J. Agr. Sci. Tech. (2019) Vol. 21(6): 1367-1377

Assessment of Farmers' Perception on Rice Seed Production Standard in Nakhon Sawan Province, Lower Northern Thailand

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ABSTRACT

The objectives of this investigation were to determine general background of farmers, their existing rice seed production condition, their perception of rice seed production standard, and constraints on farmers' rice seed production. The sample of 66 selected rice farmers in Thamai Sub-District, Chumsaeng District, Nakhon Sawan Province was estimated using the formula developed by Arkin (1974) through multistage sampling technique. Data was obtained by interview schedule under close observation and in-depth discussion with key persons in the research site. The results revealed that average age of respondent was 48.09 years. Average year of rice seed cultivation experience was 4.36 years. The average size of owned land for seed cultivation was 3.36 hectares. Total seed cultivation land, accounting for 74.88%, was farmers' owned land that they inherited from their parents. These can reduce the risk in farming because it is their own land. The results of assessment of farmers' perception indicated that most of respondents had the required knowledge in seed production standard. They could answer correctly questions regarding rice seed production technology. Most of them had positive attitude toward the proposed standard practice. Nearly 60% of the respondents followed the right production practices. Farmers' characteristics factors affecting seed yield were number of extension contact, farm media perception, and participation in community intervention program, respectively. The constraints in rice seed production improvement were high cost of inputs, high cost of fertilizer, low rice price, and climate variability, respectively.

Keywords: Arkin formula, Efficient use of inputs, Good quality seed, Seed standard.

INTRODUCTION

Rice is an important economic crop because it is the staple food for a large part of the world's human population, especially in Asia. It has significant impact on the country's food security. Rice is cultivated in more than a hundred countries with a total cultivated area in 2013 of approximately 162 million hectares, producing more than 700 million tons annually. This volume is approximately around 470 million tons of milled rice. Furthermore, over 90% of the world's rice is produced and consumed in Asia (United States Department of Agriculture, USDA, 2014a; Hossain and Narciso, 2004)

In Thailand, rice is a vital major economic crop. Land use in crop year 2013/2014 was around 70.28 million rai (11.24 million hectares, 1 ha= 6.25 rai), accounting for at least 50% of farm holding land in 2013. Total production in the same year was 36.84 million

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[DOR: 20.1001.1.16807073.2019.21.6.8.7]

tons (Office of Agricultural Economics, OAE, 2015). In each year, domestic consumption is around 55% of total production. The rest, i.e. around 45% is exported as the main export commodity of the whole kingdom. Thailand is always the leading rice exporter of the world, except in 2012 (when we had the rice pledging scheme of Prime Minister Yingluck Shinawatra), with market share of around 25.33%. The other exporters were India, Viet Nam, Pakistan, and United States, accounting for 25.19, 14.61, 8.31, and 6.92%, respectively (USDA, 2014b). However, the average yield in Thailand is less than other countries. Regarding the cause of low yield in Thai rice production, Mutert and Fairhurst (2002) pointed out that the main contributing factors are the lower yield potential of the dominant rainfed system, greater use of traditional varieties instead of modern varieties, and low efficiency in management of water and nutrients.

Regarding most serious concern in rice production, Srisuantang *et al.* (2009) found that the main constraint was the limited supply of good quality seed, which could not meet farmers' high demand. A different demand for various cultivars in a different region is also one kind of serious concern in good quality seed supply.

The demand forecast for both quantity and type of cultivars are more dynamic and difficult because of many reasons such as difference in environment for each regional, different demands of customers, and climate variability. In addition, rice weed problem is also a serious concern in good quality seed production. Furthermore, Bureau of Rice Seed (2010) also pointed out that the good quality seed is the most important factor in rice production improvement because it will lead to low cost and productivity enhancement.

In view of the solutions in these kinds of constraints, Redfern *et al.* (2012) recommended that policy and farm practices planning must be based on actual knowledge of the systems that are already in place, but with emphasis on new adjustment to make them function with much greater efficiency in the future. Improved knowledge and technology concerning efficient use of input and research on stress-tolerant species need to be developed to allow farmers to increase the value of both the primary product of their enterprise as well as its by-products. Then, the quality of farmers education plays an important role in addressing sustainable livelihoods and in meeting the need to provide food for all, raising rural income, reducing poverty, and sustainably managing the environment and natural resources.

