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Factors Affecting Adoption of Recommended Rice Cultivation Practices by Farmers of South Kerala

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ABSTRACT

Rice is a fundamental staple crop and plays a significant role in agricultural production across the southern part of Kerala, India. Implementing recommended rice cultivation practices is essential for boosting yield, promoting sustainability, and enhancing the livelihoods of farmers. However, even with the scientifically proven practices developed by Kerala Agricultural University (KAU), the extent of adoption among farmers differs considerably. The present study was conducted in Thiruvananthapuram, Kollam, Alappuzha, Pathanamthitta, Kottayam, Ernakulam and Idukki districts to find out the factors affecting adoption of recommended rice cultivation practices by the farmers of South Kerala. A total of 105 respondents were selected from one panchayat of each of these seven districts. The extent of adoption of selected KAU technologies in rice varieties was found to be 'medium' among majority of farmers. The results of the correlation analysis revealed that out of 11 independent variables selected for the study, three variables were positively and significantly related to the dependent variable adoption of recommended practices by rice farmers. The main factors that influence technology adoption of recommended practices were extension participation and achievement motivation followed by innovativeness.

Keywords*: Kerala Agricultural University technology; Adoption; Rice farmers; South Kerala; Rice varieties; Kerala.*

INTRODUCTION

Rice farming supports the livelihoods of more than one-fifth of the global population, making it a vital element of worldwide food security. India is one of the top rice-producing countries, holding the largest cultivated area and ranking second in production, contributing approximately 20 per cent of the total global rice output (GOI, 2022). In Kerala, rice serves as the primary staple crop, playing a crucial role in meeting the food demands of the state's growing population. However, since the 1970s, the area under rice cultivation has consistently declined due to the conversion of farmland for non-agricultural purposes (GoK, 2016). This ongoing reduction poses significant challenges to the state's agricultural economy and its ability to sustain food autonomy.

Over the past two decades, agricultural technology has advanced significantly, but its benefits depend on farmers' adoption in the field. Despite the availability of innovative agricultural technologies, their adoption by farmers remains a challenge due to the research-extension gap, limiting productivity and self-sufficiency.

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Therefore, understanding the factors influencing the adoption of recommended rice cultivation practices is crucial for bridging this gap and enhancing the socioeconomic development of farmers.

The adoption of recommended Kerala Agricultural University (KAU) practices is crucial for enhancing productivity and sustainability across various crops, as studies indicate that a majority of farmers fall into the medium adoption category. For instance, Namitha (2017) reported that 54 per cent of vegetable growers in Thiruvananthapuram district had a medium level of adoption of KAU-recommended practices for crops like amaranthus, cowpea, and bitter gourd, with only 27% achieving a high level of adoption.

Similarly, in the case of cardamom cultivation, Anju (2018) observed that 38.33 per cent of farmers showed a medium level of adoption, whereas nearly half (48.33%) exhibited a low level of adoption, emphasizing the necessity for improved extension efforts. The scenario in cassava farming, as per Kavya (2020), further reinforces this trend, where 66.25 per cent of farmers showed medium adoption levels of KAU-recommended technologies.

Moreover, the adoption of recommended management practices in Rubber-Based Intercropping Systems (RBIS) in South Kerala also revealed that 61.66 per cent of respondents fell into the medium adoption category, while 21.67 per cent and 16.67 per cent were in the low and high adoption categories, respectively (Das, 2022). These findings collectively indicate that while many farmers are aware of KAU-recommended practices, targeted interventions are necessary to elevate adoption levels and maximize agricultural benefits.

In light of the above challenges and opportunities, this study aims to assess the extent of adoption and the factors influencing the adoption of recommended rice cultivation practices among farmers in the rice-growing regions of South Kerala, with the following objectives.

