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Socio-economic Characteristics of Rubber Farmer in the Drought Area in SaKaeo Province, Thailand

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A Pararubber tree is important economic crops in Thailand. Eastern of Thailand is a major source of rubber and a long-established rubber plantation because this region is sufficient with rainfall.Sa Kaeo is a province in the east; however, this province is different from those in the same region, especially drought climate. Moreover, SaKaeo is a developing province and is aimed to be a special economic zone in the future, and rubber trees are important economic crops to generate income in Sa Kaeo province.This study aimed to describe the characteristics of rubber farmers in the drought area and attempted to investigate the effect of some economic and social factors which related registered with Rubber Authority of Thailand, SaKaeo Province in 2016. Descriptive statistical analysis and linear regression model were applied to analyze the data. The results showed that most of rubber farmers were female (54.0%). The average age of rubber farmers was during 51-60 years old (32.0%). Most of them were farmer (91.0%), were members of the rubber group (94.0%) and used rubber variety was RRIM600 variety (95.0%). Harvesting of rubber farmer used 1/3 2d/3 (one third stem two days a day) tapping system (63.0%),and farmers tapped their rubber trees by themselves (55.0%). An average quantity of plot was 1 and their land size was 20 Rai (3.2hectare.) The average number of rubber tapping was 1,469with average production at179.68 kg.per tapping area (1 Rai) (1 Rai = 0.16 hectare.)The result from the regression analysis revealed that the factors affecting rubber farmers under the drought area were the size of land and the number of rubber tapping which were statistically significant at 1%. The results obtained from this study provided useful information for relevant authorities working with rubber farmers in order to increase farmer'srubber productivity.

Keywords: Drought area, Rubber Authority of Thailand,Rubber farmer,Sa Kaeo

Introduction

A Para rubber tree is an important economic crop of Thailand, covering 20.61 million Rai (3.30 million hectares) nowadays. The production of Para rubber is approximately 4.84 million tons with average yield at 235 kg per Rai (Special Affairs Group Bureau of Policy and Planning Office of the Permanent Secretary for Interior, 2017). Thailand is the main exporter of natural rubber; in the first half year of 2016 to 2017,

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the export growth rate increased about 46.22 percent, and generated income into the country around 167,182 million Thai Baht (THB). Generally, rubber trees grow well in the equatorial humid tropics and monsoon climate. In Thailand, the southern region is the most appropriate area for rubber planting, accounted for 65.51 percent of total rubber plantation area in the country with average yield was 245 kg per Rai (Office of Agricultural Economic, 2016). Since the year 2011,on average, rubber prices have soared upto 132.43 THB per Kilogram (Office of the Rubber Replanting Aid Fund, 2012).Due to the higher price,farmers turn to grow rubber trees scattering all regions of Thailand. Even though, in drought areas that unsuitable for rubber planting, many farmers are interested in planting rubber trees in order to generate family income.

The eastern region of Thailand isone part that farmersare interested inplanting rubber trees. This region is regarded asthe drought area thatis perennial, reduced precipitation contributes to shortages of water supply in many agricultural areas (Seeboonruang, 2015). However, the number of Para rubber productions in this area is2.2 million rai (0.35 million hectares) and is identified as one of economic crops to this region (Office of Agricultural Economic, 2016). Sa Kaeo Province -- one province inthe eastern region of Thailand is influenced by sedimentary rocks from the northeast region making a chance to find sandy loam, clay gravel, and shallow soil. It was noticed that this province planted rubber trees in soil condition of drought area (Land Development Department, 2013). Moreover, thegeographic of this province is differences from other provinces in the same regionwitha long-standing drought from 2016, up until now (SaKaeo Provincial Agricultural Extension Office, 2017). Interestingly, Para rubber isranked as number one economic perennial in the province. The plantation area of Para rubber trees in this province covers66,357 Rai (10,617.12 hectares) (Sa Kaeo Provincial Agricultural Extension Office, 2017).The increasing ofhigh rubber prices convinces farmers to plant. In addition, rubber trees provide highyield in the long run.

