Factors Affecting Farmers’ Acceptance of Highland Paddy Rice Variety Planting in Chiang Mai Province

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Abstract

Rice has been the national food in Thailand and the most important economic crop bringing numerous incomes to the country for a long time. Farming is the main occupation of most Thai people. The most popular and famous rice variety in Thailand is Khao Dok Mali 105. In the research, it is to study factors affecting farmers’ acceptance of highland paddy rice. From the population of 244,291 ethnic farmers in Chiang Mai, the sample was 400 ethnic farmers who plant highland paddy rice in Chiang Mai Province by calculating from Taro Yamane’s formula. The research instrument was a four-part questionnaire. However, two farmers did not complete the questionnaire, so the sample remained 398 farmers. Statistics for analysis consist of frequency, percentage, mean, standard deviation, and logit model. The findings revealed that five factors affected farmers’ acceptance of highland paddy rice planting in Chiang Mai Province including gender, education, rice planting experience, monthly average income, and the number of labourers in the household, which were all statistically significant at p≤0.01. ‘Gender’ could decrease farmers’ acceptance of highland paddy rice planting in Chiang Mai Province in the percentage of 12.10. ‘Education’ could increase farmers’ acceptance of highland paddy rice planting in Chiang Mai Province in the percentage of 43.20. ‘Rice planting experience’ could decrease farmers’ acceptance of highland paddy rice planting in Chiang Mai Province in the percentage of 57.30. ‘Average monthly income’ could increase farmers’ acceptance of highland paddy rice planting in Chiang Mai Province in the percentage of 38.80. ‘Number of household labourers’ could increase farmers’ acceptance of highland paddy rice planting in Chiang Mai Province in the percentage of 21.50. For problems and barriers of the farmers planting highland paddy rice varieties in Chiang Mai Province, it was revealed that the farmers had two problems at the highest-level including paddy rice seed shortage for planting and co-growers’ internal problems.
Keywords: Chiang Mai Province, Ethnic Farmers, Farmer’s Acceptance, Highland Paddy Rice, Khao Dok Mali 105.

1. Introduction

Rice has been the Thai national food plant with a long history that has appeared in the Thai civilization for no less than 5,500 years. Rice is the main food plant and culture plant of highland ethnic farmers who plant local varieties. It is grown for household consumption as well as to be the main occupation and create food stability. In the past, there was shifting cultivation that later was changed to rice planting once a year. At present, ethnic groups face the problem that rice is in short supply for consumption in some areas due to low production; some areas buy rice from outside the areas to consume. Consequently, a local fragrant rice variety was developed to have a higher production according to the genetic resources and food plant nutrients research group of Chiang Mai University (CMUPNlab). Fragrant rice is widely known in groups of rice growers, merchants, and consumers, due to its fragrance when cooked. Rice is grown in countries that are important producers and rice exporters in the world such as the Basmati variety (from India and Pakistan) and the Kalijira variety (Singh et al., 2000).

Fragrant rice in Thailand is widely grown in all regions which also have steamed rice, sticky rice, local rice varieties, and bred rice varieties, such as Khao Dok Mali 105, Pathum Thani 1, RD6, RD15, et cetera; the most popular and famous rice variety for the country is Khao Dok Mali 105. In addition to the aforementioned rice varieties, there are Thai fragrant rice varieties such as Hom Nang Mol, Hom An, Hom Dong, and Hom Jan, which are steamed rice; there is also sticky rice such as RD6 and Dok Hom. It was reported that there were more than 155 fragrant rice varieties in Thailand (Saengnual, 2005). Fragrance rice is considered an important factor in setting rice prices; fragrant rice has a higher selling price than non-fragrant rice. In 2017 (November 2016 – October 2017), it was revealed that fragrant rice was sold at 1,825 – 3,133 baht per 100 kilograms, and 5% white rice (non-fragrant rice) was sold at 1,125 – 1,205 baht per 100 kilograms. The low production ability was due to low adaptation to the environment ability and low disease and insect resistance ability. Nevertheless, local rice varieties with unique genetics have adapted to the local environment well.

