

Adoption Innovation Red Rice Inpari 24 Land Dry in Semin District, Gunungkidul Regency

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Abstract. The production of red rice in the Semin Subdistrict has declined, necessitating the development of the Inpari 24 variety to boost yields. Understanding the adoption process of this new variety is critical for improving agricultural practices. This study aims to analyze the decision-making process and factors influencing the adoption of Inpari 24 red rice cultivation among farmers in Semin Subdistrict, Gunungkidul Regency. A survey was conducted with 150 farmers using structured interviews and field observations. Data were analyzed using descriptive statistics and multiple regression analysis to determine adoption stages and significant influencing factors. The decision-making process was divided into four stages: recognition, persuasion, decision, and confirmation. The overall adoption level was moderate. Significant factors influencing adoption included land status, family size, and participation in agricultural activities, while age, education, land size, farming experience, gender, and extension frequency were insignificant. The adoption of Inpari 24 red rice is significantly influenced by family size, land status, and participation in agricultural activities. Enhancing extension services and focusing on effective seed preparation practices can improve adoption rates. This study provides a detailed analysis of the adoption process and influential factors specific to dryland farming contexts, offering insights into policy and agricultural extension improvements.

1 Introduction

The agricultural sector plays a pivotal role in developing the national economy. A significant portion of Indonesia's population relies on agriculture as their primary source of livelihood. Agriculture remains a cornerstone of the rural economy and a vital means of sustenance for urban populations dependent on agricultural produce for their food supply. Agriculture encompasses human activities that utilize biological resources to produce food crops, industrial raw materials, and energy sources.

Rice is one of the essential agricultural products and a staple food in many parts of the world, including Indonesia. Among various types of rice, red rice (*Oryza sativa* L.) stands out due to its high nutritional value and growing popularity in contemporary diets [1][2]. Red rice is particularly suitable for cultivation in dryland areas, as it can thrive in various soil

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types, including paddy fields and drylands [3]. The general process of red rice cultivation includes land preparation, seedling, planting, fertilizing, maintenance, harvesting, and post-harvest handling. Dryland farming systems rely heavily on rainwater as the primary water source, making them well-suited to regions with low rainfall [4].

Gunungkidul Regency, a part of the Special Region of Yogyakarta, is one such area known for its red rice cultivation, both in paddy fields and drylands. Semin Subdistrict, in particular, engages extensively in dryland red rice farming [5]. This region is also a primary target for provincial government initiatives to develop red rice farming. Dryland red rice cultivation does not require irrigation. It can be applied in areas with low rainfall, aligning well with the agricultural characteristics of Gunungkidul, which features limestone hills, limited rain, and thin soil layers [6].

According to the Agricultural Extension Agency of Semin Subdistrict (2020), the average production of red rice reached 11,986 tons, with a productivity of 564 tons per hectare of harvested dry grain (GKP) over 50 hectares. Semin Subdistrict, located in the northern part of Gunungkidul, comprises ten villages with a total area of 7,891.80 hectares. Nearly 90% of the local population are farmers, contributing significantly to the local economy (BPP Kecamatan Semin, 2020). The development of red rice production from 2016 to 2020 is shown in Table 1.

Table 1. Development of Planting Area, Production, and Productivity of Red Rice in Semin Subdistrict, 2016-2020

Year	Planting Area (Ha)	Production (Ton)	Productivity (ton/ha)
2016	2.095	9,113.25	4.35
2017	2.125	11,900.00	5.60
2018	2.125	12,410.00	5.84
2019	2.125	12,537.00	5.90
2020	2.125	11,985.00	5.64

Table 1 shows that from 2016 to 2019, production and productivity increased despite the same land area. However, in 2020, production and productivity declined due to farmers' limited understanding of red rice cultivation technology and the lack of innovative approaches in red rice farming. The low adoption of advanced cultivation methods has decreased red rice production and productivity in the Semin Subdistrict (BPP Kecamatan Semin, 2019).

