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

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Abstract

The cultivation of rice in Thailand is not only a significant economic activity but also a cultural practice among highland ethnic farmers who grow it for consumption within their communities. However, low yields have led to a shortage of rice among some ethnic groups. To address this challenge, researchers affiliated with Chiang Mai University's Faculty of Agriculture have created an enhanced highland paddy rice variety, boasting a distinctive flavor, with the aim of motivating farmers in Chiang Mai Province's highland regions to adopt its cultivation practices. This study aimed to investigate the level of acceptance and factors affecting the acceptance of this improved rice variety among highland farmers in Chiang Mai Province. The study collected data from 398 farmers using Taro Yamane's formula and analyzed it using basic statistics such as percentages, standard deviation, Likert scale, and logistic regression analysis. The study found that farmers generally accepted the highland paddy rice varieties planted at a moderate level, with most of them having a moderate level of acceptance. Factors such as age, education level, and experience in rice cultivation were found to have a significant impact on farmers' acceptance levels. Farmers who are younger (between 20-49 years old) have higher levels of education and have some experience in rice cultivation were more likely to accept the improved rice variety than other groups. The study indicates that the strategic selection of these farmers and providing them with sustainable production training could encourage the cultivation of highland paddy rice in the coming years.

Keywords: Chiang Mai Province, Ethnic Farmers, Farmer's Acceptance, Highland Paddy Rice, Logit Model

1. Introduction

For over 5,500 years, rice has held a significant role as a staple food crop in Thai civilization, making it an integral part of the country's culinary heritage. Rice is the main food plant and cultural plant of highland ethnic farmers who plant local varieties. Rice is cultivated not only for domestic consumption but also as a primary occupation, playing a crucial role in ensuring food security and stability.

In the past, the practice of shifting cultivation gradually transitioned to an annual rice planting system. However, presently, various ethnic groups encounter challenges with insufficient rice production in certain regions, leading to a shortage of rice for local consumption. Consequently, these areas rely on purchasing rice from external sources to meet their dietary needs.

Consequently, a local fragrant rice variety was developed to have higher production, according to the genetic resources and food plant nutrients research group of Chiang Mai University (CMUPNlab). Fragrant rice is widely known among 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, including steamed rice, sticky rice, local rice varieties, and bred rice varieties like Khao Dok Mali 105, Pathum Thani 1, RD6, and RD15, among others. The most popular and famous rice variety in 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 Thai baht per 100 kilograms, and 5% white rice (non-fragrant rice) was sold at 1,125–1,205 Thai baht per 100 kilograms (Office of Agricultural Economics, 2017). The low production ability was due to low adaptation to the environment and low disease and insect resistance. Nevertheless, local rice varieties with unique genetics have adapted well to the local environment.

The characteristics of local varieties consist of many genotypes that adapt well to the environment. Mostly, similar phenotypes have been 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 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 that 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 and Sleper, 1995). The presence of a pandan-like fragrance is a significant economic characteristic that influences both consumer preferences and pricing decisions.

The characteristics of fragrance can be found in many food plants, including food products, vegetables, and some meats (Adams and De Kimpe, 2006; Wakte *et al*., 2017), which are a mixture of essential substances and many semi-essential substances. The most important substance is 2-acetyl-1-pyrroline (2AP) (Buttery *et al*., 1983), caused by proline (Yoshihashi *et al*.,

2002), which is controlled by the recessive gene BADH2 (Bradbury *et al*., 2005).

It is characterized by eight nucleotides, 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 the 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 were no above-mentioned gene mutations in non-fragrant rice varieties or 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 a mixture of essential and semi-essential substances that creates a unique fragrance. The essential substance mostly found is 2-acetyl-1-pyrroline (2AP), which is derived 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. Food plant nutrients not only impact the intensity of fragrance but also play a crucial role in determining seed quality. At present, next-generation sequencing (NGS) technology, which has a lower cost, is being used as a technique for fast and accurate sequencing (Wilanto *et al*., 2012; Barabaschi *et al*., 2016) for diverse genomic and genetic research applications. Relevant gene locations directly help with selection in a rice crop breeding project.