The characteristics of local varieties consist of many genotypes that adapt to the environment well. Mostly, similar phenotypes are found to be genetically diverse within the population. The diversity of each trait depends on the adapted and selected locality. Pure line selection in plant breeding, proposed by Johannsen, explained that self-pollinated plants have different characteristics due to genetic diversity or environmental influence. Allard (2001) explained the principle of plant breeding, that the pure breed must be only an offspring of the
homogeneous homozygous population consisting of three main steps. The first step is to select plants from the heterogeneous population such as local varieties which are selected by the single-plant selection, the seeds from each plant are then separated and planted in one line. The second step is to bring seeds from the first step plant to the row and select good lines which are considered for progeny testing. The final step is to compare varieties when the characteristics cannot be selected by eyesight; this step is to plant by using replicated trails as well as to compare standard varieties. In this step, varieties are compared after approximately three years (Allard, 1966; Poehlman & Sleper, 1995).

The fragrance that has a pandan-like scent is one of the important economic features affecting consumption and price setting. The characteristics of fragrance can be found in many food plants including food products, vegetables, and some meats (Adams & De Kimpe, 2006; Wakte et al., 2017), which are a mixture between essential substances and many semi-essential substances. The most common important substance is 2-acetyl-1-pyrroline (2AP) (Buttery et al., 1982) caused by proline (Yoshihashi et al., 2002) that is controlled by the recessive gene, BADH2 (Bradbury et al., 2005). It is characterized by eight nucleotides absence and there are three single nucleotide polymorphisms (SNPs) on Exon 7. From genetic analysis using different rice varieties, differences in the gene mutation location were reported by Shi et al. (2008) who showed a comparison between nucleotide sequences of fragrance genes in 24 fragrant rice varieties and 10 non-fragrant rice varieties. It was revealed that 12 fragrant rice varieties showed eight nucleotides were absent and there are three SNPs on Exon 7, while the other 12 fragrant rice varieties showed seven nucleotides absence on Exon 2. Besides, there was no aforementioned gene mutation in non-fragrant rice varieties or no SNPs on Exon 13 or Intron 1 in Japanese fragrant rice (Ootsuka et al., 2014). Functional markers have been developed for the BADH2 gene.

Rice fragrance is from a mixture between essential substances and many semi-essential substances which create a unique fragrance. The important substance that is mostly found is 2-acetyl-1-pyrroline (2AP) which is from proline (Yoshihashi et al., 2002) which rice fragrance can genetically inherit. However, rice fragrance is controlled by recessive genes. It is revealed that environmental factors and food nutrients are important factors affecting product growth and fragrance quality of fragrant rice as well as crop management (Gay et al., 2010; Li et al., 2016) such as food plant nutrients, fertilizing, planting system, type of soil, and post-harvest storage, as well as temperature during seed filling. Moreover, stress is found to affect fragrance levels such as salt stress and drought stress. For food plant nutrients, it not only affects the fragrance level but also affects seed quality. At present, the next-generation sequencing (NGS) technology which has a lower cost is being used as a technique for fast and accurate sequencing (Wilanto et al.,

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2012; Barabaschi et al., 2016) for diverse genomic and genetic research applications. Relevant gene locations directly help for selection in a rice plant breeding project.

Previously, the genetic resources and food plant nutrients researchers of the Agriculture Faculty, Chiang Mai University have studied and selected potential highland paddy rice (Chan-in et al., 2020) to breed the variety precisely by using high-efficiency sequencing technology for developing functional markers related to fragrance under food nutrition conditions that promote fragrance and increase productivity. Therefore, the research aims to study factors affecting the farmers’ acceptance of highland paddy rice planting in Chiang Mai Province. Furthermore, there are problems, barriers, and suggestions regarding the acceptance of highland paddy rice, especially the factors affecting the farmers’ acceptance of highland paddy rice varieties planting in Chiang Mai Province. Knowledge and promotion about the technology and planting of highland paddy rice varieties for the farmers in Chiang Mai Province, and a guideline for further research.

