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## Factors Affecting Rice Seed Production of Farmers in Sakon - Nakhon Province, Thailand

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The good quality rice seed production is a crucial factor to increase productivity at a minimal investment. Encouraging farmer to establish a group to produce rice seed for their own use consistently was distributed to the community. Moreover, rice seed production would be improved in order to increase farmer income. The objective of this study was to investigate factors affecting rice seed production of farmers in Sakon Nakhon province, Thailand. Structure interview was applied to collect data from 182 farmers who produced rice seed for Sakon Nakhon Rice Seed Center. Data analysis was conducted by descriptive statistics and multiple regression analysis. The results showed that the average age of farmers was 52.34 years. The average duration of rice seed production was 16.64 years. The average number of farm labours was 2.51 persons while the average size of rice seed production was 14.21 rai (2.27 ha.). Three rice variety, namely RD 15, RD6 and KDML 105 were grown by 59.18%, 34.70%, and 6.12% respectively. The average rice seed yield was 406 kg./rai and average annual income earned from rice seed production was 110,769.80 THB per household. Farmers could sale their seed at the price of 19.20 baht/kg. Hypothesis testing showed that the variable factors which significantly affected the rice seed production were information obtained and attitude.

**Keywords:** rice seed production, factor affecting, Sakon Nakhon province

### Introduction

Rice is the major staple food in Thailand. It represents a significant portion of the Thai economy and labor force (Library of Congress-Federal Research Division, 2007). Rice also contributes to the main components of Thai exports. It is grown throughout the country, particularly in lowland areas (Isvilanoda and Bunyasiri, 2009). The north-eastern part of the country accounts for the largest share of both rice area and production 60.91% and 47.46%, respectively. (OAE, 2014). The rice planted areas including the major

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and second planted area in the 2013/14 crop year accounts for 72.45 million rais (11.59 ha.) and the production was about 33.80 million tons. In 2014, Thailand exported 10.97 million tons of rice and total value of 174,853 million Thai baht (THB). (OAE, 2015).

Although, Thailand is the world largest rice exporter, the production yield per area is still considered quite low. The average rice production of Thailand in year 2013/14 was 504 kilogram/rai compared with China, India, Indonesia, Bangladesh, Vietnam, Philippines, Brazil, and Japan were 1,075, 582, 755,701, 926, 627, 814, 1,077 kg./rai, respectively (OAE, 2014). The one of the reasons was due to the phenomenon of quality of rice seed. Although the farmer provides another good inputs for cultivating, the poor quality of rice seed still gives an unsatisfied quantity and quality.

Therefore, good quality of rice seed is the crucial key factor to increase productivity and obtain the high quality with minimal investment. According to the Department of Rice (DR) reported that if farmers used good rice seed varieties, the rate of rice seed application per areas would decrease 50 percent from those conventional practices. Therefore, productivity would be increased by 10 percent (RD 2014). The results indicated that if the farmers were able to produce the good rice seed varieties, they would be directly beneficial to farmers as well. Furthermore, the farmers could be able to sell their rice products at the higher price as well. Each year, the demand of good quality rice seed was 6 hundred thousand tons/year. Nevertheless, the rice seed that passed the systematically production process of Department of Agricultural Extension (DOAE) was about 4-6 ten thousand tons. The remaining, the farmers could be collected rice seed on their own for the next season or exchanged in the local area by themselves. In addition, they could be purchased rice seed from private suppliers. Usually, if the farmer does not recognize the preservation of rice seed, after 2-3 years of cultivating, the quality of rice seed will be deteriorated (DOAE, 2011).

Sakhon Nakorn Rice Seed Center (SN-RSC) under Rice Department (RD), Ministry of Agriculture and Cooperatives (MOAC) in Thailand has been established Community Rice Seed Center (CRSC) encouraging the farmers to establish a group to produce rice seed for their own use consistently and also distribute to their own communities and outside communities focusing on a sustainable management to have good quality of rice seed, and being a technology transfer center to farmers in various communities. Every year, the SN-RSC provides the contest called “Excellent Rice Seed Producers” to find the rice seed grower organization containing knowledge and experiences in terms of abilities to produce rice seed, to manage a group, and to dedicate to

whole societies for getting esteem from people in societies and for being a role model for other rice seed production group (RD, 2014).