In order to develop farmers' seed production towards production standard, this investigation aimed to set up some policy oriented and implementation oriented to fulfill their capability from their potential.

MATERIALS AND METHODS

The Study Areas

This study was conducted in Thamai Sub-District, Chumsaeng District, NakhonSawan Province in the lower northern of Thailand. The research site ranks the top in the northern region in terms of rice cultivated areas (17%) and yield (1%) in the total region. Besides, farmers in this research site have been carrying out efficient production technology dissemination through intervention program on rice seed production standard and community empowerment by Nakhon Sawan Rice Seed Center, Rice Department, Ministry of Agriculture and Cooperatives, since 2006 until present (Figure 1). The climatic condition in the study areas is Tropical Savanna (Am) with 3 seasons including rainy season, hot season, and cool season, with the average annual temperature of 28.42°C, relative humidity of 74.03%, and evaporation of 133.41 mm per month. The average number of rainy days is 8.25 days per month. The average monthly rainfall is 95.53 mm per month with 2.88 mm per day. Majority of the land, accounting for 64.56% of the total land, is suitable for rice cultivation.

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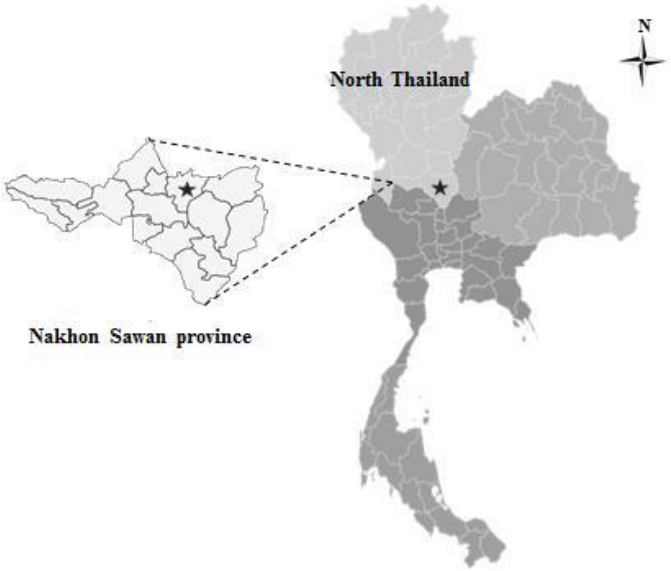

Figure 1. Location of the study areas. Source: Compiled from Land Development Department (2017).

The period of study was in crop year 2013/2014. There were 15 villages with 2,479 households. Total population was 8,147 persons with 51.44% female and 49.56% male. The population density was 138 persons per square kilometer. The major occupation was rice cultivation (48.37%), followed by fruit and vegetable cultivation (22.63%), labor (15.61%), trader (1.82%), sugar palm reaper (1.41%), livestock (1.25%), and others (8.91%), respectively.

Population and sampling technique

Population of the study consisted of 736 rice farmers in Thamai Sub-District, Chumsaeng District, Nakhon Sawan province in crop year 2013/2014. Studied sample was 66 selected rice farmers that was estimated by using the formula of Arkin (1974) through multistage sampling technique in each village.

Data Collection

Data was collected in major rice crop year 2013/2014 from respective selected rice farmers by means of an interview schedule under close observation and also in-depth discussion with key persons in rice seed production supply chain. The interview schedule was tested with 30 rice seed farmers in Chedi Hak Sub-District, Mueang District, Ratchaburi Province. Testing of reliability coefficient (KR20) revealed the reliability value as 0.89 (Kuder and Richardson, 1937) before data collection. After testing, the interview schedule was improved into appropriate form for gathering data in the research site.

Statistical Analysis

Descriptive statistics including frequencies, percentages, arithmetic means, and standard deviations were used to describe general background of farmers, their existing rice seed production, and farmers' knowledge on rice seed production standard.

