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Factors affecting the improvement of mango plantation for commercial ripe fruit production and SWOT analysis of Nam Dok Mai Mango collaborative farming in Bang Phli District, Samut Prakan Province, Thailand – Short Communications

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Abstract The factors affecting the improvement of mango plantation for commercial ripe mango production and SWOT analysis in Bang Phli District, Samut Prakan Province, Thailand was investigated. The results showed– that age and education were factors affecting the improvement of mango var Num Dok Mai for commercial ripe mango production. Farmers ages 31-50 years old had upper senior high school level of education. The result of SWOT analysis showed that the farmers grew mangoes for ripening. Their strengths include good soil quality, flawless mango skin and thus received GAP-free standards. In addition, they had opportunities due to high market demand and support from the government. However, their weak points were lack of labour because most of the farmers were elderly and uncertainty in productivity. They were threatened with worms, insects, diseases, climate changes and stealing.

Keyword: Nam Dok Mai Mango, Collaborative farm, Production behavior, SWOT analysis

Introduction

Metropolitan Bangkok and the surrounding areas become city areas and the industry is rapidly expanding (Bank of Thailand, 2018). Therefore, the agricultural areas are being reduced (Satterthwaite *et al.*, 2010). Most of farmers were old (Clive and Matt, 1992; Pakapon, 2018.) and the younger generations prefer to work in the industrial sector causing a shortage of agricultural workers (Yuzhe *et al.*, 2014). This is a problem in the agricultural industry. Another important metropolitan area is Samut Prakan Province. There are industrial estates in the area, such as Bangpoo Industry and Asia Industrial Estate, Suvarnabhumi (Samutprakan Provincial Industrial Office, 2018. In the Bang Phli District is where the Suvarnabhumi

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Airport is located. The expansion of the city is rapid and there are also important farming areas in Bang Phli District, Samut Prakan Province wherein raising fish in the ponds is the main occupation of farmers. Farmers encounter problems with prices, conditions, and production (Samutprakan Provincial Agricultural Extension Office, 2017). Thus, some farmers do additional careers and one of the best alternative for these farmers is planting Nam Dok Mai Mangoes around the fish ponds.

Based on the data from the Samutprakan Provincial Agricultural Extension Office (2017), it was found that most cultivated areas for Nam Dok Mai Mangoes were in Bang Phli district. The total area devoted for mangoes is 1,272 rai. Although there are many Nam Dok Mai Mangoes planted, most farmers do not pay much attention on the growing of mangoes effectively. During the harvest season, most farmers sell their raw Nam Dok Mai Mangoes which is cheaper than selling ripe ones. The price of raw fruit Nam Dok Mai Mangoes is at 20-35 baht per kilogram and the ripe ones at 80-110 baht per kilogram (Talat Thai, 2018). If farmers pay attention on the proper management of Nam Dok Mai Mangoes to make high quality products, they can upgrade the mangoes and sell them ripe with good priced allowing the farmers to earn more income. Also, this may reduce the bargaining power of middlemen. There are limitations and differences on how to store ripe and raw Nam Dok Mai Mangoes. Hence, this research was conducted to study the production behavior for Nam Dok Mai Mangoes. Also, analyse the relationships that affected the farmers regarding changes in the sales of mangoes and SWOT analysis of Nam Dok Mai Mangoes Collaborative Farm, Bang Phli District, Samut Prakan Province, Thailand. The data are used as basic information for farmers. Government and private sector related government organizations supported the upgrading of Nam Dok Mai Mangoes Cultivation in the area to transfer the information to farmers in such areas to acknowledge facts, so it shall lead them to the promotion of agriculture that can generate better income and create better quality of life for farmers.

Materials and methods

This research used questionnaires as a tool for data collection. The research questionnaire was created from the review of relevant documents and researches. The questionnaires were sent to 3 experts to verify the Index of Item Objective Congruence (IOC), in which the IOC was scored more than 0.73. This research applied SWOT analysis for farmers growing mangoes in a collaborative farm to provide a good basis for successful strategy formulation (Kurttila *et al*., 2000). There are 30 farmers growing Nam Dok Mai Mangoes for collaborative farming (Bang Phli District Agriculture Office, 2017). The data were collected from 22 farmers engaged in the project.

