respondents were growers who owned a small farm (cultivated area <1.6 hectare). Some growers had found it very difficult to comply with GAP rules and standards, which contributed to the low proportion of farmers practicing GAP. In addition, about 54.4% of the respondents had participated in GAP training only twice and this might have impacted on their capability to implement GAP. The growers had the lowest GAP issue (2.81%) regarding water sources although they had difficulty to access to clean water for irrigation. This

is because they could prepare their own water reservoir in the farm, the operation that increases the cost of production. On the other hand, the farmers highly understood about the significance of recording the farming practices (3.16%). This is because the local GAP extension officers facilitate this step by providing the forms for the growers in the area. The officers also visited the growers once a month, an action that establishes the understanding between these two stakeholders. In contrast, coffee growers in Chumphon province had the least understanding about the significance of recording data of the farm practices in GAP (Pongvinyoo *et al.*, 2014).

Factors influencing the implementation of GAP among farmers in the study area

Multiple regression was employed to investigate factors influencing the implementation of GAP practices among growers. The results revealed an F-ratio of 43.831 which was not significant. However, an R-squared value of 0.998 indicated that the eleven variables explained 99.8% of the implementation of GAP by growers. These variables, including gender, age, education level, the number of family members, the number of family laborers, farming experience, membership of a farmer organization, cultivated area, land ownership status, GAP training and financial support, were not statistically significant to the implementation of GAP. However, the result of Pearson correlation coefficient showed that gender, the number of family labour and the farming organization membership were highly and positively significant to GAP implementation (Table 4). As banana (Gros Michel) is the horticultural product that requires carefully handling, human labour is very important. The extra labour from the other family members should play an important role in the activities that requires labour for GAP implementation.

Table 3: GAP implementation level of the Gros Michel banana farmers.

GAP Implementation items	GAP practical level (%)				Average practical score	S. D	Practical level
	None	Low	Moderate	High			
Water source	19.1	10.6	40.4	29.8	2.81	0.16	Moderate
Cultivation site	24.4	-	44.4	31.1	2.82	0.17	Moderate
Use of hazardous agricultural substances	22.7	4.5	31.8	40.9	2.91	0.18	Moderate
Product storage and on-site transportation	22.0	2.4	43.9	31.7	2.85	0.17	Moderate
Disease and pest-free production	7.1	9.5	45.2	38.1	3.14	0.13	Moderate
Management of quality production	7.0	11.6	46.5	34.9	3.09	0.13	Moderate
Harvesting and post-harvest handling	9.5	2.4	54.8	33.3	3.12	0.13	Moderate
Data recording	7.0	9.3	44.2	39.5	3.16	0.13	Moderate
Overall					2.80	1.08	Moderate

In addition, grower's membership to the agricultural organizations significantly influenced to growers implementing GAP. Most of banana (Gros Michel) growers were the

member of the Ban Lat Agricultural Cooperative. This facilitates them to access to an agricultural extension officers who can provide knowledge about banana and GAP practices. Khaengkhan & Khumsoonthon (2016) suggested that forming grower groups could contribute to the growers to get higher standards. Fakkhong & Suwanmaneepong (2017) also reported that membership to the farming organizations impact significantly and positively to the growers in implementing GAP.

Sriwichailamphan *et al.* (2008) revealed that age, farm size, and contract situation (market assessment) influenced the pineapple growers to understand GAP. Mankeb *et al.* (2013) also showed that the grower's understanding to GAP was influenced by age, farming experience and education. Salakpetch (2007) indicated that level of farmer's education and GAP extension services were the important factors to improve the grower's GAP understanding. Pongvinyoo *et al.* (2014) reported that farming experience had negative impact and cultivated area had the positive impact on the perception of GAP understanding among coffee growers in Chumphon. Ganpat *et al.* (2014) indicated that the level of compliance with GAP was directly related to farming experience. Suwanmaneepong *et al.* (2016) demonstrated that farming experience had a positive relationship to GAP implementation by fruit farmers in Rayong province, Thailand

These past studies indicated that to promote GAP it is very important to understand the socio-economic characteristics of the farmers in each specific area. Thai farmers' adherence to conventional farming methods was the challenge for extension institutions in promoting the standard GAP procedure.

Table 4: Multiple regression and Pearson correlation coefficient results.

	Multiple Regression ^a					Pearson Correlation	Sig
	B	SE	Beta	t	Sig		
(Constant)	-5.969	1.147		-5.206	0.121		
Gender	-0.806	0.156	-0.408	-5.154	0.122	-0.494*	0.043
Age	1.167	0.250	0.647	4.662	0.135	0.300	0.159
Education	0.193	0.109	0.254	1.773	0.327	0.126	0.341
The number of family member	1.060	0.334	0.398	3.175	0.194	0.222	0.233
The number of family labor	0.092	0.089	0.095	1.039	0.488	0.646**	0.009
Farming experience	-0.462	0.145	-0.384	-3.177	0.194	0.200	0.256
Belong to farmer organization	1.491	0.192	0.654	7.775	0.081	0.570*	0.021
Cultivate area	0.194	0.151	0.151	1.284	0.421	0.322	0.142
Land owner	0.370	0.246	0.187	1.504	0.374	-0.165	0.296
GAP training	0.637	0.140	0.354	4.541	0.138	0.300	0.159
Financial support	0.437	0.070	0.380	6.211	0.102	0.000	0.500
F ratio	43.831						
R squared	0.998						
Adjusted R squared	0.975						

* Correlation is significant at 0.05 level, ** Correlation is significant at 0.01 level.

Conclusion

Good Agricultural Practice (GAP) for banana (Gros Michel) has facilitated the growers to export the product overseas. This can be achieved by the active collaboration between the growers and the agricultural extension officers. GAP implementation will bring about the

access to market which the customers who prepare to pay high price for quality. This study revealed that most of growers had difficulty to access to clean water for irrigation. They coped with this problem by having water reservoir in their own farm. The growers did practice data recording in the farming practices as required by GAP. The factors influencing implementation of GAP among banana (Gros Michel) growers in Ban Lat district, Phetchaburi province were gender, number of family members and farming organization membership. This study provided the information for the agricultural extensionists to focus their effort to the relevant target growers to improve banana farming practices in accordance with the GAP.

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