In a previous study conducted by researchers from the Faculty of Agriculture, Chiang Mai University (Chan-in *et al*., 2020), genetic resources and food plant nutrients were examined to identify and select promising highland paddy rice varieties. These selected varieties were then subjected to high-efficiency sequencing technology to develop functional markers associated with fragrance under specific food nutrition conditions. The ultimate goal of this research was to promote fragrance and enhance productivity in the cultivated variety. Therefore, the research aims to study factors affecting the farmers' acceptance of highland paddy rice cultivation in Chiang Mai Province.

Furthermore, there are problems, barriers, and suggestions regarding the acceptance of highland paddy rice, especially about the factors affecting the farmers' acceptance of the varieties of highland paddy rice cultivation in Chiang Mai Province. The dissemination of knowledge and promotion of technology for cultivating highland paddy rice varieties among farmers in

Chiang Mai Province, along with providing guidelines for future research, are essential objectives of this study.

Therefore, this study aims not only to study the level of acceptance of highland paddy rice variety cultivation but also to investigate the factors that affect the acceptance of highland paddy rice variety planting among the farmers in Chiang Mai Province. The empirical results will provide insight into the key factors that determine farmers' acceptance of growing highland paddy rice varieties, which can be used to promote the cultivation of highland paddy rice varieties in the northern region of Thailand.

2. Related Theory and Literature Review

Ideas and theories regarding the acceptance of technology

Individuals' acceptance and adoption of technology are crucial factors in determining the success or failure of any technological innovation. According to Louho *et al*., (2006), technology acceptance refers to the willingness of people to adopt and utilize a particular technology. User involvement is a critical aspect of this process, as demonstrated by Dillon (2001), who defined user acceptance of technology as the demonstrable willingness of a user group to use IT for its intended purpose. In psychological terms, acceptance has been conceptualized as an outcome variable that users go through in making technology decisions, as described by Dillon and Morris (2001).

Researchers are interested in understanding why people accept information technology and how they react to new technology. The growing availability of information related to accessing new technologies underscores the importance of understanding the significance of technology acceptance (Suvama and Godavari, 2012). Therefore, researchers have studied various issues related to technology acceptance, ranging from individual user characteristics such as cognitive style to internal beliefs and their impact on user behavior. Several theories and models of technology acceptance have been proposed by researchers to explain and predict user acceptance of technology, accounting for the rapid changes in both technologies and their environments.

The process of acceptance

Normally, the individual's acceptance process must pass through five various stages or steps (Roger and Shoemaker, 1978, cited in Jaruwan, 2017). The first step is awareness, or the stage of information perception. This is the step of awareness of information. Following the receipt of information, the second step, known as the interest stage, involves generating curiosity among farmers about the innovation. At this point, they actively seek more information by consulting friends who have already tried it or by approaching agricultural extension officers for further insights. The third step, the evaluation, or the trailing stage, is the stage where farmers have received details and will use them to evaluate whether it is worth it or not. The fourth step, the trial stage, is the stage where, after evaluating the pros and cons, farmers will try it themselves. The fifth step, the adoption stage, is the final stage of the process. This is the stage of accepting new ideas, processes, or technologies to be used in their future occupation.

However, accepting all five steps is not a permanent behavior change. In case their beliefs are not adequately validated by the information they have received, individuals might seek additional sources to corroborate their convictions. Therefore, Rogers proposed a new framework called the Innovation Decision Process, consisting of four steps: (1) Knowledge, which is the stage of being aware of the innovation and exploring information to understand it; (2) Persuasion, which is the stage where individuals have attitudes towards the new things they see, whether they agree with them or not; (3) Decision, which is the stage where individuals decide to participate in the innovation and decide whether or not to accept it, but the decision may not be permanent and may change later on; (4) Confirmation, which is the final stage of the process and involves seeking information to support the decision, take a long time before individuals accept the new idea as a permanent factor affecting their acceptance of innovation.

Theory of acceptance

The theory of acceptance is a psychological process that starts from the moment they receive information about technology or products until they accept them to practice or choose to buy and use them (Roger, 1983). Internal and external factors affect the acceptance process, and acceptance can become more complex. Even though a farmer has passed the third and fourth stages, they can still reject technology, and rejection at any stage can change to acceptance. Factors relating to communication channels affect acceptance at every stage of the process. Personal factors have a significant impact on the knowledge stage, such as social characteristics, personality, and communication. At the persuasion stage, external factors such as the benefits of using new technology compared to old technology.