The Thai government promoted rubber plantations in Sa Kaeo province, and later rubber sectors contributed to agricultural economics in this area. Some part of this province, however, is not suitable for planting rubber plantationsparticularlythe climate.An average rainfall is 1,296-1,539 millimeters, and the average temperature is 27.5 to 28.7 degrees Celsius. Accordingly, there are only 146,801 Rai. (23,488.16 hectare) or 13.33% of the total area is grouping into situation zone for rubber plantation, indicatingthat 87.97% of the total Para rubber plantation is grownin non-situation zone (Sa Kaeo Provincial Agricultural Extension Office, 2017). An average yield of Para rubber was168 kilogram per Rai, while; the average yield per Rai of the whole country was235 kg per Rai (Office of Agricultural Economic, 2016). Hence, strategy to supportfarmers to

gainhigh yield of rubber product in this area is the main task forrelated organizations.

From literature reviews, it was found that the farming can be influenced by various factors, including socio-economic. Socio-economic is a field of study that examines social and economic factors including age, level of education (years of formal education), farm size, years of farming experience, and the number of contacts with extension agents in a season (Muhammad *et al.*, 2014). Socio-economic status is the position that individual farmer occupies regarding the prevailing average standards, material possession, social participation and other factors (Trivedi, 1963; Kumar, 2014). Mostprevious research focused on socio-economic impacts of rubber cultivation such as Blagodatskiy, *et. al.* (2015). In Thailand, many research focused on socio-economic factors of Para rubber farmers in Southern of Thailandwhich were suitable areas for rubber plantation such as Masae and Cramb (1995), Ratanachai and Somboonsuke (1997), Somboonsuke (2005), and Jongrungrot (2014).

For that reason, this study aimed to examine the socio-economic characteristics of Para rubber farmers in the drought area by describing the socio-economic characteristics and investigate socio-economic factors influencing rubber yields in drought areas. The samples of this study were 100 Para rubber farmers in Sa Kaeo province and registered with Rubber Authority of Thailand in 2016. The resultsfromthis research cansupport the development of rubber strategiesin order to increase rubber yield in drought areas.

Materials and methods

This study was conducted in Sa Kaeo area because Para rubber trees had beenranked asthe first economic plantsin the province (Office of Sa Kaeo Agriculture and Cooperatives, 2017) where rubber plantations in this drought areas differed from those in the same sector where rubber plantations were grown in suitable areas as presentedin Fig. 1.

Sampling and Sample Size

The samples were 100 rubber farmers registered with the Rubber Authority of Thailand, Sa KaeoProvince Branch in 2016. This samples were selected from Para rubber farmers in two districts -- Khao Chakran district and Wang Som Boon district -- because there werea lot of rubber plantations as shown in Table. 1.