To enhance red rice production and productivity, it is essential to introduce innovations such as providing high-quality red rice seeds like Inpari 24. The Ministry of Agriculture of the Republic of Indonesia has implemented policies to support the development of red rice farming. In October 2020, assistance in the form of Inpari 24 seeds and fertilizers was provided to farmers through the Agricultural Extension Agency of Semin Subdistrict. The Ministry has also introduced new rice varieties with advantages such as resistance to pests and diseases, exemplified by the red rice variety Inpari 24, which contains 191 mg/1000 g of anthocyanin, offering health benefits and economic value[7] [8] [9].

According to the Agricultural Extension Agency coordinator in Semin, the introduction of Inpari 24 seeds has significantly impacted the area's dryland red rice farming sustainability. However, some farmers have accepted the innovation, while others have rejected it. Farmers who adopt the Inpari 24 variety implement it at different levels, influenced by age, gender, education, land status, land size, farming experience, frequency of extension services, and participation in agricultural activities. This study aims to investigate the decision-making process regarding adopting the Inpari 24 variety, the level of its cultivation in dryland, and the factors influencing its adoption in the Semin Subdistrict.

Dryland farming presents unique challenges due to limited water resources and soil fertility, relying primarily on rainfall. Effective management and innovative agricultural

practices are essential for maximizing productivity in these regions [10]. Research indicates that physical land conditions, technology, and socio-economic factors significantly constrain dryland farming, necessitating appropriate strategies and technologies for sustainable development [11] [12].

Red rice, with its higher nutritional value than white rice, plays a strategic role in national food security. It can be cultivated in paddy fields and drylands, offering health benefits such as cancer, cholesterol, and heart disease prevention [13] [14]. Studies have shown that red rice is rich in essential nutrients and minerals, making it a healthier alternative to white rice [15][16] [17][18].

Innovations in agricultural practices, such as introducing high-quality red rice varieties like Inpari 24, have shown promise in enhancing productivity. The Inpari 24 variety, known for its resistance to pests and high anthocyanin content, offers health benefits and economic value [19]. The adoption of such innovations, however, depends on various factors, including farmers' socio-economic conditions, access to information, and support from agricultural extension services [20][21].

This research addresses the gap in understanding the factors influencing the adoption of agricultural innovations in dryland farming systems, precisely the Inpari 24 variety of red rice. By examining the decision-making processes and levels of adoption among farmers in the Semin Subdistrict, this study contributes to the broader knowledge of agricultural innovation adoption in developing regions. The findings will provide valuable insights for policymakers and agricultural extension services to design targeted interventions that enhance the adoption of innovative practices, ultimately improving farm productivity and sustainability [22].

This study aims to enhance the understanding of agricultural innovation adoption in dryland farming systems, focusing on the Inpari 24 variety of red rice in the Semin Subdistrict. By identifying the factors influencing adoption and assessing farmers' decision-making processes, this research will provide valuable insights for improving agricultural practices and policies, ultimately contributing to the sustainability and productivity of dryland farming in Indonesia.

2 Research method

This study utilizes a descriptive analysis method to investigate a group of people or a current condition. Descriptive analysis involves collecting actual data, organizing, processing, and analyzing it to describe the existing problem

2.1 Population and Sampling

2.1.1 Location Determination

The research location was selected using a purposive sampling technique. This intentional technique determined the location based on specific considerations aligned with the research objectives. The Semin District was chosen because it is one of the areas receiving Inpari 24 variety assistance from the Agriculture and Food Security Office of Yogyakarta Special Region. The Agricultural Extension Office in Semin District also informed us of this selection.

2.1.2 Respondent Determination

Respondents were selected using the Simple Random Sampling technique. This simple technique randomly selects sample members from a homogeneous population without

considering the existing strata. The sample size of red rice farmers with Inpari 24 variety is shown in Table 2

Table 2. List of Numbers of Red Rice Farmers Inpari 24

Village	Population	Sample
Kalitekuk	105	82
Sumberejo	55	32
Semin	29	26
Candirejo	31	10
Total	220	150

Based on Table 2, four villages were chosen, each with a land area of at least 10 hectares. 150 out of 220 farmers were randomly selected, representing more than half of the population, by drawing names from a list obtained from the Agricultural Extension Office.