Changes that make it difficult to practice and the flexibility of experimentation, as well as data collection from the study, affect decision-making about whether to accept or reject. The use of econometric tools to analyze the relationship between independent variables affecting acceptance and binary choice models, which are dependent variables that have limited options, is useful for predicting acceptance. When studying predictive ability, the model can help in planning effective communication strategies to persuade farmers to accept technology or products.

$$\text{Logit model } E(y_i|x_i) = F(w) = L(w)) = \frac{exp^w}{1+exp^w} \quad (1)$$

The common representation of a logistic regression model is in the form of a logarithmic transformation of the odds ratio, which is also known as the logit function.

$$\ln\left[\frac{p_i}{1-p_i}\right] = X_i'\beta \quad (2)$$

The two options for creating a model are to use the proxy variable (*y'*) as a representation of y in the model. The value of y in this equation is the benefit that occurs at an income level, resulting from satisfaction and the potential of the rice seed a farmer decides to accept and choose to buy as a factor in rice production. It demonstrates the power of farmers' decision-making. Therefore, each farmer (*i*) may have different levels of satisfaction

and potential for rice seeds. An equation can be written to decide which seed to accept in different ways with independent variables (x'_i) and unobservable variables (u_i).

Equation (2) will be estimated using the maximum likelihood method to obtain the value of β and the probability

value of (y'_i) = 1 when (x_i') is – $p_i = \frac{exp^{X_i'}}{1+exp^{x_i'\beta}} = \frac{1}{1+exp^{-x_i'\beta}}$ (3)

The return on the independent variable (x), called the marginal effect, can be calculated from equation (4) which emphasizes probability (Pimchaya, 2021).

$$\frac{\partial p_i}{\partial p_i} = \left[\frac{e^{z_i}}{(1+e^{z_i})^2}\right][bx_i] \quad (4)$$

In summary, the concepts and theories related to technology acceptance include the meaning of acceptance, the characteristics of acceptance, and acceptance models that discuss behavioral factors that lead to technology acceptance, such as ease of use, perceived usefulness, and use attitudes. In addition, the steps involved in technology acceptance were discussed, including awareness, interest, evaluation, trial, and acceptance. The ease with which technology is accepted depends on the individual. In this research, various concepts were applied to study the factors affecting the high acceptance of aromatic rice cultivation technology among farmers in Chiang Mai Province, including factors related to technology acceptance.

Factors related to technology adoption

Factors related to technology adoption are divided into three main parts: economic, social, and other factors. The economic factor is an economic factor or condition, including financial status, land tenure, occupational labor, and having good credit, which is an important factor affecting the acceptance of innovation. Rogers and Shoemaker (1978) said that it is related to the adoption of technology and making changes so that farmers can bring technology to use, including ownership of more arable land or having more income and having a large number of production resources to accept and implement: (1) Cost and return are the most important factors that affect the acceptance rate. If the investment is high, acceptance will be slow. If the method gives quick results, there will be faster acceptance as well as the ability to convey meaning. Concepts or methods that are easy to convey or understand are often accepted faster than more complex and consistent methods. People tend to accept new ideas or methods that are consistent with existing practices or experiences. (2) The size of the farm will inevitably influence. (3) In terms of income size, high-income farmers are also more interested in accepting innovation, requiring investment, and thinking about improving their status by using academic principles as a leader.

According to Rogers and Shoemaker (1978), social factors indicate that specific target individuals are more inclined to embrace technology as a fundamental social norm. These individuals include females, teenagers, those with higher levels of education and experience, those who regularly communicate with leaders, and those who listen to news information. They are more likely to accept technology quickly, including basic communication skills such as efficient information listening, reading,

speaking, writing, and critical thinking. Additionally, factors related to leadership, such as knowledgeable and competent technical staff, effective technology transfer, and positive personal attitudes and beliefs, can all contribute to building trust and accelerating the acceptance of technology, even for farmers.