Basic statistical methods such as frequency and percentage were used in analyzing the demographic characteristics of respondents and production behavior for Nam Dok Mai Mangoes.ANOVA and t-test were used for analyzing the factors that affect farmers on switching from selling unripe to ripe mangoes. Additionally, Mean and standard deviation were used in SWOT statements calculated from a five-point Likert scale as follows: 1.00-1.49 = strongly disagree, 1.50-2.49 = disagree, 2.50-3.49 = moderately agree, 3.50-4.49 = agree (A), and 4.50-5.00 = strongly agree.

Results

The respondents were 50% males and 50% females, most of whom were over 60 years of age and 13 of them had primary school education (Table 1.). In this case, 15 persons had main occupation as farmers, having married marital status and had the experience of growing mangoes for 6-10 years. Those who had experiences more than 20 years were 9 persons.

16 farmers who grow Nam Dok Mai Mangoes in collaborative farm in Bang Phli District, Samut Prakarn Province had used fertilizers supported by the District Agricultural Office and the other 6 persons do not use fertilizer (Table 2.). They harvested mango fruits 2 times per year. Most of the mango cultivars are mangoes var, Num Dok Mai number 4 grown by 21 farmers. The farmers obtained knowledge about growing mangoes from training with government organizations. In terms of sales, they primarily sell their products in front of the farm. For manpower, all the 21 farmers employedin family members. Most of the mangoes cultivation areas were annually rented (15 persons). The factor that made the farmers shift to collect, and sell ripe mangoes is done by market support. The price of ripe mango was 50% higher than the raw or unripe mangoes.

The factors affecting the improvement of mangoes plantation for selling ripe mangoes is shown inTable 3. It was found that age and education of farmers effects preference to sell ripe mangoes.

The SWOT analysis for farmers growing mangoes in the collaborative farm in Bang Phli District, Samudra Prakan Province is shown in Table 4. The strength showed that the soil quality which was very much suitable for growing mangoes with good quality and sweet taste that revealed the most important strength, (mean 4.58), and followed by Nam Dok Mai mangoes who received GAP-free standards (mean 4.51), and Mango fruit was beautiful skin (mean 4.44). The products were available throughout the year (mean 3.44), and there was a network to educate and sell Nam Dok Mai mangoes (mean 3.35).

Weakness showed that the farmers in the collaborative farm mostly used family workers. Therefore, there were shortages of labor (mean 4.52) and many old farmers (mean 4.50). There was not enough time to train the

mango growers due to other responsibilities required (mean 4.44), and the products were inadequate in sales (mean 3.95).

Opportunity revealed that Nam Dok Mai Mangoes were high demand in the markets (mean 4.48). In addition, there were government organizations willing to supply fertilizers, wrapping bags and packaging, (mean 4.36), and the government policies had supported agricultural management based knowledge in the collaborative farms (mean 4.33).

The threat for production for high quality of Nam Dok Mai Mangoes that the growers faced the problems of insects and diseases (mean 4.58), hot weather and rain shortage (mean 4.46) and stealing (mean 4.29).

Table 1. Characteristics of respondents (n = 22)

Characteristics	Frequency	%
Gender		
Male	11	50
Female	11	50
Age		
31-40 years old	3	13.6
41-50 years old	2	9.1
51-60 years old	6	27.3
61-70 years old	8	36.4
More than 70 years old	3	13.6
Education		
Primary school	13	59.1
Senior High school	6	27.2
Bachelor	3	13.6
Main career		
Government service officer	2	9.1
Farmers	15	68.2
Private employees	1	4.5
Workers	3	13.6
Merchants	1	4.5
Status		
Single	4	18.2
Marriage	18	81.8
Experience		
1-5 years	1	4.5
6-10 years	10	45.5
11-15 years	2	9.1
More than 20 years	9	40.9
Membership status of the collaborative farm	18	81.8
Being a member	4	18.2
Being a member, not continue doing it		