1.1 Objective

To study factors affecting the farmers’ acceptance of highland paddy rice planting

2. Methodology

The research was quantitative research to study factors affecting ethnic farmers’ acceptance of highland paddy rice planting in Chiang Mai Province by the following methods:

2.1 Population and Sample in Research

The population in the research was 244,291 ethnic farmers who plant highland paddy rice in Chiang Mai Province (Highland Research and Development Institute, 2018).

The sample was from Taro Yamane’s formula at p-value = 0.05 meaning 400 ethnic farmers who plant highland paddy rice in Chiang Mai Province.

2.2 Research Instrument

The instrument for research consisted of the questionnaire which was divided into four parts as follows:

Part 1: General information of the respondents in the checklist

Part 2: Academic service to promote highland paddy rice varieties planting of the farmers in Chiang Mai Province in the checklist
Part 3: Opinions about factors affecting the acceptance of highland paddy rice planting in Chiang Mai Province

The questionnaire was on a rating scale. By applying a Likert scale, five levels of acceptance score, which are highest, high, moderate, low, and lowest, were interpreted according to an interval scale (Kallaya, 2011, as cited in Traiyawong et al., 2017).

Part 4: Problems, barriers, and suggestions of the farmers who plant highland paddy rice in Chiang Mai Province

2.3 Checking Instrument Quality

1) Content validity is to analyze whether the generated questionnaire matches the content, covers the research objectives, and is suited to language use with respondents. This was achieved by consulting advisory committees.

2) Questionnaire reliability is to generate an interviewing questionnaire for a 30-person sample which has resembling characteristics to the sample in the research for finding Cronbach’s alpha to measure the questionnaire reliability quality. Normally, the acceptable value is more than 0.70.

2.4 Data Collection

The sources used in the research can be divided into two categories which are 1) secondary data: collected data from books, documents, and relevant reports, and 2) primary data: a questionnaire as an instrument for research data collection by individually collecting data from the farmers who plant highland paddy rice in Chiang Mai Province.

2.5 Data Analysis

In the research, a statistical package was used as follows. Part 1: general information of the respondents which was analyzed by using frequency and percentage, and Part 2: acceptance of highland paddy rice planting which was analyzed by using a logit model. The researcher collected data from 400 farmers who plant highland paddy rice in Chiang Mai Province who all returned the questionnaire, but two were incomplete questionnaires. Therefore, the sample for analysis was 398 farmers.
3. Empirical Results and Findings

Table 1 Factors Affecting Farmers’ Acceptance of Highland Paddy Rice Varieties Planting in Chiang Mai Province

<table>
<thead>
<tr>
<th>Variants</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>8.086</td>
<td>1.108</td>
<td>7.298</td>
<td>0.000*</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>-0.781</td>
<td>0.362</td>
<td>-0.101</td>
<td>-2.158</td>
<td>0.032**</td>
</tr>
<tr>
<td>Education</td>
<td>-0.404</td>
<td>0.075</td>
<td>-0.275</td>
<td>-5.385</td>
<td>0.000*</td>
</tr>
<tr>
<td>Rice planting experience</td>
<td>0.577</td>
<td>0.157</td>
<td>0.181</td>
<td>3.666</td>
<td>0.000*</td>
</tr>
<tr>
<td>Average monthly income</td>
<td>-2.369</td>
<td>0.764</td>
<td>-0.146</td>
<td>-3.103</td>
<td>0.002*</td>
</tr>
<tr>
<td>Number of household labourers</td>
<td>0.346</td>
<td>0.111</td>
<td>0.153</td>
<td>3.113</td>
<td>0.002*</td>
</tr>
</tbody>
</table>

R = 0.380, R² = 0.144, F = 13.191, Sig. F = 0.000

According to Table 1, five factors affect farmers’ acceptance of highland paddy rice planting in Chiang Mai Province, including gender, education, rice planting experience, average monthly income, and the number of household labourers, which were all statistically significant at p≤0.01. ‘Gender’ was statistically significant at p≤0.05 which can forecast highland paddy rice planting in Chiang Mai Province (R2) in the percentage of 14.4.