1. To study the extent of adoption of selected KAU technologies in rice varieties
2. To study the relationship between independent variables and extent of adoption of selected KAU technologies in rice varieties

METHODOLOGY

The present study was conducted in Thiruvananthapuram, Kollam, Alappuzha, Pathanamthitta, Kottayam, Ernakulam and Idukki districts of Kerala state, representing the rice growing tracts of South Kerala. Of all the seven districts comprising Southern part of Kerala, a list of 7 blocks were purposively selected from each district with the help of scientists from Krishi Vigyan Kendras (KVKs: Farm Science Centres), Regional Agricultural Research Stations (RARS) and Agricultural officers of respective Krishi Bhavans, based on highest area under paddy cultivation. Subsequently, one panchayat with maximum rice farmers from each block were selected and the respective Agro Ecological Units (AEU)of these selected panchayats were identified and documented. Following the discussions with the corresponding Agricultural Officers, a list of rice farmers from designated panchayats were obtained. By adopting a simple random sample technique, fifteen rice farmers from each panchayat were chosen. . The criteria for selecting the farmers were that they should have a minimum of 50 cents of rice field. Thus, total sample size selected was 105 consisting of 15 farmers from each of the selected *panchayats* namely, Ramankary, Karumalloor, Udumbanchola, Sooranad North, Thiruvarppu, Peringara and Nagaroor.

A well-structured interview schedule was constructed; and data were collected from the respondents through personal interview method. The extent of adoption was the main dependent

variable and eleven independent variables were selected for the study namely, age, farming experience, area under rice cultivation, annual income, mass media exposure, extension participation, achievement motivation, risk orientation, credit orientation, innovativeness, and knowledge level. The selection of these eleven independent variables was based on their potential influence on farmers' adoption behaviour, as identified in previous agricultural extension and adoption studies, as in line with the findings of Basheer(2016), Kumar (2019), and Chowhan (2020). Socio-economic factors like age, farming experience, area under cultivation and annual income, while psychological traits such as achievement motivation, risk orientation, credit orientation and innovativeness determine a farmer's willingness to adopt new technologies. Additionally, variables like mass media exposure, extension participation, and knowledge level were included as they play a crucial role in information access and awareness, ultimately affecting adoption rates.

Out of the sixty improved technologies of paddy identified fifteen practices were selected after judges rating for the purpose of the study, from the package of practices published by Kerala Agricultural University. The independent variables were measured using standardized scoring procedures and the dependent variable extent of adoption was calculated using adoption quotient for measuring adoption behaviour as developed by Chattopadhyay (1963) and modified by Singh and Singh (1967) using the formula;

$$AQ = \frac{\sum_{i=1}^{n} \frac{e_i}{p_i} \times 100}{N}$$

Where,
AQ = Adoption quotient
ei = Extent of adoption of each practice
pi = Potentiality of adoption of each practice
N = Total number of practices selected

FINDINGS AND DISCUSSION

Extent of Adoption of KAU Varieties and Selected Recommended Practices

The distribution of respondents based on the extent of adoption of recommended cultivation practices by rice farmers is presented in Table 1. The respondents were categorised into high, medium, and low adopters of recommended practices in rice based on mean and standard deviation . On perusal of Table 1 it is evident that majority of farmers fell under medium category with 50.48 per cent level of adoption. It was followed by low and high category with 25.71 and 23.81 per cent respectively. This is in line with the findings of Emran (2020), and Karthiga (2021).

As a result, it is clear that majority of the rice farmers had medium to low level of adoption of recommended practices. The average adoption score was 61.77, with a range of 28 to 93.77. There was no respondent who completely adopted all the practices recommended in the Package of Practices (POP) by KAU for rice cultivation.

In the District wise distribution, the adoption level ranged from low (60.00 %) to high (33.33 %) in Thiruvananthapuram District. In Kollam District the adoption ranged from high (40.00 %) to low (33.33 %) whereas in Alappuzha District the adoption ranged from medium (66.67 %) to high (26.66%). While considering Pathanamthitta District the adoption level ranged from medium (93.33 %) to low (6.67 %) whereas in Kottayam District the adoption level ranged from medium (73.33 %) to high (20.00 %). In Idukki District the adoption ranged from low (53.33 %) to medium (40.00 %) while in Ernakulam District the adoption level ranged from medium (46.67 %) to high (40.00 %).

Table 1. Distribution of Respondents Based on the Extent of Adoption of Recommended Practices by Rice Farmers

Category	Trivand rum (n=15)		Kollam (n=15)		Alappuzha (n=15)		Pathanam thitta (n=15)		Kottayam (n=15)		Idukki (n=15)		Ernakulam (n=15)		Total (n=105)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Low (≤54.66)	9	60	5	33.33	1	6.67	1	6.67	1	6.67	8	53.33	2	13.33	27	25.71
Medium (>54.66 to ≤69.33)	1	6.67	4	26.67	10	66.67	14	93.33	11	73.33	6	40	7	46.67	53	50.48
High (>69.33)	5	33.33	6	40	4	26.66	0	0	3	20	1	6.67	6	40	25	23.81
															Maximum-93.77	
															Minimum-28	
															Mean-61.77	
															S.D-12.773	

Adopter categorisation of Rice Farmer Respondents based on Level of Adoption of Recommended Practices in Rice

According to Rogers (1982), farmer respondents were classified as innovators, early adopters, early majority, late majority, and laggards.