Perception Measurement

Farmers' knowledge on rice seed production standard was measured by correct answers

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in rice seed production technology. The Percentile rank and T-score formula (Garrett, 1976; Aungsuratana, 2013) were employed to analyze the level of farmers' capability based on their scores on given question.

Farmers' attitude on rice seed production improvement towards standard was measured by rice farmers' opinions in the feasibility of practicing rice seed production technology. The positive and negative opinion scale consisted of 11 scales and the scale was divided into 5 levels from Thurstone scale (Thurstone, 1959) as follows: 1.00-3.00= Strongly disagree, 3.01-5.00= Disagree, 5.01-7.00= Uncertain, 7.01-9.00= agree, 9.01-11.00= Strongly agree.

Farmers' practice on rice seed production standard was measured by the marking of score. These score referred to their actual operation in any step of rice seed production standard by ranking the score of "Always practice= 1" and "Never practice= 0".

RESULTS AND DISCUSSION

General Background of Farmers and Their Existing Rice Seed Production

As shown in Table 1, the average age of farmer was 48.09 years. The study implied that, according to FAO, most of the respondents were in active labor force (15-64 years). Most of them (59.09%) had, at least, primary education. The rest had attended high school education or vocational training, secondary education, bachelor's degree, and diploma, respectively. Results revealed that all respondents were educated, in particular, primary or compulsory education as commonly found in rural areas in Thailand. The average year of farmers' rice cultivation experience was 21.18 years. The average year of seed cultivation experience was 4.36 years. Regarding experiences in rice seed production training, the average attendance was 1.73 times per year. The study indicated that most of respondents had an opportunity to attend training in rice seed production in crop year 2013/2014 at least once, because these areas have high potential for rice seed cultivation. They also received new information and some techniques in rice cultivation from training such as alternate wet and dry practice and integrated pest management.

In terms of land tenure status, the average land tenure for seed cultivation was 3.83 hectares per household, which was similar to size of northern Thailand in 2013 that was 4 ha (OAE, 2014). Land in the research site is suitable for rice cultivation. Most population in this community cultivated rice as the major or minor occupation. The average number of owned land for seed cultivation was 3.36 hectares. Total seed cultivation land, accounting for 74.88%, was farmers' owned land that they inherited from their parents. This could reduce the risk in

Table 1. General information of farmers' rice seed production in the study areas (n= 66).

Item	Minimum	Maximum	*X*	*SD*
Age (Year)	27	80	48.09	9.31
Experience in rice cultivation (Year)	2	60	21.18	13.76
Experience in rice seed cultivation (Year)	1	14	4.36	3.31
Experiences in rice seed production training (Time/Year)	4	1	1.73	1.26
Number of total land tenure for seed cultivation (Hectare/Household)	0.48	12.80	3.83	15.90
Number of owned land for seed cultivation (Hectare/Household)	0.48	12.80	3.36	16.80
Number of rented land for seed cultivation (Hectare/Household)	0.96	6.88	2.59	9.95

Source: Survey (2015).

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farming because it is their own land. Concerning number of rented land, most of farmers (66.67%) did not have rented land for seed cultivation because majority of them used their own land for seed production. The average number of rented land was 2.59 ha.

Farmers' Knowledge on Rice Seed Production Standard

The level of suitable knowledge in rice seed production technology consists of 7 main items with 46 sub-items. The main items include: (1) Land location, (2) Land preparation, (3) Seed preparation, (4) Cultivation and maintenance, (5) Field inspection and roguing, (6) Harvest, and (7) Postharvest management.

The percentile rank and T-score formula were obtained to determine the level of farmers' knowledge based on their scores as shown in Table 2. The respondents' knowledge were in the moderate level (39.39%), high level (37.88%), and lower level (22.73%), respectively. The maximum normalized T-score of farmers' knowledge was 70.40, with the minimum of 33.09 and the average of 50.56. The results revealed that more than 60% of respondents had the required knowledge in seed production standard. This implied that the majority of respondents had high capability to understand the concept and principle of rice seed production technology. This is because they always received new information about rice technology from concerned agencies including public and private agencies.