The objective of this study was to investigate factors affecting rice seed production of farmers in Sakon Nakhon province, Thailand.

## **Materials and methods**

### ***The study area***

The study was conducted in Sakon Nakhon province, northeastern Thailand. It is located between latitude of 17°15'N and longitude of 104°101'E and covers total area of about 9,605.8 square kilometers. Neighbouring provinces are Nong Khai, Bueng Kan, Nakhon Phanom, Mukdahan, Kalasin, and Udon Thani (Wikipedia 2016).

### ***Population and sampling procedure***

The population of this study were 182 rice seed growers, the members of the SN-RSC in Sakon Nakhon province, obtaining the award called “Excellent Rice Seed Producers” in 2012, 2013, 2014. 182 rice seed growers were selected for this study.

### ***Data collection and analysis***

A structure interview was employed to collect data from respondents through face to face interview by the author. The structure interview covered the socio-economic background of respondents and their knowledge, attitudes and rice production. The structure interview was tested reliability with 30 rice seed growers that not the sample in this study. The reliability of knowledge on rice seed production used the Kuder-Richarson reliability value of coefficient (KR-21) with the reliability value of 0.764 (Kuder and Richarson, 1937). The semantic differential scaling methods of attitude and rice seed production were obtained by internal consistency using Cronbach’s alpha with the values of 0.849 and 0.992 respectively (Cronbach 1951).

The data analysis utilized both descriptive and inferential statistics. Frequencies, percentages, arithmetic means, and standard deviations were used to describe the socio-economic, farm characteristics, farmers’ attitude, knowledge, and rice seed production. The stepwise multiple regression analysis (MRA) was applied for factors influencing rice seed production.

### ***Analytical Model***

The regression model is expressed implicitly as:

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_{14} x_{14} + \epsilon_i$$

Where;

Y = Rice seed production

$\beta_0$  = Constant

$\beta_k$  = Coefficients

$\epsilon_i$  = Error term

$x_1$  = Gender (male = 1, female = 0)

$x_2$  = Age (years)

$x_3$  = Education level (number of years of formal education)

$x_4$  = Experience of rice seed production (years)

$x_5$  = Labour of seed production (persons)

$x_6$  = Farm area (rais)

$x_7$  = Income from rice seed production (THB)

$x_8$  = Information obtained

$x_9$  = Knowledge

$x_{10}$  = Attitude

### **Results**

#### ***Socio-Demographic Background of Respondents***

Table 1 showed that the majority of respondents was male (71.4%), average age 52.34 years, completed primary school (79.7%), average rice seed production experiences 16.64 years, average rice production area 14.21 rais, average labor to produce rice seed 2.51 persons, average income 110,769.80 Thai Baht (THB)/household, 3 varieties of rice seed were used, i.e. IR15 (59.18%), IR6 (34.70%), and Kaw Dok Mali 105 (KDML 105) (6.12%), and average yield of rice seed production 406 kilograms/rai.

**Table 1** Socio-demographic backgrounds and farm characteristics of respondents.

(N=182)		
<b>Characteristics</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Gender of household head</b>		
Male	130	71.4
Female	52	28.6
<b>Age (mean = 52.34 years)</b>		
21-35	8	4.39
36-50	71	39.02
51-65	91	50
> 65	12	6.59
<b>Education level of household head</b>		
None education	1	0.5
Primary school	145	79.7
junior high school	12	6.6
Secondary school	18	9.9
Diploma	3	1.6
Graduate education	2	1.1
Postgraduate	1	0.5
<b>Experience in farming (mean = 16.64 years)</b>		
> 20 years	134	73.62
21 – 40 years	47	25.82
< 41 years	1	0.54
<b>Rice seed area (mean = 14.21 rais)</b>		
Small (2.5-6.5 rais)	11	6.04
Medium (6.6-19 rais)	127	69.78
Large (> 19 rais)	44	24.17
<b>Family labour (mean = 3 persons)</b>		
< 3	113	62.08
3-5	69	37.91
<b>Rice seed income (mean = 110,769.80 THB / year)</b>		
< 40,000 THB	4	2.19
40,001 – 50,000 THB	7	3.84
50,0001 – 100,000 THB	83	45.60
100,001 – 200,000 THB	81	45.05
> 200,000 THB	7	3.84