2.2 Types and Data Collection Techniques

This research utilizes both primary and secondary data. Primary data were collected directly from sources through observations and interviews with red rice farmers using the Inpari 24 variety. Questionnaires facilitated interviews, while observations were conducted to assess the actual field conditions. The interviews aimed to gather data on farmers' profiles, decision-making processes, and the level of adoption of red rice farming practices with Inpari 24 variety. Secondary data were collected through documentation techniques from external sources such as the Gunungkidul Central Bureau of Statistics, the Gunungkidul Agriculture Office, and the Agricultural Research and Extension Office in Semin District. This data included general geographic conditions, population demographics, red rice production over several years, and land area information for villages in Semin District.

2.3 Data Analysis Techniques

Data analysis involves systematically organizing and processing collected data into categories, described through units, and presented in patterns to facilitate understanding. This study employs three analysis methods: Descriptive Analysis, Score Analysis, and Multiple Linear Regression Analysis.

2.3.1 Descriptive Analysis

Descriptive analysis was used to depict farmers' decision-making process regarding the Inpari 24 red rice innovation through awareness, persuasion, decision, and confirmation stages.

2.3.2 Score Analysis

Score analysis was used to determine the level of technology adoption in Inpari 24 red rice farming practices. The adoption level was measured by evaluating the implementation of standard operating procedures from land preparation to post-harvest activities. If the farmer's level of application of the Inpari 24 red rice cultivation technology has an achievement score ranging from 0% - 33.33% then it is included in the "Low" criteria, if it reaches a score ranging from 33.34% - 66.67% then it is included in the "Moderate" category. " and if the level of farmers' application of Inpari 24 red rice cultivation technology reaches a score ranging from 66.68% - 100% then it is included in the "High" categor

2.3.3. Multiple Linear Regression Analysis

Multiple linear regression analysis aimed to analyze the factors influencing the adoption level of Inpari 24 red rice farming. The dependent variable (Y) is the adoption level, and the independent variables (X) affect adoption. The mathematical equation is:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + e \tag{1}$$

Y = Adoption Level (%)

X₁ = Age (years)

X₂ = Education [Not Completed Elementary School (0), Elementary School (1), Junior High School (2), Senior High School (3)]

X₃ = Land Area (ha)

X₄ = Farming Experience (years)

X₅ = Family Size (people)

X₆ = Land Status [Owned (1), Others (0)]

X₇ = Gender [Male (1), Female (0)]

X₈ = Extension Frequency (times)

X₉ = Agricultural Activity Participation [Active (1), Not Active (0)]

a = Constant

e = Error

b₁, b₂, b₉ = Regression Coefficients

Statistical Tests

Coefficient of Determination (R²): Measures model accuracy. Higher R² indicates a better model fit.

F-Test: Evaluate the overall significance of the model at a 90% confidence level.

T-Test: Assesses the significance of individual predictors at a 90% confidence level,

3 Results and discussion

3.1 Profile of Farmers

In carrying out Inpari 24 red rice cultivation activities, the profile of respondent farmers who cultivate Inpari 24 red rice in Semin District can be observed from several aspects. The respondents in this study consisted of 150 dryland red rice farmers characterized by age, gender, education, land status, land area, farming experience, frequency of counseling, and activeness in agricultural activities. The profile of the farmers is presented in Table 1.

Based on the data in Table 3, the majority of farmers (36.67%) are aged 46-55 years, with an average age of 56.23 years, indicating that most farmers are still in their productive age. Additionally, many farmers are male (63.33%), and most have completed elementary school (62.00%).

The predominance of farmers in the 46-55 age group suggests that middle-aged farmers are more active and engaged in agricultural activities. This aligns with previous research indicating that middle-aged individuals are often more willing to adopt new technologies due to their physical capability and openness to innovation [23].

The gender distribution shows male dominance in farming activities, consistent with traditional gender roles in agriculture. However, the significant participation of female farmers indicates a shift towards more inclusive farming practices. This finding corroborates the work of [24], highlighting women's increasing involvement in agricultural decision-making.