As presented in Figure 2, farmers could answer correctly questions regarding rice seed production technology, particularly the item on harvest, which was correctly answered by all of them. The rest were the items of land location (90.91%), land preparation (86.36%), cultivation and maintenance (83.33%), field inspection and roguing (72.72%), postharvest (53.03%), and seed preparation (50.00%). The high percentage of correct answers is because farmers had long experience and had gained knowledge and skill in rice technology by

Table 2. Level of farmers' knowledge on rice seed production standard (n=66).[a]

Score	Frequency	Cumulative frequency	Percentile	Normalized *T*-score	Level
45	1	66	99.24	70.40	
44	4	65	95.45	68.71	
43	3	61	90.15	67.01	High
42	1	58	87.12	65.32	(22.73%)
39	3	57	84.09	60.23	
38	3	54	79.55	58.53	
37	4	51	74.24	56.84	
36	4	47	68.18	55.14	
34	2	43	63.64	51.75	Moderate
33	5	41	58.33	50.05	(39.39%)
32	3	36	52.27	48.35	
31	8	33	43.94	46.66	
30	5	25	34.09	44.96	
29	5	20	26.52	43.27	
28	6	15	18.18	41.57	
27	1	9	12.88	39.87	Low
26	1	8	11.36	38.18	(37.88%)
25	2	7	9.09	36.48	
24	3	5	5.30	34.79	
23	2	2	1.52	33.09	

[a] Steps to calculate level of farmers' knowledge

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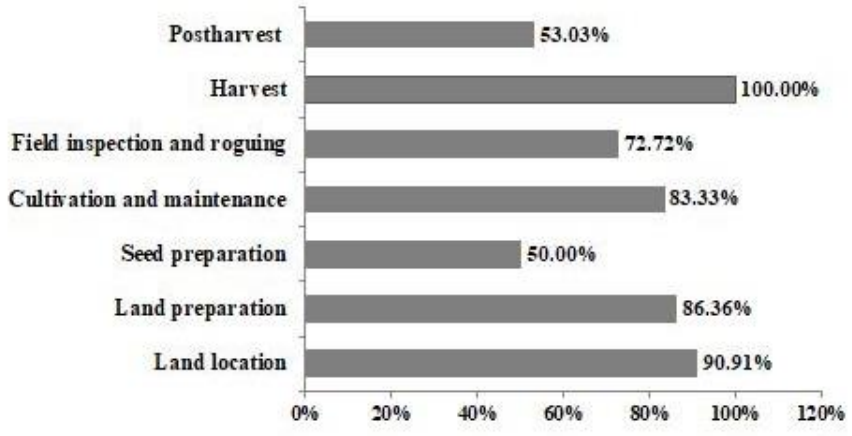

Figure 2. Distribution of farmers' correct knowledge on seed production standard (Source: Survey, 2015).

various extension methods and they learned from concerned agencies in programs such as field visit, training, demonstration, and field trip.

Farmers' Attitude on Rice Seed Production Standard

Regarding evaluation of farmers' attitude on rice seed production standard, ranging from "strongly disagree" to "strongly agree", the findings revealed that the respondents had agreeable attitude (71.21%), strongly agreeable attitude (27.27%), and uncertain attitude (1.52%), respectively. As shown in Figure 3, there were 3 main items that the respondents strongly agreed. These were harvest, land location, and land preparation with average score of 4.79, 4.75, and 4.53, respectively. The rest were 4 main items that the respondents agreed. These were postharvest, field inspection and roguing, seed preparation, and cultivation and