***Information obtained on rice seed production***

Table 2 showed that the overall of information obtained on rice seed production by farmers was high level ( $\bar{X}$ =4.20). Consideration divided into types of extension for information obtained, the results showed that the information obtained was the high levels in all types. The average of individual contact, group contact, and mass contact were 4.37, 4.21, and 4.02, respectively.

**Table 2** Information obtained on rice seed production divided by type of extension.

Type of extension	$\bar{X}$	SD	Level of information obtained
Individual contacts	4.37	0.56	High
Group contacts	4.21	0.55	High
Mass contacts	4.02	0.01	High
<b>Grand mean</b>	<b>4.20</b>	<b>0.48</b>	High

### *Farmer knowledge of rice seed production*

Table 3 showed that the majority of farmers (86.30%) had the knowledge at a medium level of rice seed production. The average score was 15.36. The findings indicated that the training and advisory service should be provide for the farmers continuously.

**Table 3** Overall knowledge level of rice seed production.

(N = 182)

Knowledge level (Score)	Rice seed farmers	
	No.	%
1. Low (up to 14.67)	13	7.10
2. Medium (14.68-16.04)	157	86.30
3. High (16.05 and above)	12	6.60
Grand mean = 15.36, SD = 0.69		

### *Farmer attitude towards rice seed production*

The study of farmer attitude towards rice seed production in 3 aspects were working proficiencies of extension officers, leadership of extension officers, and technology to produce rice seed production. The results revealed that the overall farmer attitude strongly agreed with rice seed production ( $\bar{X} = 4.63$ ). When considering on each aspect, indicated that the leadership of extension officers towards rice seed production had strongly agreed ( $\bar{X} = 4.67$ ), while proficiencies of extension officers and technology to produce rice seed production determined attitude to agree ( $\bar{X} = 4.48, 4.43$ , respectively). (Table 4). The farmer attitude findings indicated that there was an opportunity to implement rice seed production with the growers involve in the study.

**Table 4** Farmer attitude towards rice seed production. (N =182)

Item	Frequency Scale (%)					$\bar{x}$	SD	Attitude meaning
	Strongly agree	Agree	Un-decided	Dis-agree	Strongly disagree			
1. Performance Proficiencies of extension officers	62.7	12.6	24.7	-	-	4.48	0.46	Agree
2. Leadership of extension officers	81.0	29.0	-	-	-	4.67	0.30	Strongly agree
3. Technology to produce rice seed production	38.6	54.3	7.1	-	-	4.43	0.41	Agree
<b>Grand mean</b>						<b>4.63</b>	<b>0.39</b>	Strongly agree

**Note:** 1.00-1.49 = strongly disagree  
 1.50-2.49 = disagree  
 2.50-3.49 = undecided  
 3.50-4.49 = agree  
 4.50-5.00 = strongly agree

### *Farmer practice on rice seed production*

The results of the farmer practice in rice seed production within 8 main items followed the process of Rice Department were presented in Table 5. The results revealed that the overall of farmer practice of rice seed production was high with the mean score of 67.90 points, maximum score of 72 and minimum score of 64.99 point. Consideration of each item revealed that the farmer practice in rice seed production at the high level all aspects including 1) seed preparation, 2) soil preparation, 3) cultivation, 4) attendance, 5) contaminated seed elimination, 6) harvesting, 7) Moisture reduction, and 8) seed storage. It might be due to the farmer had high experience, was trained, was continuously followed by extension officers.