Table 3. Farmer Profile

Farmer Age	Frequency	Percentage (%)
36 – 45	21	14.00
46 – 55	55	36.67
56 – 65	53	35.33
66 – 75	16	10.67
76 – 85	5	3.33
Total	150	100.00
Gender	Frequency	Percentage (%)
Man	95	63.33
Woman	55	36.67
Total	150	100.00
Education	Frequency	Percentage (%)
Not Graduated from Elementary School	4	2.67
SD	93	62.00
JUNIOR	36	24.00
SMA	17	11.33
Total	150	100.00
Farming experience (years)	Frequency	Percentage (%)
2 – 13	10	6.67
14 – 25	34	22.67
26 – 37	51	34.00
38 – 49	39	26.00
50 – 62	16	10.66
Total	150	100.00
Land Area (m²)	Frequency	Percentage (%)
1-100	1	0.66
101-300	22	14.66
301-600	36	24.00
601-1,000	38	25.33
>1,000	53	35.33
Total	150	100.00
Land Status	Frequency	Percentage (%)
Own	125	83.33
Rent	4	14.00
Profit Sharing	21	2.67
Total	150	100.00

Farmers with extensive experience (34% with 26-37 years) are likely to adopt new practices due to their accumulated knowledge and skills. This finding aligns with the diffusion of innovations theory, which suggests that experienced individuals are better positioned to evaluate and implement new technologies [23].

Land Size and Risk Management: the predominance of small land sizes (76.67% with 100-1,733 m²) highlights farmers' cautious approach toward adopting new techniques to mitigate risks. Small-scale farmers are often risk-averse due to their limited resources, a phenomenon well-documented in the literature [25]

The high land ownership rate (83.33%) allows farmers greater autonomy in decision-making and adoption of innovations. Land ownership has been shown to positively influence the adoption of agricultural technologies, as it provides a sense of security and long-term investment potential [26].

Active participation in agricultural activities (81.33%) is crucial for disseminating and adopting new farming practices. This finding supports the argument that engagement in

agricultural extension services enhances farmers' knowledge and willingness to adopt innovations [25]

Family Size and Resource Allocation. Most farmers have smaller families (56% with 1-2 members), influencing their ability to allocate resources effectively for agricultural activities. Larger families often mean more household responsibilities, which can impact the time and resources available for farming (FAO, 2011).

Counseling Frequency. Most farmers participated in agricultural counseling 1-2 times yearly (73.33%). Regular counseling sessions are essential for providing farmers with up-to-date knowledge and practices. This aligns with the findings of [27] Permatasari et al. (2018), which emphasize the importance of active participation in counseling for improved knowledge and skills.

3.2 Inpari 24 Red Rice Innovation Decision-Making Process

The innovation decision-making process is a process that a person must pass after accepting or getting to know an innovation until deciding to accept or reject it continuously. When people learn about an innovation, they can immediately implement it if it has been proven to provide more benefits for people who want to adopt it. In this decision-making process, farmers can sustainably implement innovation. The following is the decision-making process for *Inpari 24* dryland red rice innovation in Semin District, Gunungkidul Regency:

Table 4. *Inpari 24* Red Rice Innovation Decision Making

It	Indicators	Parameters	Category	%
1	Introduction	Time to Know Innovation	During Counseling	80.67
		Initial Resources	Extension Officer	76.00
		Initial Information Impressions	Useful	60.67
		Initial Information	Cultivation Techniques	62.00
	Persuasion	Early Impressions of Innovation	Interested	72.00
		Reasons for Interested in Innovation	Seed Assistance	62.00
		Additional Resources	Extension Officer	78.00
		Additional Information	Cultivation Techniques	67.33
3	Decision	Decision Time	After Counseling	92.00
		Result Type	Individual	58.67
		Mood Results	Self-Belief	68.00
		Reasons for Decision	Government Assistance	52.67
4	Confirmation	Active Seeking Information	one source	93.33
		Confirmation Information Sources	Extension Officer	64.67
		Consistency	Continue	100
		Market Opportunities	Traditional Market	61.33

Based on Table 4, at the Introduction Stage, it was stated that as many as 80.67% of red rice farmers were familiar with *the Inpari 24 red rice innovation* at the time of counseling. According to farmers who received initial information in the form of cultivation techniques during counseling because they did not previously know about the existence of *the Inpari 24* variety, extension workers who came as a source of initial information to provide counseling were the suitable medium for farmers to get information about innovations about agriculture. When counseling was carried out, farmers thought that this innovation was beneficial for red rice farming in Semin District. The knowledge farmers have about technology is still elementary, and their attitude still needs to change because the mindset

of farmers is still traditional. Therefore, increasing farmers' knowledge of superior red rice varieties is necessary. Furthermore, the persuasion stage occurs when farmers are interested in *Inpari 24 red rice innovation* after looking for additional information about the benefits that will be obtained later.