Table 2. Production behavior of Nam Dok Mai Mango

Production behavior	Frequency	%
1. Planting characteristics		
Planting area is around the fish pond	22	100%
2. How to take care		
By nature	5	23%
Fertilizing by receiving it from the agricultural district	16	73%
Fertilize by purchasing it by yourself	1	5%
3. Harvesting		
2 times a year	16	73%
3 times a year	2	9%
4 times a year	4	18%
4. Mango varieties		
Number 4	21	95%
Golden color	4	18%
Others	13	59%
5. Knowledge source		
Training with government organizations	17	77%
Self-study	5	23%
6. Selling		
Send government organizations	2	9%
Middle-men	5	23%
Selling in front of the farm	14	64%
Have their own stall	5	23%
7. Labor		
Family labor	21	95%
Daily labor	1	5%
8. Land ownership type		
Rent	15	68%
Owner of the land	7	32%
9. The expansion of the planting area in the future		
Stable	14	64%
Decrease	3	14%
Expand	5	23%
10. The changing on how to collect ripe mangoes in the future		
Change		
Not change	5	23%
	17	77%
11. Factors to increase harvesting of ripe mangoes		
There is a definite support market.	21	95%
50% higher price than raw mango	18	82%
Have more family labor	10	45%

Table 3. The factors affecting the improvement of mangoes plantation for selling ripe mangoes

Factors	F	Sig.
Gender	.238	.631
Age	14.926	.001***
Education	13.469	.002***
Status	.013	.910
Experience	1.614	.219
Main career	2.254	.149

Note: *** sig. 0.05

Table 4. SWOT analysis

SWOT statements	$\bar{X}$	S.D.	Ranking	
Strengths				
1. Soil quality is suitable for growing sweet mangoes.	4.58	0.66	Strongly Agree	1
2. Nam Dok Mai Mangoes receive GAP-fee standard.	4.51	0.68	Strongly Agree	2
3. The skin of Mangoes is beautiful.	4.44	0.74	Agree	3
4. Have productivity throughout the year.	3.44	0.86	Moderately	4
5. Have a network of obtaining knowledge.	3.35	0.88	agree Moderately agree	5
Weaknesses				
1. Labor shortages.	4.52	0.62	Strongly Agree	1
2. Aged.	4.50	0.78	Strongly Agree	2
3. Lack of time.	4.44	0.74	Agree	3
4. Products are inadequate sales.	3.95	0.80	Agree	4
Opportunities				
1. The market has high demand.	4.48	0.75	Agree	1
2. There are organizations of government to support.	4.36	0.79	Agree	2
3. Government policy supports collaborative farms.	4.33	0.85	Agree	3
Threat				
1. Worm insect disease	4.58	0.66	Strongly	1
2. Hot weather and a little bit of rain	4.464.29	0.83	Agree	2
3. The steal		0.92	Agree	3

Discussion

Farmers growing Nam Dok Mai Mangoes in collaborative farms in Bang Phli District, Samut Prakan Province were found to be males and females in the same proportion. Most of them were over 60 years old and have experience in growing mangoes for around 6-10 years. Four members did not grow mangoes due to lack of labor and did other farming. From the above information, when considering the relationship of factors, it was found that farmers' age was a factor in shifting the sales from unripe to ripe mangoes. This was the same result of Pakapon (2018). Abdulai and Eberlin (2001) stated that if farmers are elderly, they will do agriculture as they get used to and they will not change the planting behavior or sales in a better way. When farmers are old, so they will not collect ripe mangoes for sale as it takes time to wrap the ripe fruits. Ripe fruits tend to get rotten easily and it is difficult to store them. The educational factor is in accordance with the research of Luh (2017). Oduro *et al.* (2014) who stated that education affects agriculture knowledge and younger farmers accept to change behavior to increase income. Chimong (2014) stated that most farmers do not bring their products to market but they sell it through middleman or sell

in front of the farm. In addition, the laborers are family members (Ferenc, 2018). Cai *et al.* (2008) indicated that farmers currently do not have their own planting areas and they must rent the areas. This is consistent with the research that most mango cultivation areas are rented areas. In addition, farmers are not likely to expand the planting area to increase the production and sales of ripe mangoes because there was not exactly supported to market and there was labor shortage.

