Relationship of Farmers Profile Characteristics with Adoption Level of CO 51 Cultivation in Tamil Nadu

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ABSTRACT

Rice is estimated to contribute about 2.5 percent of Gross Domestic Product (GDP) of India. Rice cultivation in Tamil Nadu is done in *kuruvai,* and *samba* seasons, Kancheepuram and Tiruvarur districts had a maximum area under CO 51 cultivation; these two districts were purposively selected for the study with a sample size of 300 respondents. The annual income can be sustained and increased through the adoption of high-yielding rice variety CO 51. It is possible through social participation that includes extension agency contact, which leads to undertaking training, and the educational status facilitates the same. The age of a farmer and the educational status will impact social contact, which is essential for moving out and establishing contact with extension agencies. The extension agency contact had a significant relationship with adoption in both the Kancheepuram and Tiruvarur districts. These factors, combined with credit orientation and farm size, plays a significant role in the adoption. Thus, with a limited scope on other fronts, the farmer has to necessarily raise production levels and adopt the latest variety, which has more yields. This study recommends the policies to build initiatives on widespread of an improved package of practices, which results in the adoption of rice variety, CO 51 cultivation.

 HIGHLIGHTS

⊙ Farmer's decision on adoption of rice variety is mainly influenced by increasing revenue by the adoption of Package of practices.
⊙ Adoption of variety is significantly influenced by farmers social, psychological, and economic aspects.
⊙ Education, extension agency contact had a high significant relationship with the adoption of CO 51 rice variety.

Keywords: Adoption, CO 51, Profile characteristics, Rice, Relationship

Globally, rice is the primary food crop for more than three billion people. Therefore, investing in rice aimed at a tangible increase in rice productivity is vital; and therefore investing in rice aimed at a tangible increase in rice productivity is vital; otherwise, the demand would outstrip its supply. Global consumption of rice has seen a slight increase over the last several years. In the 2018-2019 crop year, about 486.62 million metric tons of rice was consumed worldwide, up from 437.18 million metric tons in the 2008-2009 crop year (Shahbandeh

2017). Rice is estimated to contribute about 2.5 percent of India's Gross Domestic Product (GDP) and employs a more significant workforce in crop production and processing. In such a situation, adopting High Yielding Varieties (HYV) and Hybrids in rice is essential for continuous increase in production with cultivable land shrinking; increase in productivity is a vital parameter. The two million tonnes of rice has to be achieved by adopting various yield-enhancing crop technologies of which choice of varieties has a direct influence. In Tamil Nadu, the total area under rice is 18.30 lakh hectares, production of 58.39 lakh tonnes and productivity of 3.19 t/ha during 2014-15 (Indiastat, 2015). Rice cultivation in Tamil Nadu is done in *kuruvai/ Sornavari* season and *samba/thaladi* seasons. Out of the total 18.3 lakh ha of rice in Tamil Nadu, one-third area is cultivated in *kuruvai/ sornavari* seasons and the rest in *samba/thaladi* seasons. CO 51 was introduced as an ideal replacement for the hitherto popular variety ADT 43 in medium, slender grain segments (Robin *et al.* 2019). The reception of this new variety among the farmers is so good that 40 percent area or roughly 2 lakh ha in *kuruvai* season in the Cauvery delta was covered by CO 51 in two years of its release (Ramasamy, K. 2015). For the variety, farmers are the end-users so the relationship of farmers profile characteristics with adoption level on rice cultivation is given due consideration because widespread adoption of the variety is based on their social, psychological and economic aspects of farmers. For this, the present study was taken up to undertake "Relationship of farmers profile characteristics with adoption level of CO 51 cultivation in Tamil Nadu".