Table 2. Adopter Categorisation of Rice Farmer Respondents on Level of Adoption of Recommended Practices.

Category	No.	%	Roger's standard curve (%)
Innovators	2	1.90	2.5
Early adopters	15	14.28	13.5
Early majority	30	28.57	34
Late majority	45	42.87	34
Laggards	13	12.38	16
Total	105	100	

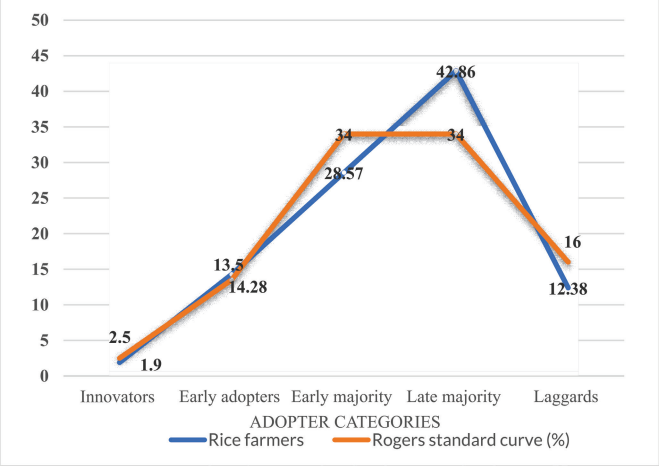

Figure. 1. Comparison of Adopters of Recommended Rice Cultivation Practices with Standard Rogers' Curve

On observing Table 2 and Fig. 1, it is inferred that, the percentage of innovators is 1.90 per cent which is less than 2.5 per cent in the standard Rogers curve. Early adopters were 14.28 per cent which was greater than the 13.5 per cent

in Roger's curve indicating more adoption of recommended practices in rice cultivation. The early majority farmers are lesser and late majority farmers are more in number as compared to standard Roger's curve which indicates that adoption is comparatively lesser. Laggards or *traditionals* are 12.38 per cent in the case of rice farmers against 16 per cent in a standard curve.

The percentage of farmers falling under the early adopter category is more than the standard curve indicates higher rate of adoption at the same time the percentage coming under the other three categories indicates lesser adoption. Therefore, focusing on the late majority and laggards through various successful teaching programs can improve overall adoption. The results of the adopter categorization show that there is a need for an effective extension mechanism, as well as assistance and encouragement, to lower the percentage of late majority and increase the percentage of early majority. This is very important because rice is Kerala's most economically dominant and stable food crop. More efforts should be made to develop and disseminate location specific and sustainable production and protection practices that meet the needs of farmers.

Adoption of Recommended Practices by the Respondent Farmers

The percentage of adoption of the recommended practices were found out and presented in Table 3.

Table 3. Adoption of Recommended Practices by the Respondents

Sl. No	Recommended Practices	Total (n=105)	
		No.	%
1.	Suitable months for sowing in all 3 crop seasons (*Virippu*, *Mundakan* & *Puncha*)	99	94.28
2.	Recommended KAU rice varieties- *Uma*, *Jyothi*, *Kanchana*, *Manurathna*	95	90.47
3.	Usage of recommended plant protection chemicals for Pest & Diseases	78	74.28
4.	Fertilizer applied per hectare: NPK – 70:35:35 kg/ha (S.D) NPK – 90:45:45 kg/ha (M.D)	63	60
5.	Adoption of recommended frequency of irrigation to be maintained	60	57.14
6.	Follow cultural methods of weeding	58	55.23
7.	Usage of bioagents for seed treatment: *Pseudomonas* & *Trichoderma*	51	48.57
8.	Adoption of recommended nursery management practices	49	46.66
9.	Weeding: First weeding: 20 days after planting Second weeding: 40 days after planting	48	45.71
10.	Usage of tricho-cards against stem borer	47	44.76
11.	Transplanting stages of seedlings: 18-21 days (Short Duration) & 20-25 days (Medium Duration)	45	42.85