The first farmers considered that after learning about this innovation, they were interested because of the seed assistance from the government, which they felt could reduce the costs incurred for cultivating this dryland red rice. Once someone is interested in an innovation, that person will look for additional information to corroborate the idea. Advanced information searches can be obtained from various sources. Based on Table 2, it can be seen that farmers in Semin District, as many as 78%, choose to seek information from extension workers. Farmers decide to seek information about red rice from extension workers through cultivation techniques because extension workers are considered the most understanding, knowledgeable, and trustworthy people.

At this decision-making stage, farmers must be able to decide whether to use innovations that have been made or reject socialized innovations. Farmers have reasons and considerations based on the data to accept or reject the decision at this decision-making stage. Farmers make decisions at the time after the extension is carried out, with some as many farmers making individual decisions by 58.67% with the confidence of the farmers themselves. In the decision-making stage, farmers make decisions because the government provides seed assistance.

Based on Table 2, most farmers are looking for one source of information that can convince them at the confirmation stage, where they have decided and chosen how to implement it next. This one source can affect farmers' continuation in adopting or deciding to stop. Extension workers are a source trusted by farmers to strengthen farmers in farming *Inpari 24 red rice*. Extension workers are a means of accurate and comfortable information to be discussed. It can be seen that 100% of farmers apply the cultivation of red rice *of the Inpari 24 variety* continuously. This is because farmers can already feel the results of this red rice cultivation. In addition to being healthy and profitable, farmers can feel the difference in the rice eaten, which comes from white rice and red rice, both the previous and current varieties planted. In addition, farmers also determine the target market for red rice, most of whom choose the traditional market because the process is more straightforward than distributing red rice products to the modern market. Considering the distance between farmers' houses and traditional markets, farmers do not spend money on transportation or labor.

3.3 Application Rate of Inpari Red Rice Cultivation in 24 Drylands

The application level of *Inpari 24* red rice cultivation in Semin District is how red rice farmers implement *Inpari 24* red rice cultivation. Farmers have tried to follow the recommendations, but they are influenced by factors such as age, education, land area, farming experience, number of family members, land status, gender, frequency of counseling, and activeness of agricultural activities.

Based on the answer score data, the calculation was carried out by obtaining the average number of scores and score achievements of all respondents in the Semin District. The data on the average number and achievement of the score can be seen in Table 3.

Based on Figure 1, the overall application rate of red rice cultivation in Semin District is 64.62%, which means that it is in the medium category. This happened because the application received the lowest score in the application of seed preparation, where farmers were not suitable in their application, which recommended seeding and seed selection before planting; farmers in Semin District did not do seed selection, seeding, and germination in red rice cultivation. For example, it is easy for farmers to get quality seeds by selecting rice seeds

using a salt solution; by giving salt during selection, they can choose insightful seeds and empty seeds. Seeds that are insightful or viable will sink in the salt solution, but hollow or unsuitable ones will float. In addition to separating empty seeds from seedy seeds, seed selection treatment with a salt solution is also helpful as an initial treatment to minimize the attack of rice plants by diseases caused by fungi carried by the rice seeds.