LITERATURE REVIEW

Adopting modern varieties is positively correlated with extension visits, negatively correlated with off-farm and poverty (Duong, P.B. and Thanh, P.T. 2019). In the production characteristics, land size positively influenced modern variety adoption and negatively affected the intensity of adoption. In improved varieties, adoption was positively associated with the education level (Bannor *et al.* 2020). Mariano *et al.* (2012) found that household size is inversely related to technology adoption at 1% level of significance but has a low

marginal effect. The present study was taken up to undertake an association and contribution of profile with the adoption of CO 51 farmers in Kancheepuram and Tiruvarur districts.

METHODS

Kancheepuram and Tiruvarur districts had a maximum area under CO 51 cultivation, and these two districts were purposively selected for the study. Among the thirteen blocks in the Kancheepuram district, three blocks viz., Kancheepuram, Sriperumpudur, and Walajabad were purposively selected for the study. Tiruvarur district encompasses seven blocks, and from these seven blocks, three blocks viz., Nannilam, Tiruvarur, and Valangaiman were purposively selected for the study. Farmers who adopted rice variety CO 51 were considered as respondents. A sample size of 300 respondents was drawn from the selected six blocks, with three villages per block constituting a total 18 revenue villages in the selected two districts. For this study, ex-post-facto research design was followed. The collected data were analyzed with a statistical tool of Pearson correlation, and multiple regression analysis was analyzed with the help of SPSS software.

RESULTS AND DISCUSSION

(I) Relationship of profile characteristics with adoption level of CO 51 cultivation in Kancheepuram district

From Table 1, it could be observed that the correlation coefficient of educational status (X_2), annual income (X_3), social participation (X_7), extension agency contact (X_9), and training undergone (X_{14}) had a significant and positive relationship with the extent of adoption at one percent level whereas, farm size (X_5) and market intelligence (X_{18}) had a significant and positive relationship with the extent of adoption at five percent level. The findings agree with Meena, S.L. *et al.* (2012), who also reported that social participation, extension agency contact, and market intelligence are significant in adoption.

Annual income is a critical factor and the aspiration to scale up the income year after year is a common trait

Table 1: Relationship of profile characteristics with adoption level of CO 51 cultivation in Kancheepuram district (n = 150)

Variable No.	Variables	Correlation coefficient	Regression coefficient	Standard error	't'	'P' Value
X_1	Age	-0.029	0.245**	0.592	2.641	0.009
X_2	Educational status	0.237**	0.136	0.421	1.059	0.291
X_3	Annual income	0.275**	0.009	1.053	0.042	0.966
X_4	Occupational status	-0.040	0.044	0.368	0.664	0.508
X_5	Farm size	0.200*	0.028	0.358	0.329	0.743
X_6	Farming experience	-0.211**	-0.284**	0.438	-3.139	0.002
X_7	Social participation	0.317**	0.322	0.955	1.612	0.109
X_8	Mass media exposure	0.134	-0.142	0.201	-1.483	0.140
X_9	Extension agency contact	0.330**	0.254**	0.148	3.390	0.001
X_{10}	Information seeking behavior	-0.320**	-0.353**	0.412	-5.089	0.000
X_{11}	Economic motivation	0.068	0.038	0.114	0.576	0.565
X_{12}	Credit orientation	-0.073	-0.340**	0.259	-4.315	0.000
X_{13}	Decision making behavior	0.031	0.039	0.393	0.581	0.562
X_{14}	Training undergone	0.317**	0.126	1.011	1.294	0.198
X_{15}	Scientific orientation	-0.292**	-0.216**	0.139	-3.279	0.001
X_{16}	Storage facilities	-0.040	0.006	3.003	0.100	0.921
X_{17}	Marketable surplus	0.040	0.169**	0.371	2.445	0.016
X_{18}	Market intelligence	0.167*	0.054	0.982	0.772	0.442
X_{19}	Market channel preference	-0.130	0.023	0.411	0.319	0.750