Gender had a statistically significant effect on farmers’ acceptance of highland paddy rice planting in Chiang Mai Province. From a marginal effect value, the coefficient equaled -0.1210 which showed that gender could decrease farmers’ acceptance of highland paddy rice planting in Chiang Mai Province in the percentage of 12.10.
Education had a statistically significant effect on towards farmers’ acceptance of highland paddy rice planting in Chiang Mai Province. From the marginal effect value, the coefficient equalled 0.4320 which showed that education could increase farmers’ acceptance of highland paddy rice planting in Chiang Mai Province in the percentage of 43.20.

Rice planting experience had a statistically significant effect on farmers’ acceptance of highland paddy rice planting in Chiang Mai Province. From the marginal effect value, the coefficient equalled -0.5730 which showed that rice planting experience could decrease farmers’ acceptance of highland paddy rice planting in Chiang Mai Province in the percentage of 57.30.

Average monthly income had a statistically significant effect on farmers’ acceptance of highland paddy rice planting in Chiang Mai Province. From the marginal effect value, the coefficient equalled 0.3880 which showed that the average monthly income could increase farmers’ acceptance of highland paddy rice planting in Chiang Mai Province in the percentage of 38.80.

The number of household labourers had a statistically significant effect on farmers’ acceptance of highland paddy rice planting in Chiang Mai Province. From the marginal effect value, the coefficient equalled 0.2150 which showed that the number of household labourers could increase farmers’ acceptance of highland paddy rice planting in Chiang Mai Province in the percentage of 21.50.

**Table 2 Problems and Barriers of Farmers Who Plant Highland Paddy Rice in Chiang Mai Province (N=398)**

<table>
<thead>
<tr>
<th>Problems</th>
<th>Have Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number (People)</td>
</tr>
<tr>
<td>1. Paddy rice seeds shortage for planting</td>
<td>374</td>
</tr>
<tr>
<td>2. Fund shortage</td>
<td>246</td>
</tr>
<tr>
<td>3. Pest, disease, and insect problems</td>
<td>77</td>
</tr>
<tr>
<td>4. Labour shortage</td>
<td>313</td>
</tr>
<tr>
<td>5. Low production quantity</td>
<td>364</td>
</tr>
<tr>
<td>6. Product price for sale</td>
<td>339</td>
</tr>
<tr>
<td>7. Selling sources or purchasing sources of paddy rice production</td>
<td>363</td>
</tr>
</tbody>
</table>
According to Table 2, the problems and barriers of the farmers who plant highland paddy rice in Chiang Mai Province were arranged from the maximum. The two biggest problems were paddy rice seeds shortage for planting and co-growers’ internal problems (number: 374 people; percentage: 94.0 equally). The second biggest problems were low production quantity (number: 364 people; percentage: 91.5) and selling sources or purchasing sources of paddy rice production (number: 363 people; percentage: 91.2). The minimum problem was pest, disease, and insect problems.

4. Discussion

From the findings, it was revealed that five factors that affected farmers’ acceptance of highland paddy rice planting in Chiang Mai Province, including gender, education, rice planting experience, average monthly income, and the number of household labourers, were statistically significant.