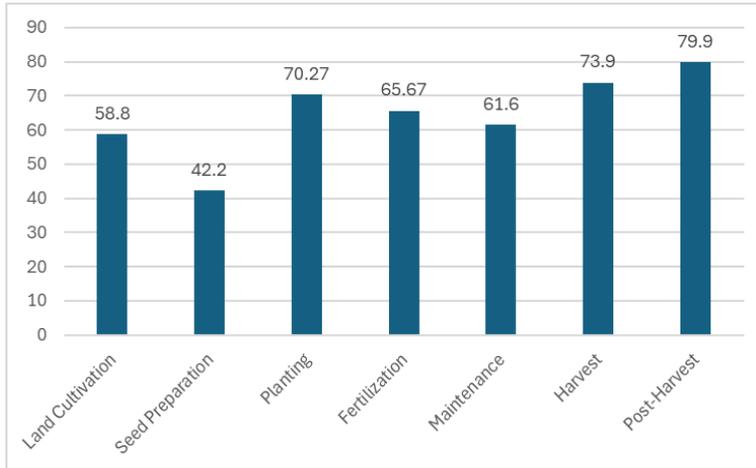


Fig. 1. Overall Level of *Inpari 24 Red Rice Cultivation*

Overall, the highest score was for post-harvest application, where farmers followed the application by reversing the drying every 2 hours. Drying in the sun (drying) should pay attention to the intensity of the rays, the ever-changing drying temperature, the thickness of the drying, and the frequency of reversal. Drying that is carried out without paying attention to the things mentioned above can cause a decrease in the quality of rice; for example, rice will break during the milling process. The implementation of *Inpari red rice cultivation for 24* farmers in the Semin District needs to be improved again. It is constantly monitored regularly by farmer groups and assisted by extension workers.

3.4 Factors influencing the level of implementation of *Inpari 24* dry land red rice cultivation in Semin District

Multiple linear regression tests analyze how independent variables affect dependent variables. In this study, the variables used were age (X_1), education (X_2), land area (X_3), farming experience (X_4), number of family members (X_5), land status (X_6), gender (X_7), frequency of counseling (X_8), and activity of agricultural activities (X_9), while the dependent variable used in this study was the level of cultivation application (Y). The results of the multiple linear regression test are as follows:

The determination coefficient shows how much of the percentage of independent variables explains the variance of dependent variables. The multiple linear regression test results showed a coefficient of determination (R^2) of 0.128. The value showed that 12.8% of the application rate was influenced by age (X_1), education (X_2), land area (X_3), farming experience (X_4), number of family members (X_5), land status (X_6), gender (X_7), frequency of extension (X_8), and activity of agricultural activities (X_9), while the remaining 88.2% was influenced by other variables that were not examined in this study such as cosmopolitan level, income, distance from house to Land, production results.

This F test is intended to determine whether or not there is an influence of independent variables together on dependent variables. This test identifies whether the estimated

regression model is feasible or not. Feasibility here means that the model is estimated to be suitable for explaining the influence of independent variables on bound variables.

Based on the results of Table 5, the results of the F test can be seen that the calculated F value is 3.200 with the F table of 2.275, the significance of the independent variable to the dependent variable is the application level of $0.021 < 0.1$ at a confidence level of 90%. In conclusion, the value of F calculated in $> F$ table means that the independent variables significantly affect the application level, or H_0 is rejected and H_a is accepted.

The T-test shows the influence of individual independent variables on dependent variables. This aims to determine how influential one independent variable is in explaining the dependent variable. This test aims to determine the direction of influence of several independent variables on dependent variables an explanation of the results of the T-Test for each independent variable in Table 5.

Table 5. Factors influencing the level of implementation of Inpari 24 red rice cultivation

Independent Variables	b	t count	Sig.	Information
Constant	39.638	5.188		
Age	0.164	1.409	0.161	Insignificant
Education	0.448	0.425	0.672	Insignificant
Land	-0.965	-0.151	0.880	Insignificant
Farming Experience	-0.019	-0.223	0.824	Insignificant
Number of Family Members	1.132	2.004	0.047	Significant
Land Status	5.582	2.978	0.003	Significant
Gender	0.189	0.132	0.895	Insignificant
Extension Frequency	0.783	1.426	0.156	Insignificant
Agricultural Activity Participation	3.485	1.663	0.099	Significant
F Calculate	3.200			
F table	2.275			
R ²	0.128			

T table = 1.665

Based on Table 5, the influence between the influencing factors and the application level is as follows: the factors that significantly influence the number of family members, land status, and activity in agricultural activities. The regression coefficient number is positive or unidirectional, meaning that the more.

In this study, farmer age did not significantly influence the implementation of cultivation practices. The age difference between young and old farmers does not cause significant variations in their cultivation techniques. This aligns with previous research, which states that age is not the primary determinant in adopting agricultural technology [25][23]. Research by [28] also supports this view, confirming that technology adoption is more related to access to counseling and training than age factors.