**Table 5** Farmer practice degree on rice seed production. (N = 182).

Item of rice seed production	$\bar{x}$	SD	Min	Max	Farmers' Practice degree
1. Seed preparation (0-6)	5.40	0.27	3.99	6.00	High
2. Land preparation (0-12)	10.50	0.185	9.00	12.00	High
3. Cultivation (0-8)	8.00	0.00	8.00	8.00	High
4. Attendance (0-8)	8.00	0.00	8.00	8.00	High
5. Seed contamination elimination (0-6)	6.00	0.00	6.00	6.00	High
6. Harvesting (0-10)	10.00	0.00	10.00	10.00	High
7. Moisture reduction (0-10)	10.00	0.00	10.00	10.00	High
8. Seed storage (0-10)	10.00	0.00	10.00	10.00	High
<b>Grand mean (0-72)</b>	<b>67.90</b>	<b>0.22</b>	<b>64.99</b>	<b>72</b>	High

### *Factors affecting rice seed production of farmers*

Table 6 illustrates the results of multiple regression analysis to determine factors affecting rice seed production of farmers. The results revealed that out of 10 variables, only 2 variable factors significantly ( $p < .01$ ) affected rice seed production. These variables were information obtained and attitude toward rice seed production. They were also capable of explaining the dependent variable by 80.5% ( $R^2 = .803$ ). The variables have gender, age, education, experience in rice seed production, household labour for seed production, farm size, income from rice seed production and knowledge in rice production were not significant in explaining the rice seed production of the area.

Information obtained of rice seed production had a positive relationship which was significant at the 1% level. This indicated that if the farmer received information of rice seed production in the better way, the operating process corresponded with the rice seed production would be more precise. The finding was supported by the research results of Suksombat (2003) and Roy and Hamid (2014) demonstrating obtaining information made the farmer being open-minded toward rice seed production technology. Furthermore, it was corresponded with the study of Ruansuk (2005) and Ajah (2014) found that obtaining information made the farmers getting more knowledge and be able to produce the rice seed according to the rice production standard of Local Rice Production Project of farmers in Sing Buri Province, Thailand.

In the case of the factor having negative coefficient was the attitude towards rice seed production, which might be due to the processes of rice production that needed to follow the processes provided by Rice Department. Moreover, the promoting officers should intimately follow the processes of rice production. If the quality of rice seed does not pass the mentioned production processed, those cannot be traded to a government sector, which is Rice Seed Center. The findings was consonance with the study of Sawasdeemongkol (2002) and Termsrirat (2009) revealing that the attitude affecting technology accepting of farmers according to Local Rice Seed Production Promoting Project.

**Table 6** Multiple regression analysis estimated factors affecting rice seed production of farmer.

Variables	B	Std.Error	Beta	t	p-value
Constant	62.764	1.228		51.128	.000**
Gender	.093	.114	.030	.851	.461
Age	.002	.006	.012	.290	.722
Education	-.005	.018	-.011	-.274	.784

Experience in rice seed production		-0.009	.006	-0.066	-1.546	.124
Labour of seed production		-.110	.061	-.069	-1.814	.071
Farm area seed		.007	.010	0.31	.739	.461
Rice seed production income		4.101E-8	.000	.003	.070	.944
Information		3.191	.133	1.092	23.921	.000**
Knowledge		.051	.071	.026	.718	.474
Attitude		-1.920	.187	-.469	-10.288	.000**
<i>Multiple R</i>	=	.896	<i>F</i>	=	69.890	
<i>Multiple R</i> <sup>2</sup>	=	.803	<i>Sig. F</i>	=	.000	
<i>SE<sub>est</sub></i>	=	.64002	<i>Durbin Watson</i>	=	1.004	

\*\* significant at level 0.01

## Conclusion

This paper investigated factors affecting rice seed production of farmers in Sakon Nakhon province, Thailand. The results revealed that the overall farmer practice on rice seed production was the high level while the knowledge was the moderate level and strongly agreeable attitude respectively. The results of multiple regression analysis to determine factors affecting rice seed production of farmers revealed that only 2 variable factors significantly ( $p < .01$ ) affected rice seed production. These variables were information obtained and attitude. Information obtained had a positive relationship, whereas, attitude was negative. The model was also capable of explaining the dependent variable by 80.5% ( $R^2 = .805$ ). The findings suggested that training and advisory service of the extension officer should be provide to both individual and groups continuously.

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