The section on Boontham Jit-anan's merit (Phuthisak, 2018) states that the acceptance of innovation among farmers, whether fast or slow and in large or small amounts, depends on important farmer characteristics such as social status. These characteristics include: (1) Gender: women tend to believe and accept changes in innovation easily, while age affects acceptance. Younger people tend to take risks and follow advice more easily, while older individuals is more hesitant and skeptical. Newer-generation farmers tend to accept new plans better than older farmers. Farmers or target individuals with a younger age tend to have a higher inclination to accept new plans compared to those of an older age. Therefore, they are interested in new technologies, while older farmers tend to be more traditional and resistant to accepting new practices on the farm. (3) Ability to communicate: Farmers who can read, speak, understand, and accept innovations more quickly. (4) Education level and experiences: Farmers with higher education and experience tend to have a positive attitude toward change and can understand new concepts quickly. Those with higher education tend to be more likely to accept agricultural experts as speakers compared to farmers with lower education. Farmers with higher education are more likely to accept and have a tendency to understand quickly. The level of knowledge and ability is important because farmers with higher education have a broad knowledge base, know the surrounding factors, and can compare the benefits of new scientific knowledge.

This helps farmers make decisions more easily, quickly, and with greater confidence. In terms of experience, if the previous generation practiced agriculture, the next generation is more likely to follow in their footsteps or make improvements. However, those who are starting new farming practices are often interested in new techniques. (5) The attitude of farmers who have a good attitude towards learning and seeking knowledge is focused on promoting and disseminating knowledge in their profession and among leading farmers. They are prepared for and adaptable to real-world conditions more quickly and effectively. (6) Engaging in logical, rational discussions and actively exchanging ideas facilitates quicker and more effective promotion compared to individuals who are illogical and unwilling to share knowledge. (7) Intellectual maturity, good memory, and acceptance allow for quick learning. (8) Social engagement and service by farmers will attract attention and interest from society. (9) Being up-to-date and not being left behind makes one more accepting of innovation and change. (10) By upholding traditions and customs, farmers who have a strong belief in them are slower to change.

In addition, Jaruwann (2017) summarized the factors related to technology acceptance as follows: (1) Information sources, such as newspapers, magazines, radio, and television. If the target audience does not receive any information, there will be no acceptance. (2) Depending on the type of training or education on a particular subject, if there is prior

knowledge, acceptance will occur more quickly. (3) The promotion of officers' visits: if they are visited frequently, acceptance will be higher. (4) Local agencies help spread information; acceptance will increase. (5) Activities and participation, such as exhibitions and group activities, will encourage familiarity. (6) The social system in which we live, whether it is an old or new society, has developed to the extent that it is open or closed to new information. (7) The supportive environment, such as irrigation systems, marketing systems, electricity, roads, and credit systems, will lead to rapid and high acceptance.

In summary, the factors influencing technology acceptance encompass aspects related to the technology itself, including cost and ease of use, as well as factors associated with the technology users, such as personal characteristics, knowledge, economic, and social considerations. Additionally, promotional efforts from organizations involved in the technology adoption process also play a pivotal role in shaping acceptance levels.

2. Methodology

For this study, a quantitative research approach was employed to investigate the various factors influencing the acceptance of highland paddy rice planting among ethnic farmers in Chiang Mai Province.

2.1 Population and sample sizes

Chiang Mai has the highest number of hill tribes, with 244,291 people (Highland Research and Development Institute, 2018). The sample size was calculated by Taro Yamane's formula at a p-value of 0.05. Therefore, there are 398 ethnic farmers who plant highland paddy rice varieties 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 about 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; 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, cited in Traiyawong *et al*., 2017).

Part 4: Problems, barriers, and suggestions of the farmers who plant highland paddy rice varieties 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 made possible through the consultation of the advisory committees. (2) To assess the questionnaire's reliability, a 30-person sample with characteristics similar to those of the research participants was interviewed. The Cronbach's alpha coefficient was

then calculated to evaluate the quality and consistency of the questionnaire. Normally, the acceptable value is greater than 0.70.

2.4 Data collection

The sources used in the research can be divided into two categories: primary and secondary data. To gather primary data, a questionnaire was utilized as a research instrument to individually collect data from highland paddy rice farmers in Chiang Mai Province. The data collection process involved 398 farmers participating in the study. The secondary data were collected from books, published documents, and relevant empirical reports.

2.5 Data analysis

A statistical package was used for analysis in this study. Part 1: Explains the general information about the respondents, which was analyzed using frequency and percentage. Part 2: The study focused on the acceptance of highland paddy rice variety cultivation and employed a logit model for analysis.

3. Empirical Results and Findings

After conducting surveys among farmers to assess their acceptance levels towards cultivating highland paddy rice varieties, the study revealed an overall level of acceptance categorized as "trialing." This can be attributed to the fact that highland paddy rice represents a newly improved variety that farmers are either unfamiliar with or have not yet had experience growing.