Gender is the factor affecting farmers’ acceptance of highland paddy rice planting in Chiang Mai Province the most. It is shown that most farmers are men. They have more acceptance of highland paddy rice planting than women. According to the data collection, farmers, at present, must register farmer particulars. Therefore, it is necessary to be flexible and convenient in contacting relevant officers. In particular, Thai society still accepts men as family leaders. It is currently participating in government projects. Men contact officers, so it causes more information awareness and training than women. Most ethnic farmers allow women, if they have a family, to stay at home to look after their children or husbands rather than working outside the house which is considered a long tradition. Scholars in Women’s Studies, at Chiang Mai University, pointed out that patriarchy, especially in ethnic groups, is an important factor that eliminates women’s participation. It corresponded to Priyakorn Bunsong’s research (2017) which studied factors influencing the adoption of promoting the cultivation of black glutinous rice in Chalae Sub-district, Singha Nakorn District, Songkhla Province. It was revealed that most farmers were men who were married and their education level was primary level. The number of household members who did agriculture was two people per household on average. Their average possessed area was 6.33 rai per household. Their average income was no more than 10,000 baht per month, and they had debt.
They had an acceptance level at the highest. The number of household members and farmers’ additional occupations were factors affecting farmers’ acceptance of promoting the planting of local black sticky rice varieties with statistical significance at a confidence level of 95 percent. Sahaphap Traiyawong et al.’s research (2017), which studied adoption of quality Hom Mali rice production under good agricultural practice of farmers in Roi Et Province. They found that farmers, who have different gender, education, and rice planting experience, accepted good quality jasmine rice planting according to good agricultural practices (different overall). On the other hand, farmers, who have different ages, number of household labourers, and possessed planting areas, accepted good quality jasmine rice planting according to good agricultural practices (not different overall).

The education of most farmers was primary level. Different education level causes different opinions on farmers’ acceptance of highland paddy rice planting in Chiang Mai Province with a significant statistical difference since the education level of farmers causes planting planning. Even though most farmers plan the production, there is no written document and they do not record revenues and expenses due to insufficient knowledge, especially ethnic farmers who cannot write. For that reason, the development and promotion of the cultivation of highland paddy rice planting are still limited. In the matter of technology and knowledge of paddy rice production, technology transfer, forms, and media to promote paddy rice production, and the policy in the production of paddy rice varieties is limited due to the current agricultural development. If focusing on technology transfer, many technologies do not reach highland farmers due to unsuitable economic and social conditions of agriculture, farmers still lack the motivation to switch to this farming system. Being on highland, the access to information is quite limited as well as the lack of knowledge and understanding of how to use production factors for full efficiency in highland paddy rice planting. It corresponded to Phuthisan Khrueakham et al.’s research (2018) which studied factors affecting to farmers’ adoption of rice production technology under good agricultural practices system in Champhone District, Savannakhet Province, Lao People’s Democratic Republic. It was revealed that farmers, overall, accepted rice cultivation technology under the good agricultural practices system at a low level. Five factors affecting farmers’ acceptance of rice cultivation technology under the good agricultural practices system were education, the number of times contacting officers, news acknowledgement, agricultural information awareness, and knowledge and understanding of rice cultivation under the appropriate agricultural system. The problem of growing rice under the appropriate agricultural system found that farmers have problems without accepting modern technology used in production, water insufficiency for production, lack of soil fertility, rice production damaged by natural disasters, and
disease and pest outbreaks. Consequently, the researchers made the following suggestions. Because farmers accepted rice cultivation technology under the good agricultural practices system at a low level, agriculture extension officers should promote and support knowledge of modern technology in rice cultivation for farmers and make farmers realize the importance of using modern technology in rice production. However, it contradicted Narongrit Phaosakoo’s and Chaichan Wongsaman’s research (2018) which studied farmers’ acceptance of jasmine rice production technology under good agricultural practices in Thung Kula Ronghai, Roi Et Province. It revealed that jasmine rice production technology under good agricultural practices is accepted at a high level overall. Besides, technology acceptance comparison results found that there was a statistically significant difference at P<0.05. Therefore, agriculture extension officers and relevant agencies should educate and suggest to farmers the use of appropriate technology for the production of jasmine rice according to academic principles and the avoidance of using chemicals in the production of jasmine rice.