SWOT analysis showed that the strengths were good soil quality and GAP-free certification. Their weaknesses were lack of labor, aged farmers, no time to maintain plantation leading to inadequate products for sale. They were good opportunity that the government organization had supported in the collaborative farms to reduce the production costs while the market demand is high. It found that the problems associated mango production faced insects and disease infestation, and environmental factors as high temperature or drought leading less yield of mano fruits. It is suggested that the age of farmers should below 50 years, and completed higher education level than primary school level. Moreover, It should be provided a fixed markets for sales.

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References

Abdulai, A. and Eberlin, R. (2001). Technical efficiency during economic reform in Nicaragua: Evidence from farm household survey data. Economic Systems, 25:113-125.

Bank of Thailand. (2018). Urbanization and the policy implications of Thailand. Focused and Quick Report, 128:1-15.

Bang Phli District Agriculture Office. (2017). Nam Dok Mai Mango collaborative farming 2016. Report collaborative farming.

Cai, F., Wang, D. and Du, Y. (2008). Rural reform and change in china: analysis of 30-years history and lessons, truth & wisdom press, Shanghai People's Publishing House, Shanghai.

Chimong, S. (2014). Farmers' attitudes toward the good agricultural practice and contract farming for manaifera indica linn. in Kuiburi district Prachuap Khiri Khan province. Veridian E-Journal, 7:561-585.

Clive, P. and Matt, L. (1992). The conservation status and potential of elderly farmers: Results from a survey in England and Wales. Journal of Rural Studies, 8:133-143.

Ferenc, I. B., Julio C. D., Sandra, M. S., Kellen, C. K. and Rodrigo C. P. (2018). Structural features, labor conditions and family succession in dairy production systems in Paran á State, Brazil Cahiers Agricultures, 27:1-11.

Kurttila, M., Pesonen, M., Kangas, J. and Kajanus, M. (2000). Utilizing the analytic hierarchy process (AHP) in SWOT analysis—a hybrid method and its application to a forest-certification case. Forest policy and economics, 1:41-52.

Luh, Yir-H. (2017). the impact of education on agricultural productivity: evidence from

east Asian economies. International Journal of Food and Agricultural Economics 5:11-24.

Oduro, O. E., Aboagye, A. P. and Acquaye, N. A. E. (2014). Effects of education on the agricultural productivity of farmers in the offinso municipality. International Journal of Development Research, 4:1951-1960.

Pakapon, S., Isriya, B., Prapinwadee, S. and Itthipong, M. (2018). The impact of age structure on technical efficiency in Thai agriculture. Kasetsart Journal of Social Sciences, 1:1-7.

Samutprakan Provincial Agricultural Extension Office. (2017). Samutprakan Provincial data. Retrieved from http://www.samutprak andoae.go.th/html/contact.htm.

Samutprakan Provincial Industrial Office (2018). Samut Prakan Industrial Estate. Retrieved from http://www.industry.go.th/samutprakan/.

Satterthwaite, D., McGranahan, G. and Tacoli, C. (2010). Urbanization and its implications for food and farming. Philosophical Transactions of the Royal Society B: Biological Sciences, 365:2809-2820.

Talat Thai. (2018). Products price. Retrieved from https://talaadthai.com/product-search/.

Yuzhe, W., Xiaoling, Z., Martin, S., Yan, S. and Eddie, C. M. H. (2014). Industrial land price and its impact on urban growth: A Chinese case study. Land Use Policy, 36:199-209.

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