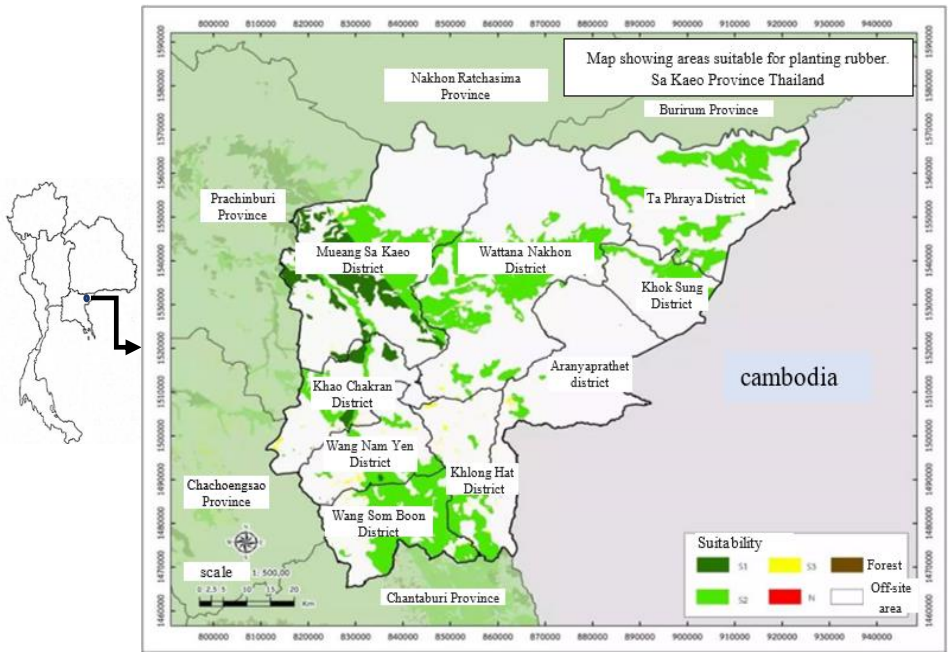

Fig.1 Map of Sa Kaeo Province, Thailand
Source:Sa KaeoProvincial Agricultural Extension Office (2017)

Table.1: Percentage of areas for planting rubber Sa Kaeo Province Thailand

District	Area (Rai)	Percentage
Mueang Sa Kaeo	7,865	12
Khlong Hat	6,973	10
Ta PhrayaDistrict	971	1
Wang Nam Yen	7,709	12
Wattana Nakhon	10,562	16
Aranyaprathet	1,361	2
Khao Chakran	12,611	19
Khok Sung	433	1
Wang Som Boon	17,872	27
Total	66,357	100

Source:Database of Office of Sa Kaeo Agricultural and Cooperatives. (2017)

Data collection and Data analysis

Data were gathered from rubber farmers registration database containing the following farmer's details: name, identification number, address, age, gender, occupation, membership status of rubber group, quantity of plots, land size in Rai, rubber variety, the number of rubber tapping, tapping system, the number of tapping labors, rubber production, and registration date of 100 sample rubber farmers in Sa Kaeo Province Thailand.

Descriptive analysis namely, frequency, percentage, and mean were used to describe the socio-economic characteristics of the sample Para rubber farmers in the drought area. Regression model was employed to analyze factors influencing rubber production in the drought area in Sa Kaeo Province Thailand.

Analytical regression model expressed implicitly variables as below:(Jharna, M. et.al.,2017)

$$\gamma = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k k + \varepsilon$$

When, γ = Rubber production (kg.)
β_0 = Constant term
β_k = Coefficient to be estimated
X_1 = Age
X_2 = Gender
X_3 = Occupation
X_4 = Membership status of rubber group
X_5 = Quantity of plot
X_6 = Land size
X_7 = Rubber variety
X_8 = The number of rubber tapping
X_9 = Tapping system
X_{10} = The number of labors fortapping
ε = Error of Model

Results

Socio-economic characteristics of Para rubber farmers

The social-economic characteristics of Para rubber farmers in the drought area in Sa Kaeo province Thailand are demonstrated in Table 2. The result revealed that most of the respondents were more female (54.0%) than male (46.0%) and have their own land.The large proportion of respondents was 51-60 years old (32.0%), had occupation as a farmer (91.0%) and most of them (94%) were members of the rubber group. In addition, more than 95% of the respondent exposed that the rubber farmers mostly used RRIM600 (95.0%) as a rubber variety. Regarding the tapping system used, the majority of rubber farmers employed 1/3 2d/3 (one-third stem, two days a day) at 63.0%, and farmers tapped rubber trees by themselves (55%) which washigher than hiring labors (45.0%).

Table 2: Socio-economic characteristics of rubber farmers in the drought area in Sa Kaeo province Thailand.