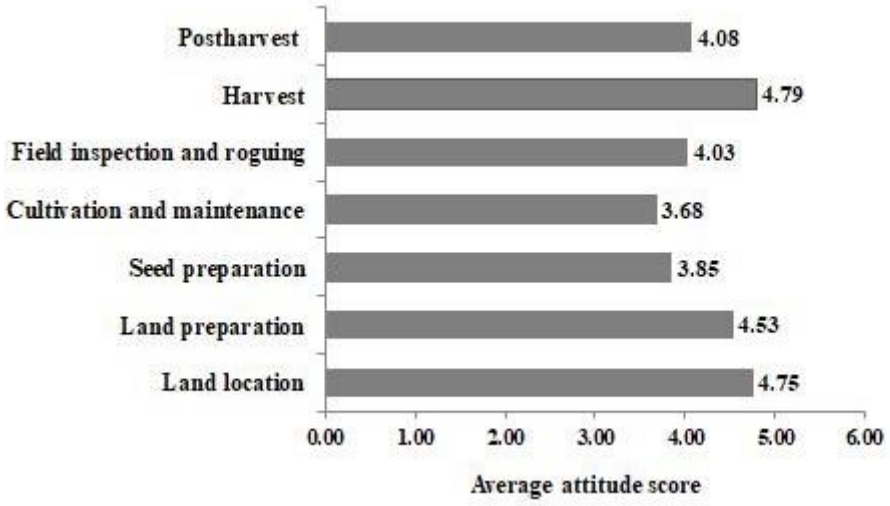

Figure 3. Distribution of farmers' attitude on seed production standard. Note: Average score 4.25-5.00= Strongly agree, 3.41-4.20= Agree, 2.61-3.40= Uncertain, 1.81-2.60= Disagree, 1.00-1.80= Strongly disagree. Source: Survey (2015).

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maintenance with average score of 4.08, 4.03, 3.85, and 3.68, respectively. This is because all respondents used combine harvester for seed harvesting. They were very worried about contamination from combine harvester that causes lower seed standard. Therefore, they strongly agreed with cleaning before harvesting. In addition, they trusted the officer who helps them to determine harvesting time. Moreover, they strongly agreed with land location and land preparation. It is because they stated that the land for seeding must be a suitable land and appropriate land preparation can increase both quality and yield.

Farmers' Practice on Rice Seed Production Standard

Farmers' practice level on seed production standard can be divided into 3 levels including good level (score more than 28.75), moderate level (score between 19.01-28.75) and poor level (score less than 19.01). As presented in Figure 4, the results revealed that most of respondents had practice scores in moderate level, accounting for 59.09%. The rest were in poor level and good level, accounting for 24.24 and 16.67%, respectively. The maximum practice score was 37 points; with the minimum practice score of 14 and the average practice score of 23.88. The findings revealed that almost 60% of respondents had the right moderate practice. However, some respondents still had the poor practice. This is because they had less experience and some of them changed their occupation from non-farm labor to seed producer, for which they did not have the experience.

Summary of Farmers' Perception on Seed Production Standard

Considering farmers' perception (knowledge, attitude, practice) on the 7 main items of rice seed production standard as presented in Table 3, the findings revealed that the majority of respondents had correct knowledge and good attitude in all items including land location, land preparation, seed preparation, cultivation and maintenance, field inspection and roguing, harvest, and postharvest. On the contrary, there were 2 items that most of the respondents did not practice. These were seed preparation and postharvest. Therefore, concerned agencies should encourage them to correctly practice. This encouragement should be done under the process of learning y doing and participation approach.

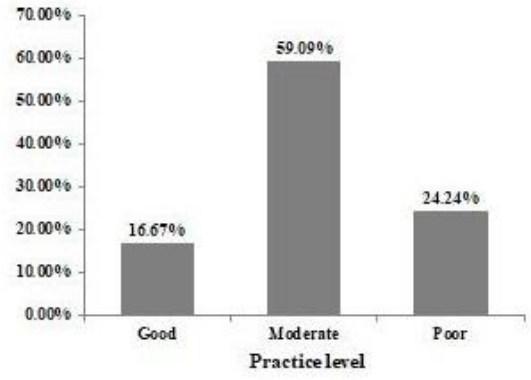

Figure 4. Evaluation of farmers' practice on seed production standard. Note: Min= 14 Average attitude score, Max= 37, *X*= 23.88 points, *SD*= 4.87. Practice level was classified into 3 levels as follow; Moderate level= 19.01-28.75 (23.88-4.87=19.01 to 23.88+4.87=28.75), Good level= More than 28.75, Poor level= Less than 19.01. Source: Survey (2015).