*Significance at 0.05 level; ** Significance at 0.01 level; R^2 = 0.515; F value: 7.265.*

with any individual. A grower would naturally use the factors that facilitate an increase in annual income to the maximum extent possible. The data from Table 1 confirms the same, revealing that the rice growers' adoption of new technologies like rice variety CO 51 is significantly influenced by factors viz., annual income, educational status, social participation, contact with extension agencies and training undergone. It can be inferred that the annual income can be sustained and increased by adopting high yielding variety CO 51, which is possible through social participation that includes extension agency contact, which leads to undertaking training and the educational status facilitates the same. Thus all the above factors have had a significant and positive relationship with the extent of adoption of rice variety CO 51. Factors like farm size and market intelligence also have a significant role in adopting rice varieties CO 51. The results indicate the R^2 value of 0.515, which revealed that only 51.50 percent variation in the extent

of adoption was explained by age, educational status, annual income, occupational status, farm size, farm experience, social participation, mass media exposure, extension agency contact, information-seeking behavior, economic motivation, credit orientation, decision-making behavior, training undergone, scientific orientation, storage facilities, marketable surplus, market intelligence, market channel preference variables selected for the study. The prediction equation fitted for the extent of adoption was given below.

$Y_1 = 78.799 + 0.245^{**} (X_1) + 0.136 (X_2) + 0.009 (X_3) + 0.044 (X_4) + 0.028 (X_5) - 0.284^{**} (X_6) + 0.322 (X_7) - 0.142 (X_8) + 0.254^{**} (X_9) - 0.353^{**} (X_{10}) + 0.038 (X_{11}) - 0.340^{**} (X_{12}) + 0.039 (X_{13}) + 0.126 (X_{14}) - 0.216^{**} (X_{15}) + 0.006 (X_{16}) + 0.169^{**} (X_{17}) + 0.054 (X_{18}) + 0.023 (X_{19})$

Age (X_1), extension agency contact (X_9), and marketable surplus (X_{17}) were highly significant (at one percent level) and optimistic, which implies that if age, extension

agency contact, and marketable surplus increased by one percent, then the extent of adoption *Ceteris paribus* would increase by 0.245, 0.254 and 0.169 respectively.

(II) Relationship of profile characteristics with adoption level of CO 51 cultivation in Tiruvarur district

From Table 2, it could be observed that age (X_1), educational status (X_2), annual income (X_3), farm size (X_5), social participation (X_7), mass media exposure (X_8), extension agency contact (X_9), credit orientation (X_{12}) and market intelligence (X_{18}) had a significant and positive relationship with the extent of adoption at one percent level whereas, farm experience (X_6) and training undergone (X_{14}) had a significant and positive relationship with the extent of adoption at five percent level of significance.

Adopting a variety is a decision made by the farmer with the principle objective of increasing the revenue. Hence,

annual income has a significant and positive impact on adoption, as revealed in Table 2. However, the adoption of rice variety CO 51 is influenced by factors like age, educational status, farm size, social participation, mass media exposure, extension agency contact, credit orientation, and market intelligence. These findings are in line with Acheampong, *et al.* (2017), who reported that information seeking behavior is important in adopting recommended practices among rice growers. These factors work in tandem and in a sequence that ultimately results in the adoption. In a district like Tiruvarur, where the scope for cash crops or multi-cropping is limited, farmers necessarily need to look for ways and means to increase the income from rice cultivation. Hence, the adoption of improved varieties like CO 51 becomes critical. The age of a farmer and the educational status will impact the social contact, which is essential for moving out and establishing contact with extension agencies. These factors, combined with credit orientation and farm size play a significant role in the

Table 2: Relationship of profile characteristics with adoption level of CO 51 cultivation in Tiruvarur district (n = 150)