Characteristic	Categories	Frequency	Percentage
Gender	Male	46	46
	Female	54	54
Total		100	100
Age	21 – 30 years	1	1
	31 – 40 years	14	14
	41 – 50 years	23	23
	51 – 60 years	32	32
	61 years and above	30	30
Total		100	100
Occupation	Farmer	91	91
	Government officer	3	3
	Business worker	6	6
Total		100	100
Membership status of rubbergroup	Member ofrubber group	94	94
	Not member ofrubber group	6	6
Total		100	100
Rubber variety	RRIM600 variety	95	95
	RRIT251 variety	5	5
Total		100	100
Tapping system	1/3 d/3	1	1
	1/3 2d/3	63	63
	1/3 3d/4	2	2
	1/3 d/d	12	12
	1/2 2d/3	17	17

Table 2: (continue)

Characteristic	Categories	Frequency	Percentage
	1/2 3d/4	2	2
	1/2 d/d	3	3
Total		100	100
Number of labors for tapping	By self	55	55
	Labor hire	45	45
Total		100	100

Characteristics of rubber farming

Table 3representscharacteristics of Para rubber farming. An average numberof plot was 1.11,with maximum 2 plots andminimum 1 plot. With regard to rubber land size, the Office of the Rubber Replanting Aid Fund (2014) identified rubber land size into three categories: small size(less than 50 Rai or 8 hectares), medium size (50-250 Rai or 8-40 hectares) and large size(more than 250 Rai or 40 hectares).It revealed that an average land size was 20.55 Rai (3.2 hectares). In other words, the majority of the sample farmerswere small rubber farmers. Theaverage number of rubber tapping was 1,469 with maximum 4,800 treesand minimum 261trees. On average,

the amount of rubber production was 179.68 kilogram per a tapping area (1 Rai)with an average total production at3,693.65kilogram per 20.55 Rai.

Table 3: Characteristics of rubber farming in the drought area, Sa Kaeo province Thailand.

Categories	Minimum	Maximum	Mean	S. D.
Quantity of plot	1	2	1.11	0.314
Land size (Rai)	3	52.49	20.55	12.60
Number of rubber tapping	261	4800	1,469.45	924.986
Average production kilogram pera tapping area (1 Rai)	70	320	179.68	40.32849
Totalproduction (kg)	**450**	**12000**	**3,693.65**	**2,519.35247**

Source: Database of Rubber Authority of Thailand Branch Sa Kaeo (2016)
Noted: 1 Rai = 0.16 hectare.

Factors influencing rubber production

The Table 4 shows the result of farm and rubber farmer's characteristics affecting rubber production in thedrought area in Sa Kaeo Province, Thailand. According to the data from therubber farmer register database, this study selected ten variables affecting rubber production, namely age(X_1), gender (X_2), Occupation(X_3), Membership status of rubber group(X_4), Quantity of plot(X_5), Land size in Rai(X_6), Rubber variety(X_7), The number of rubber tapping(X_8), Tapping system (X_9), and The number of labors for tapping (X_{10}).

The R^2 value of0.890 indicated that 89.00% of the variations in the output of rubber production in the drought area can be explained by included socio-economic variables. The F-Ratio at 72.375 was significant at 1% which implied that the data attests to the overall significance of the regression equation. Land size and the number of rubber tapping were significant to the production of rubber in the study area.

The coefficients of theage of rubber farmers, gender, occupation, membership status of rubber group, and tapping system were negative, but not significant with the output of rubber production in the drought area. The coefficients of quantity of plot, rubber variety, and the number of labors for tapping were positive but not significant with the output of rubber production in the drought area.The coefficients for land size in Rai and the number of rubber tapping were positive and highly significant at 1% level of probability. This result implied that if rubber farmers had a land size in Rai increasedat 1%, the output of rubber production will increase by 87.34%. Similarly, if rubber farmers'increase at 1% of the number of rubber tapping, will increase the rubber productionoutputswill also increase by 1.39%.