However, the farmers displayed a keen interest in experimenting with the highland paddy rice variety, leading them to be categorized in the "trialing" stage. Upon analyzing individual items, the study identified that many farmers (53.27%) exhibited a level of acceptance also classified as "trialing". The subsequent levels of acceptance were as follows: experimentation, which constituted 43.22% of the farmers, followed by interest at 1.51%, and lastly, implementation at 1.01%, in that order (Table 1).

Table 1: Level of acceptance of highland paddy rice variety cultivation among farmers in Chiang Mai Province

Level of Acceptance		Number	Percentage
Implemented	(4.50-5.00)	4	1.01
Experimented	(3.50-4.49)	172	43.22
Trialing	(2.50-3.49)	212	53.27
Interest	(1.50-2.49)	6	1.51
Awareness	(1.00-1.49)	4	1.01
Total		**398**	**100.00**
The overall level of acceptance		**3.35**	

In Table 2, the study on factors affecting the acceptance of highland paddy rice variety planting by farmers was analyzed using logistic regression

analysis. The study revealed that factors significantly affecting the acceptance of highland paddy rice planting among farmers at a statistically significant level of 0.01 were the age of the farmer, level of education, and experience in rice cultivation. When the age of the farmer decreased by one year, the farmer's acceptance of highland paddy rice variety planting increased by 2.930 times. In other words, younger farmers are more likely to accept highland paddy rice variety cultivation than older farmers due to their curiosity, enthusiasm for new experiences, and proactive knowledge-seeking behavior.

With each additional year of education, the acceptance of highland paddy rice variety cultivation among farmers increases by a factor of 2.294. This implies that higher levels of education are associated with greater acceptance of planting the highland paddy rice variety. This phenomenon can be attributed to the fact that higher education broadens farmers' horizons, exposing them to new knowledge, ideas, and attitudes, thereby fostering a greater interest in exploring novel agricultural practices.

A decrease in one year of farming experience leads to a 0.370-times increase in the acceptance of highland paddy rice varieties planted in highland areas among farmers. This suggests that farmers with less experience are more inclined to embrace the cultivation of highland paddy rice varieties compared to those with greater experience. The reason behind this is that farmers with less experience tend to exhibit greater receptiveness to new knowledge and technologies, making them more open to adopting innovative agricultural practices in highland regions.

Furthermore, the factors of gender, income, number of household members, and land area for cultivation have no relationship with the acceptance of highland paddy rice variety planting. As a result, these factors are unable to be included in this analysis.

Table 2: Factors affecting the acceptance of highland paddy rice variety planting among farmers in Chiang Mai

Factors	B	S.E.	Wald	Sig.	Exp (B)	95 % C.I.	
						Lower	Upper
Constant	-1.310	0.887	2.201	0.138	0.268		
1. Gender	0.331	0.388	0.728	0.394^{ns}	1.392	0.651	2.976
2. Age	-1.075	0.321	11.238	0.001***	2.930	1.563	5.494
3. Educational level	0.830	0.264	9.877	0.002***	2.294	1.367	3.850
4. Income	-0.338	0.224	2.281	0.131^{ns}	0.713	0.460	1.106
5. Experience	-0.993	0.374	7.057	0.008***	0.370	0.178	0.771
6. Land area	0.217	0.163	1.769	0.217^{ns}	0.681	0.989	0.935
7. Household members	-0.012	0.028	0.169	0.183^{ns}	1.242	0.903	1.708

Table 2: Factors affecting the acceptance of highland paddy rice variety planting among farmers in Chiang Mai *(Cont'd)*

-2 Log likelihood = 249.025	Cox & Snell R Square = 0.067
Predicted = 88.90	Nagelkerke R Square = 0.134

Source: By calculation

Note: *, **, *** depict the statistically significant levels at 90%, 95% and 99%, respectively.

ns presents the non-significant level.

The problems and barriers of the farmers who cultivate highland paddy rice variety in Chiang Mai Province were categorized by types of the problems (Table 3). The two biggest problems were paddy rice seed shortages for planting and co-growers' internal problems (374 people with 94% equally). The second-biggest problems were low production quantity (364 people with 91.5%) and selling or purchasing sources of paddy rice production (363 people with 91.2%). The minimum problem was pest, disease, and insect problems (77 people with 19.3%).