Rice planting experience is a factor affecting farmers’ acceptance of highland paddy rice planting in Chiang Mai Province. Because farmers generally have experience in growing rice, it is easier to grow highland paddy rice in Chiang Mai Province. Due to their unique skills and expertise in production, many production techniques can be used in the highlands easily and well without learning anymore because previous experience can be a basis for highland paddy rice planting. Furthermore, due to the good compatibility from previous experience in growing rice in general and highland paddy rice planting, farmers are interested in experimenting with different types of rice planting. It corresponded to Thongphun Kongjinda’s research (2013) which studied acceptance of the concept of organic farming with small-scale farmers in Khom Bang Sub-district Administrative Organization, Mueang District, Chanthaburi Province. It was revealed that the sample group accepted organic agriculture at a high level sorted by organic agriculture concepts, organic agriculture inventions, and practice. Factors affecting the acceptance of organic agriculture were the compatibility of organic agriculture with chemical agriculture, experiment ability, relative benefits of organic agriculture, and the level of sophistication of organic agriculture. Narasinee Kaewlaima et al.’s research (2017) studied factors affecting farmers’ adoption of organic agricultural practices in Mae Ho Phra Sub-district, Mae Taeng District, Chiang Mai Province. It was revealed that factors affecting farmers’ acceptance of the concept of organic farming in Mae Ho Phra Sub-district, Mae Taeng District, Chiang Mai Province that was statically significant were 1) training; 2) knowledge and experience in organic farming; 3) farmers' attitudes in organic farming; 4) farmer's age; 5) size of crop production area; 6) number of labourers employed in agriculture, and 7) duration of occupation in agriculture. Regarding the problems and barriers for farmers, it was found that
organic farming is difficult. Farmers have little knowledge and experience. Pest control is difficult. The source of organic produce is limited, taking a lot of time to take care of the plants that are planted, and organic farming steps cannot be controlled or followed at all.

The average monthly income is a factor affecting farmers’ acceptance of highland paddy rice planting in Chiang Mai Province. From the findings, it was revealed that most farmers’ average monthly income was between 10,000 – 30,000 baht. It indicates that low-income farmers may be due to paddy rice seeds shortage for planting, co-growers’ internal problems, low production quantity, or even selling sources or purchasing sources of paddy rice production. As a result, farmers are still unable to adapt to these problems, or it may be a problem that has been encountered continuously from the past to the present due to the lack of knowledge and understanding or even the lack of new information awareness, adaptation, or new knowledge application from technological information sources. Therefore, the average monthly income is still low. Farmers may have a small amount of their own arable land, have a lot of debt, or if farmers rent more land than they own land, they may not gain profit from paddy rice planting. It corresponded to Phanida Salee-art’s and Saisakul Fongmul’s research (2019) which studied farmer’s adoption on dry-season rice production technology in Khrueang Sub-district Municipality, Chiang Khong District, Chiang Rai Province. It was found that factors affecting the acceptance of dry-season rice cultivation technology with a statistical significance in a positive way were dry-season rice planting area, debt burden, and access to agricultural information. Negatively, there was income from dry-season rice cultivation and experience in rice cultivation. The problems faced by farmers in dry-season rice cultivation were 1) the lack of knowledge to prepare for long-term drought conditions; 2) the intensification and spread of insect pest outbreaks in rice, and 3) carrying the cost of rice production. Moreover, Wallika Polasen et al.’s research (2017) studied factors affecting farmer’s adoption of rice berry production innovation in Suphanburi Province. It was found that the main problem of cultivation was an insufficient amount of water. The problem with production costs was the high wages of labourers. The problem with returns is price fluctuation. There were eight factors affecting the acceptance of innovation in rice berry rice production with statistical significance at p<0.05, namely; distribution method by selling to mills, the selling price of paddy, rice planting experience, rice berry planting experience, self-sale, income from rice berry planting, gender, and cost of rice berry production.