The results of the T-test for the Education variable (X_2) show that the farmer's education level does not have a significant effect on the implementation of cultivation, with a calculated t-value of 0.425 and a significance of 0.672 (>0.05). This shows that formal education is not the main factor in determining how effectively farmers adopt cultivation practices. Formal education is often considered important in increasing the ability to adapt to new technology; in fact, the application of Inpari 24 red rice cultivation technology among farmers is more likely to be influenced by other factors such as access to counseling and field assistance [29] [28].

The area of Land owned by farmers does not significantly influence the implementation of cultivation. This shows that farmers with smaller Land can apply more effective cultivation technology than farmers with larger Land if they have access to adequate information,

technology, or external support. Farmers with smaller land areas are often more intensive in utilizing technology to increase yields because limited Land makes them focus more on increasing productivity per unit area of Land [30][25].

Farming experience also shows little influence on the application of cultivation. This indicates that farmers who have been farming for decades are more likely to apply modern technology or cultivation practices than farmers who are just starting. Farmers with more extended farming experience tend to rely more on traditional practices that are already considered adequate. Hence, farmers need to see an urgent need to adopt new technology or practices. This is often referred to as technological conservatism [23][28].

Table 5 shows that the variable number of family members significantly influences the application of Inpari 24 red rice cultivation technology. This indicates that the more family members, the higher the level of application of cultivation. This may be related to the availability of additional labor in the family to help with agricultural activities [31].

The research results show that the status of land ownership significantly affects the implementation of cultivation. Farmers who own their Land tend to be more motivated to implement better cultivation practices than farmers who rent Land. Farmers have full ownership of the Land, so they think long-term and are willing to make more efforts to increase land productivity. On the other hand, farmers who rent Land may have limitations in long-term planning because rental status often needs to provide certainty regarding land use in the long term [32].

The gender of the farmer does not significantly influence the implementation of cultivation. This means that both male and female farmers show significant differences in the level of implementation of cultivation practices [33].

The frequency of counseling attended by farmers has little influence on the implementation of cultivation. This shows that the counseling being followed is ineffective or the frequency is insufficient to bring about change. This may be because extension workers only provide theoretical information without field assistance or practical support for applying technology or cultivation practices. With sufficient follow-up, farmers may find implementing the knowledge they gain from extension services easier.[34]

The results of the T-test for the Active Agricultural Activity variable show that this variable is close to significant for the implementation of cultivation, with a calculated t-value of 1.663 and a significance of 0.099. Farmers who participate more actively in agricultural activities (such as training, seminars, and extension) tend to have better access to new knowledge and the latest information regarding cultivation practices. This activity allows them to learn from experts, extension workers, and fellow farmers, which can ultimately improve their ability to adopt better technology and cultivation practices [35].

4 Conclusion and recommendation

Based on the results of the Inpari 24 dryland red rice farming research in Semin District, it can be concluded that the decision-making process is divided into four stages. At the introduction stage in decision-making, extension workers give rise to innovations for farmers. Farmers are interested in adopting at the persuasion stage because of seed assistance from the government by looking for information related to good cultivation techniques for extension workers. At the decision stage, innovation is well received by farmers who choose to implement it after conducting individual counseling. At the confirmation stage, all farmers planted *the Inpari 24 variety*, which has been recommended by extension workers by always looking for information, being assisted by extension workers, and applying it continuously.

After knowing the decision-making process, we can describe the level of implementation of Inpari 24 dryland red rice cultivation innovation in Semin District in the medium category. The post-harvest application is included in the high category due to the influence of

appropriate drying parameters. The application of seed preparation achieves the lowest score due to the impact of inappropriate seed preparation parameters. Factors that significantly affect the application level of *Inpari 24* red rice cultivation are land status, the number of family members, and agricultural activities. Meanwhile, age, education level, land area, farming experience, gender, and frequency of counseling did not significantly influence the application level of *Inpari 24* red rice cultivation.

Farmers are advised to be more active in seeking additional information related to the target market, results, and benefits of *Inpari 24* red rice cultivation that are good and appropriate so that the results obtained can be maximized for the yield in the next planting season. Agricultural Extension Workers pay more attention to and assist farmers' performance in red rice cultivation by applying seed preparation to carry out seed selection, germination, and seeding to get good results. Farmers are advised to be more active in agricultural extension activities.

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