Sl. No	Recommended Practices	Total (n=105)	
		No.	%
12.	Adoption of recommended main field preparation practices before transplanting	43	40.95
13.	Seed rate- Transplanting:60-65 kg/ha, Broadcasting:80100 kg/ha	27	25.71
14.	Spacing: 15cmx10cm (S.D) 20cmx15cm (Ist crop, M.D) 20cmx10cm (IInd crop, M.D) 20cmx10cm (IIIrd crop, M.D)	23	21.90
15.	Adoption of recommended management of aged/over-raised seedlings	21	20

On perusal of Table 3 it could be inferred that 94.28 per cent of farmers adopted suitable months for sowing in all 3 crop seasons, 90.47 per cent of farmers adopted recommended varieties like Uma, Jyothi, Kanchana and Manurathna followed by the usage of recommended plant protection chemicals for pest and diseases (74.28 %), fertilizer applied per hectare (60.00 %), adoption of recommended frequency of irrigation to be maintained (57.14 %), following the adoption of cultural methods of weeding (55.23 %), usage of bioagents for seed treatment (48.57 %), adoption of recommended nursery management practices (46.66 %), adoption of recommended frequency of weeding (45.71 %), usage of trichocards against stem borer (44.76 %), adoption of recommended stages for seedling transplanting (42.85 %), adoption of recommended main field preparation practices before transplanting (40.95 %), seed rate (25.71 %), spacing (21.90 %) and adoption of recommended management of aged/over-raised seedlings (20.00 %).

The high adoption of suitable sowing months (94.28%) and recommended varieties (90.47%) indicates that farmers recognize the importance of timely sowing and high-yielding, disease-resistant varieties, suggesting effective dissemination of these technologies. The moderate adoption of plant protection chemicals (74.28%) and fertilizer application (60.00%) highlights the need for better awareness regarding integrated pest management and balanced fertilization to optimize productivity and environmental sustainability. On the other hand, the low adoption of recommended spacing (21.90%) and management of aged/over-raised seedlings (20.00%) can be attributed to the prevalence of direct-seeded rice (DSR) in districts like Alappuzha, Kottayam, and Pathanamthitta, where traditional transplanting recommendations are less relevant. Similarly, the low adoption of recommended seed rates (25.71%) and main field preparation practices (40.95%) suggests a need for targeted interventions to promote efficient resource use, mechanization, and site-specific recommendations to enhance adoption rates.

Relationship between Independent Variables and Extent of Adoption

The correlation of selected independent variables with the extent of adoption of recommended paddy technologies by the rice farmers are presented in Table 4. The results indicate that age, farming experience, area under rice cultivation, annual income, mass media exposure, risk orientation and knowledge level

possessed no significant relation with the extent of adoption.

And the results of the correlation revealed that out of 11 independent variables selected for the study, 3 variables were positively and significantly related to the dependent variable adoption of recommended practices by rice farmers. The most important factors influencing technology adoption of recommended practices were extension participation and achievement motivation at 1% level of significance with correlation coefficient values of 0.409 and 0.218, respectively, followed by innovativeness at 5% level of significance with a correlation coefficient value of 0.269

Table 4. Correlation Between Extent of Adoption and Variables

Variable	Independent variable	Correlation coefficient
X_1	Age	0.129 ^{NS}
X_2	Farming experience	0.126 ^{NS}
X_3	Area under rice cultivation	0.170 ^{NS}
X_4	Annual income	0.129 ^{NS}
X_5	Mass media exposure	0.179 ^{NS}
X_6	Extension participation	0.409**
X_7	Achievement motivation	0.218**
X_8	Risk orientation	0.076 ^{NS}
X_9	Credit orientation	0.145 ^{NS}
X10	Innovativeness	0.269*
X11	Knowledge level	0.173 ^{NS}

*** - Significant at 1 % level * - Significant at 5 % level*

CONCLUSION

The results of the adoption quotient revealed that, majority of rice farmers belonged to medium category of adoption of recommended rice cultivation practices, followed by low and high category of adoption. Six out of fifteen recommended practices had an overall adoption percentage greater than 50 per cent. Most of the farmers adopted the recommended months for sowing since this practice was perceived as very effective to the farmers. The least adopted practice was adoption of recommended management of aged/over-raised seedlings which might be because the farmers did not perceive this practice as relevant for them as in some districts namely Alappuzha, Kottayam and Pathanamthitta where they are practicing direct sowing instead of transplanting so only gap filling is needed for them and many of the farmers who adopt transplanting method were strictly following the recommended time duration to which the seedlings should be transplanted.