The number of household labourers is a factor affecting farmers’ acceptance of highland paddy rice planting in Chiang Mai Province. From the findings, it was revealed that mostly, there were less than five labourers per household. It was understandable that even though farming or growing rice is the main occupation of a family, there were
still too few household labourers who come to help with growing. To summarize, in each rice season including highland paddy rice planting in Chiang Mai Province, farmers still have to hire labourers from other households or from other areas to help with each time of growing. Due to the new generation of household labourers with less entering the agricultural sector, caused by the attitude of them, who think that farming is hard work, unstable price, and relying on nature which has high climate uncertainty, especially the highland climate, they relocate separately from the family to work in the lowlands instead. With these factors, more labourers are migrating to non-agricultural labour by working as an employee of other establishments whose salary is fixed, stable, and continuous income throughout the year. Therefore, farming is only an alternative occupation for the food stability of the household. Of these problems, the average age of agricultural labour is increasing. The expenses of highland paddy rice planting must also consider labour expenses including health problems of labourers and limitations in learning new technology. Farmers have problems accepting the use of technology and acknowledging information and the proper methods for highland paddy rice planting to increase efficiency of highland paddy rice planting. It corresponded to Orawan Srisomphan et al.’s research (2022) which studied small-scale farmers’ acceptance of organic rice production system in Maha Sarakham Province. It was found that factors positively influencing the acceptance of organic rice cultivation were health, promotion, education, number of household members, membership in agricultural organizations, and off-site study activities. However, farmers with a high non-agriculture income tended to accept less organic rice production. The suggestion was that the policy formulation to increase the number of organic rice production should consider the communication form with farmers, especially the issue of chemical hazards to health, focusing on the target group whose main income comes from rice cultivation. Organizing off-site study activities will help the implementation of the policies to achieve their objectives. Furthermore, Su-apha Sakulniwat’s research (2019) studied factors related to the acceptance of tailor-made fertilizer technology for rice cultivation among members of the Community Fertilizer Soil Management Center in Singburi Province. It was found that factors related to the acceptance of tailor-made fertilizer technology for rice cultivation with a statistical significance at p-value = 0.01 were the low-level acceptance of tailor-made fertilizer technology for rice cultivation (mean = 1.91), own funding source, fertilizer application knowledge, information awareness, and ease of technology use. The suggestion was that officers should regularly provide training on the use of tailor-made fertilizer technology and should support the provision of production and storage facilities for the produced fertilizers.
5. Suggestions

Problems and suggestions on farmers’ acceptance of highland paddy rice planting in Chiang Mai Province found that farmers have a shortage of paddy rice seeds for planting. It is suggested that there should be a promotion for farmers to produce rice seeds for their use, supply paddy rice seeds, and support important factors of production, such as planting quality rice seeds and materials for the maintenance and care of the rice plants. For the shortage of funds, farmers should be supported and consider the importance of reducing production costs by using appropriate production factors based on academic principles to limit costs. In addition, practical research should be promoted on the issue of reducing production costs, and the government should assist farmers in production costs, such as by reducing fertilizer and chemical prices. Sources of funding or facilitating agricultural credit. For example, the Bank for Agriculture in Chiang Mai Province should assist with easy-to-access low-interest funding sources, non-complicated conditions, and flexibility to reduce the debt of farmers in Chiang Mai Province. To study the issue of income from highland paddy rice planting, it was found that it affects the acceptance of highland paddy rice planting. It is suggested that farmers should record revenues and expenses to determine whether the cost of planting should be increased or decreased, and which part of the crop should be planted to obtain the highest income. In addition, farmers should be supported to form groups for agricultural activities to strengthen the agricultural community. This makes it easier to work together to solve problems in communities, especially in the highland communities, and the communities with many ethnic groups by relying less on government assistance or the agricultural learning centre (Agricultural Machinery Assistance). The villagers who receive support from the government for agricultural machinery are requested to share or lend to community members for mutual use or offer to an agricultural institute or college, so farmers have an opportunity to borrow or rent such machinery to alleviate the problem of higher wages and the problem of labour shortages which is another way for farmers to be self-reliant.

Bibliography