Variable No.	Variables	Correlation coefficient	Regression coefficient	Standard error	't'	'P' Value
X_1	Age	0.357**	0.265**	0.623	2.757	0.007
X_2	Educational status	0.363**	0.306*	0.813	2.220	0.028
X_3	Annual income	0.313**	0.021	0.808	0.133	0.894
X_4	Occupational status	-0.067	-0.030	0.366	-0.418	0.677
X_5	Farm size	0.278**	0.101	0.402	1.171	0.244
X_6	Farm experience	0.172*	-0.069	0.518	-0.671	0.504
X_7	Social participation	0.253**	-0.081	0.663	-0.621	0.536
X_8	Mass media exposure	0.339**	-0.075	0.280	-0.506	0.613
X_9	Extension agency contact	0.303**	0.186*	0.183	2.436	0.016
X_{10}	Information seeking behavior	-0.097	0.028	0.492	0.339	0.735
X_{11}	Economic motivation	0.060	0.043	0.127	0.541	0.589
X_{12}	Credit orientation	0.424**	0.297**	0.135	3.793	0.000
X_{13}	Decision making behavior	-0.177*	0.003	0.236	0.038	0.970
X_{14}	Training undergone	0.196*	0.030	0.854	0.360	0.719
X_{15}	Scientific orientation	-0.078	-0.110	0.171	-1.289	0.200
X_{16}	Storage facilities	-0.014	-0.058	1.706	-0.809	0.420
X_{17}	Marketable surplus	-0.024	-0.061	0.536	-0.817	0.416
X_{18}	Market intelligence	0.373**	0.175*	0.883	2.333	0.021
X_{19}	Market channel preference	-0.119	-0.038	0.328	-0.460	0.646

* Significance at 0.05 level; ** Significance at 0.01 level; R^2 = 0.452; F value: 5.645

adoption. Thus, with a limited scope on other fronts, the farmer has to necessarily raise production levels and adopt the latest variety that has more yields. The findings are by the findings of Meena *et al.* (2012). The results of multiple linear regression analysis concerning the contribution of independent variables towards the dependent variable and the extent of adoption are presented in Table 2. The results indicate the R^2 value of 0.452, which revealed that only 45.20 percent variation in the extent of adoption was explained by age, educational status, annual income, occupational status, farm size, farm experience, social participation, mass media exposure, extension agency contact, information-seeking behavior, economic motivation, credit orientation, decision-making behavior, training undergone, scientific orientation, storage facilities, marketable surplus, market intelligence, market channel preference variables selected for the study. The prediction equation fitted for the extent of adoption is given below.

Y_1 = 24.827 + 0.265** (X_1) + 0.306* (X_2) +0.021 (X_3) − 0.030 (X_4) + 0.101 (X_5) − 0.069 (X_6) − 0.081 (X_7) − 0.075 (X_8) + 0.186* (X_9) + 0.028 (X_{10}) + 0.043 (X_{11}) + 0.297** (X_{12}) + 0.003 (X_{13}) + 0.030 (X_{14}) − 0.110 (X_{15}) − 0.058 (X_{16}) − 0.061 (X_{17}) + 0.175* (X_{18}) − 0.038 (X_{19})

Age (X_1) and credit orientation (X_{12}) were highly significant (at one percent level) and positive, which implies that if age and credit orientation increased by one percent, then the extent of adoption *Ceteris paribus* would increase by 0.306 and 0.297, respectively. Educational status (X_2), Extension agency contact (X_9), and market intelligence (X_{18}) had significant and positive at five percent which implies that if educational status, extension agency contact, and market intelligence increased by five percent then the extent of adoption, of *Ceteris paribus* would increase by 0.306, 0.186 and 0.175.

CONCLUSION

The study revealed that educational status and extension agency contact had a highly significant and positive relationship with the knowledge level of the respondents on the Package of Practices (POP) for rice variety CO 51. Similarly, extension agency contact and marketable surplus had a significant and positive

relationship with POP adoption by framers cultivating rice variety CO 51. This implies that Extension agency contact plays a major role in deciding a new crop variety and other cited variables. This strategy may be adopted while introducing a new variety. In order to improve the farm incomes and achieve food security, Agricultural extension agents transfer the recommended Package of practices and include the post-harvest issues in their training package so that farmers can be practical at each stage of their production. A holistic policy of this study suggests the various stakeholders influence and build initiatives on promoting the farmers' social, economic, and psychological aspects, which results in the adoption of POP on new rice varieties.

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