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Table 3. Summary of farmers' perception on rice seed production standard (n= 66).

Item	Correct knowledge (%)	Practice (%)	Attitude level[a]
Land location	90.91	78.79	Strongly agree
Land preparation	86.36	74.24	Strongly agree
Seed preparation	50.00	39.39	Agree
Cultivation and maintenance	83.33	63.63	Agree
Field inspection and roguing	72.72	68.18	Agree
Harvest	100.00	98.48	Strongly agree
Postharvest	53.03	6.06	Agree

[a] Agree refers to positive attitude score that is 3.41-4.20. Strongly agree refers to positive attitude score that is 4.21-5.00. Source: Survey (2015).

Factors Affecting Rice Seed Yield

Pearson product moment correlation coefficient was determined for farmers' characteristics factors affecting seed yield. The correlation analysis showed that the three factors affecting seed yield were number of extension officers' contact, farm media perception, and participation in community intervention program, respectively.

As shown in Table 4, the results revealed that there was significant positive correlation between number of extension contacts and seed yield at the level of .01. It can imply that, if farmers had more contact with extension officers, they may have more yield. It is because these officers guided farmers in how to enhance rice productivity by various techniques. Moreover, the officers always visit farmers' field. The officers always inspect the fields and give advice to solve farmer's problems.

In addition, farm media perception was positively correlated with seed yield at the .01 significant level. It means that if farmers had received more media perception, they may have more yield. Generally, farmers received rice seed production information from their neighbor, relatives, and group leader. They always exchanged information regarding their occupation, farming practice, management method, and daily life. It may be stated that this community had good networking that was the basis of successful community empowerment. In addition, the majority of respondents had an opportunity to attend training, field study, and demonstration from concerned agencies. These respondents had an opportunity to exchange their knowledge and experience in rice production with rice experts, leadership, and progressive farmers.

Furthermore, we found that there was significant positive correlation between participation in community intervention program and seed yield at the level of .05. It also implied that if farmers had more participation in community intervention program, they may have more yield. It is because the intervention program is useful to improve production towards standard for

Table 4. Relationship between some characteristics of farmers and seed yield (n= 66).

Characteristics factors of farmers	Seed yield
Number of extension officers' contact	.518**
Farm media perception	.445**
Participation in community intervention program	.251*

* Significant at the .05 level, ** Significant at the .01 level.

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seed certification. The projects supported farmers to develop rice seed production towards standard.

Constraints on Farmers' Rice Seed Production

Regarding rice seed production improvement in the study areas, the investigation found 4 important problems that accounted for more than 50% of the respondents' responses, as shown in Table 5. These were high cost of input, high cost of fertilizer, low rice price, and climate variability, respectively.

Due to those serious concerns, the farmers were anxious in their production cost reduction and tried to produce compost to reduce cost of fertilizer; and used their own family labor to reduce labor cost.

CONCLUSIONS

The average age of the respondents was 48 years and the majority were in active labor force (15-64 years). Most of them had, at least, primary education (59.09%). The average year of seed cultivation experience was 4.36 years, with an average attendance in rice seed production training of 1.73 times per year. The study indicated that most of the respondents had an opportunity to attend training in rice seed production in crop year 2013/2014, at least once. They received new information and some techniques in rice cultivation from training. Concerning farmers' perception on rice seed production standard, the findings revealed that the majority of respondents had suitable knowledge and good attitude in all items including land location, land preparation, seed preparation, cultivation and maintenance, field inspection and roguing, harvest and postharvest. On the contrary, there were 2 items that most of the respondents did not practice. These were seed preparation and postharvest practices. Testing hypothesis indicated that the number of extension officers' contact, farm media perception, and participation in community intervention program affected seed yield.