The correlation analysis findings underscore the significant impact of extension participation, achievement motivation, and innovativeness on the adoption of recommended rice cultivation practices. The significant positive correlation between extension participation and adoption at 1% significance level highlights the necessity of enhancing extension services, expanding farmer training programmes, and enhancing accessibility to advisory support. Similarly, the significant impact of achievement motivation at 1% significance level indicates that policies and initiatives acknowledging and rewarding progressive farmers may enhance adoption rates. The significant positive correlation of innovativeness at 5% significance level also highlights the necessity of exposure visits, demonstrations, and farmer-led innovation platforms to enhance technology adoption. The non-significant relationship of factors such as

age, farming experience, and annual income suggests that technology adoption is more driven by behavioural and institutional factors rather than demographic or economic status. Therefore, targeted interventions focusing on behavioural change communication, participatory extension approaches, and farmer networking can effectively improve adoption rates and overall productivity. Future studies should explore extension strategies to improve farmers' adoption of recommended rice cultivation practices, emphasizing participatory approaches, farmer field schools, and digital extension services.

REFERENCES

Anju, S. (2018). *Scenario analysis of cardamom growers in Cardamom Hill Reserves of Kerala* Unpublished Master's thesis. Kerala Agricultural University, Thrissur, Kerala.

Basheer, N. (2016). *Technology utilisation of bitter gourd in Thiruvananthapuram district* .Unpublished Master's thesis. Kerala Agricultural University, Thrissur, Kerala.

Chattopadhyay, S. N. (1963). *A study of some psychological correlates of adoption of innovation in farming* . Unpublished Master's thesis. Ph.D. thesis. Indian Agricultural Research Institute, New Delhi.

Chowhan, V. (2020). *A study on knowledge, yield gap, and extent of adoption of recommended production technologies by maize growers in Koppal district*. Unpublished Master's thesis. University of Agricultural Sciences, Bangalore.

Das, D. M. (2022). *Technology assessment of rubber-based intercropping systems (RBIS) in South Kerala* .Unpublished Master's thesis. Kerala Agricultural University, Thrissur, Kerala.

Emran, H. (2020). *A study on knowledge and adoption of paddy cultivation practices in Hosnagara taluk of Shivamogga district*. Unpublished Master's thesis. University of Agricultural and Horticultural Sciences, Shivamogga.

Government of India. (2022, 20 December). Ministry of Information and Broadcasting. *Press Information Bureau*. https://static.pib.gov.in/WriteReadData/specificdocs/documents/2022/sep/doc2022920106001.pdf

Government of Kerala. (2023, 20 December). *Economic Review*. https://spb.kerala.gov.in/economic-review/ER2016/chapter02_03.php

Karthiga, V. (2021). *An analysis of knowledge and adoption of eco-friendly practices in turmeric cultivation in Erode district of Tamil Nadu*. Unpublished Master's thesis. Acharya N. G. Ranga Agricultural University, Tirupati, Andhra Pradesh.

Kavya, V. S. (2020). *Technology adoption behaviour of cassava growers in Kollam district* .Unpublished Master's thesis. Kerala Agricultural University, Thrissur, Kerala.

Kumar, P. (2019). *Study on the knowledge and adoption of the recommended production technologies by the red gram growers of Prakasam district of Andhra Pradesh*. Unpublished Master's thesis. Acharya N.G. Ranga Agricultural University, Guntur, Andhra Pradesh.

Namitha, K. (2017). *Sustainability of commercial vegetable cultivation in Thiruvananthapuram district: A multidimensional analysis*. Unpublished Master's thesis. Kerala Agricultural University, Thrissur, Kerala.

Rogers, E. M. (1983). *Diffusion of innovations* (3rd ed.). Macmillan Publishing Co., Inc.

Singh, K. M. P. & Singh, R. P. (1967). Ginger cultivation in Himachal Pradesh. *Indian Farming*. *30* (11):25-26.