Table 4: Regression result from factors influencing to rubberproduction

Factors	Coefficient	SE	t-stat	p-value
Constant	322.681	650.716	.496	.621
Age (X_1)	-73.948	91.662	-.807	.422
Gender (X_2)	-42.634	189.382	-.225	.822
Occupation (X_3)	-56.965	126.278	-.451	.653
Membership status of rubber group (X_4)	-693.732	389.889	-1.779	.079
Quantity of plot (X_5)	31.420	300.978	.104	.917
Land size in Rai (X_6)	87.345	22.124	3.948	.000**
Rubber variety *(X_7)*	341.525	420.879	.811	.419
Number of rubber tapping *(X_8)*	1.397	.302	4.631	.000**
Tapping system *(X_9)*	-25.194	61.488	-.410	.683
Number of labors for tapping *(X_{10})*	178.795	189.318	.944	.348.
R^2	.890			
Adjust R^2	.878			
F – ratio	72.375			

Noted:**significant at 1%

Land size of rubber and the number of rubber tapping were significant with total production (kilogram).

Discussion

The major characteristics of rubber farmer in thedrought area in Sa Kaeo Province, Thailand were female, aged between 51 – 60 years old which were consistent with the general characteristics of Thai farmer. Theaverage age was higher than the average age of those in Thailand -- 49.3 years old (Office of Agricultural Economic, 2011).The majority of farmers' occupation was a rubber farmer and was a member of a rubber group. Most of them usedRRIM600 as their rubber variety which was an authority-recommended breed. Nowadays, RRIT251 variety is introducedthat the yield per Rai obtained is higher than RRIM600 at 59% (Rubber Research Institute, 2014). Most rubber farmers used 1/3 2d/3 (one-third stem two day a day) tapping system; however,academicsrecommended 1/2 2d/3 (half stem two days a day) with RRIM 600 variety (Rubber Research Institute, 2014). Rubber farmers tapped their rubber trees by themselves.

The majority of rubber farmers, on average, had their owned land at 20.55 Rai (3.61 hectares) and 1 plot. This finding represented that they were small-scale rubber farmers which occupied less than 50 rai (8 hectares) of cropland as defined by the Office of the Rubber Replanting Aid Fund (2014). Theaverage number of rubber tapping was 1,469 which contradicted with the recommendation of authorities thatthe average number of rubber tapping was during 400 – 500 (Rubber Research Institute, 2014). An average rubber production of rubber farming was 179.68 kg. per tapping area (1 Rai) per year. This finding indicated that rubber yield in the study

area waslower than the average yield of Rubber Research Institute at 235 kg. per tapping area (1 Rai) per year) (Office of Agricultural Economic, 2016).

The result of factors influencing the output of rubber production by using regression revealed significant variables, namely total cultivation area and the number of rubber tapping. The total cultivation area and the number of rubber tapping had a positive signification to the output of rubber production whichindicated thatifrubber farmers have many cultivation areas and can increase thenumber of rubber tapping, their output of rubber productionwill also increase. This finding concurred with the study of Vianmana *et al*., (2014) indicating that the size of land measured affected rubber yields. Likewise, the result in this study was consistent with the study of Viswanathan (2008) pointing outthat the average number of tapping days peryear, wasimportant todetermine rubberyields in a rubber plantation.

Conclusion

This study aimed to describe the characteristics of rubber farmers in the drought area and attempted to investigate the effect of some economic and social factors which related to the production in Sa Kaeo province, Thailand. Data were collected from rubber farmers who were register with the Rubber Authority of Thailand, Sa Kaeo Provincebranch in 2016.The result showed that most of the rubber farmers were female with average age during 51-60 years old. The majority of themwere farmers and were members of a rubber group, as well asused RRIM600 variety. In addition, they employed 1/3 2d/3 (one-third stem two days a day) tapping system and tapping rubber trees by themselves. Theaverage quantity of plot was 1 with20 rai (3.2 hectares) of land size. Theaverage number of rubber tapping was 1,469.Regarding the runner production, the average production was 179.68 kg. per tapping area (1 Rai) with theaverage total production of3,693.65 kg.The result of the regression indicated that land size of rubber and the number of rubber tapping had significant influence on the rubber production. Government should pay attention to these factors because these factors can enhance rubber production in a drought area. Benefit from rubber plantation return to land use should be promoted. Moreover, the number of rubber tapping is vitalfordetermining rubber yields in a rubber plantation thatrelevantgovernment sections should concern.

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