Based on the results, the recommendations include: Increasing the efficiency of rice marketing system, in particular providing a reasonable price and preventing the risk of price such as promoting seed future market, providing efficient and reliable up-to-date rice market information for farmer, and setting information center in the community because most of respondents (56.06%) had faced price fluctuation problems. Farmers could not set their output price. The rice price depends on several factors, particularly government policy. Support farmer's knowledge development on rice marketing by promoting appropriate rice seed price, providing rice market information, and facilitating farmers' access to rice market. This is important because price fluctuation is a serious constraint in the research site and it directly affects farmers' income, Strengthen and develop the group as small seed enterprise through SMEs towards community empowerment. This will increase farmers' group potential and higher income. It is because majority of respondents had high capability to produce standard. Concerned agencies should urgently provide the knowledge and practice that most of farmers are still lacking, in

Table 5. Constraints in rice seed production improvement (n= 66).

Items	Constraints	
	No	Percentage
High cost of input	39	59.09
High cost of fertilizer	37	56.06
Low rice price	37	56.06
Climate variability	34	51.52

Source: Survey (2015).

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particular with regard to seed preparation. This is because the investigation found that most farmers had less knowledge and practice in this item. Some farmers' characteristics that had significant relationship with seed yield and should seriously be considered include number of extension contact, farm media perception and participation in community intervention program, respectively.

ACKNOWLEDGEMENTS

The authors would like to gratefully acknowledge The Royal Golden Jubilee Ph.D. Program (RGJ) under the Thailand Research Fund (TRF) for funding this research, Kasetsart University for study support, Chiba University for research support, the invaluable participation of all concerned agencies, farmers, collectors, and rice experts is also acknowledged.

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ارزیابی ادراک کشاورزان از استاندارد تولید دانه برنج در استان Nakhon Sawan در منطقه پائینی شمال تایلند

ک. کومانه، ا. آونگسوراتانا، س. روجاناریدپیچد، س. چانپرام، ک. ویجیتسریکامول و س. ساکورایی

چکیده

هدف های این پژوهش تعیین معلومات قبلی وعمومی کشاورزان، وضعیت موجود تولید دانه برنج، ادراک آنها در باره استاندارد تولید دانه برنج، و محدویت های کشاورزان درتولید برنج بود.کشاورزان مطالعه شده شامل ۶۶ نفر از زیر-بخش Thamai، در بخش Chumsaengدر استان Nakhon Sawan بود که تعداد آن ها برای این بررسی با استفاده از فرمول Arkin (1974) و کاربرد روش نمونه برداری چند مرحله ای تعیین شد. داده های پژوهش با انجام برنامه مصاحبه تحت نظارت دقیق و نیز بحث و گفتگوی عمیق با افراد کلیدی در منطقه مورد مطالعه به دست آمد. نتایج آشکار ساخت که میانگین سن کشاورزان مصاحبه شده ۰۹/۴۸ سال و میانگین سالهای تجربه آنها در کشت وکار برنج ۳۶/۴ سال بود. میانگین مساحت زمین برای تولید برنج که در مالکیت آنها بود به ۳۶/۳ هکتار بالغ می شد. سطح کل تولید دانه برنج بالغ بر ۸۸/۷۴٪ در مالکیت کشاورزان بود که از والدین خود به ارث برده بودند. در این شرایط ریسک کشاورزی کاهش می یابد زیرا زمین مال خود آنهاست. نتایج ارزیابی ادراک کشاورزان حاکی از آن بود که بیشتر مصاحبه شدگان معلومات لازم برای رعایت استاندارد تولید دانه برنج را داشتند. آنها توانستند به سوالات مربوط به فناوری تولید دانه برنج پاسخ درستی بدهند. بیشتر آنها نسبت به فعالیت های استاندارد پیشنهادشده نظر مثبتی داشتند. تقریبا ۶۰٪ مصاحبه شدگان عملیات تولید درستی به کار می بردند. عوامل ویژه کشاورزان که بر عملکرد دانه تاثیرگذار بودند به ترتیب شامل تعداد دفعات تماس مروجان، ادراک های (ناشی از) رسانه های کشاورزی، و مشارکت در برنامه های مداخلات جامعه بود. محدویت ها در بهبود تولید دانه برنج به ترتیب عبارت بود از هزینه بالای نهاده ها، گران بودن کود شیمیایی، پایین بودن قیمت برنج، و تغییرات آب وهوایی.

[DOR: 20.1001.1.16807073.2019.21.6.8.7]