Table 3: Problems and barriers of farmers who cultivate highland paddy rice variety in Chiang Mai Province (N=398)

Type of Problems	Number of People	Percentage
1. Paddy rice seeds shortage for planting	374	94.0
2. Fund shortage	246	61.8
3. Pest, disease, and insect problems	77	19.3
4. Labour shortage	313	78.6
5. Low production quantity	364	91.5
6. Product price for sale	339	85.2
7. Sales sources of paddy rice production	363	91.2
8. No area for planting paddy rice	356	89.4
9. Water shortage for planting paddy rice	98	24.6
10. Co-growers' internal problems	374	94.0

Note: Each interviewee can choose multiple selections.

4. Discussion

In reference to the findings, the factors of age, educational level, and experience affect the acceptance of the cultivation of highland paddy rice varietals among farmers in Chiang Mai Province with a confidence level of 0.01. There is a negative correlation between age and acceptance, indicating that younger farmers are more inclined to accept highland paddy rice varieties for planting compared to older farmers. The higher acceptance of highland paddy rice variety planting among younger farmers can be attributed to their proactive nature in seeking out and exploring new opportunities. This finding aligns with the research conducted by Narasinn et al. (2017), which investigated the factors influencing the acceptance of organic farming among farmers in Mae Hor Phra, Mae Taeng District, Chiang Mai Province. Their study found that the age of farmers is negatively related to acceptance of organic farming, with an odd ratio of 0.910. This explains the fact that as farmers get older, they are less likely to accept organic farming. Be because younger farmers are more knowledgeable and ready to develop new knowledge, as well as more likely to accept the decision to engage in organic farming.

Additionally, the educational level has a positive correlation, meaning that farmers with higher education levels are more likely to accept highland paddy rice varieties for planting. Farmers who have limited levels of education have limited capacity to broaden their knowledge and perspectives, hindering their ability to learn and listen to diverse opinions. Consequently, farmers with higher educational levels are more likely to accept new ideas and innovations than those with lower educational levels. This is consistent with the findings of the study on factors affecting farmers' acceptance of rice cultivation technology under a suitable agricultural system in Champasak District, Savannakhet Province, Lao People's Democratic Republic, in 2018. The study showed that higher education has an influential impact on farmers' attitudes and perspectives, enabling them to be more open-minded, analytical, and capable of understanding the benefits of new technologies. As a result, they are more likely to accept them.

Conversely, experience has a negative relationship with acceptance, indicating that farmers with less experience are more likely to accept new cultivation methods, such as high-quality fragrant rice varieties, than those with more experience. Farmers with more experience have higher self-confidence and are less likely to embrace new methods or technologies. This is consistent with the results of the study on factors affecting farmers' acceptance of sugarcane cultivation technology with supplementary irrigation in Khon Kaen Province in 2019. The study found that experience had a statistically significant negative impact on farmers' acceptance of supplementary irrigation technology for sugarcane cultivation ($p<0.05$), suggesting that experienced farmers are less likely to accept new technologies.

5. Suggestions

According to the study, the farmers in Chiang Mai Province have a high acceptance of highland paddy rice variety planting, with factors such as age, education level, and experience affecting acceptance. To encourage the future cultivation of highland paddy rice varieties, our focus should be on engaging young farmers (aged 20-49) who possess a higher level of education and some prior experience in rice cultivation. When compared to other groups, this particular demographic is more inclined to embrace highland paddy rice varieties. Moreover, farmers encounter challenges concerning the limited availability of highland paddy rice seeds for cultivation. Hence, it is imperative to offer direct production training and support to farmers to enhance their seed production capabilities.

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7. Recommendation

Future research concerning farmers' acceptance of cultivating the highland paddy rice variety in Chiang Mai Province should prioritize the exploration of several key factors. These include assessing the accessibility and quality of paddy rice seeds, investigating the efficacy of applying academic principles to minimize production expenses, analyzing the income potential derived from highland paddy rice cultivation, and examining the advantages of forming agricultural groups among farmers in the region. Specifically, research should identify measures to ensure a consistent supply of quality seeds, determine best practices for reducing production costs, explore the factors affecting income generation, and investigate the effectiveness of forming and maintaining agricultural groups. Such research can provide valuable insights into developing effective strategies for improving the acceptance and sustainability of highland paddy rice cultivation in Chiang Mai Province.

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