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ELEMENTS CONTROLLING THE GRAPE GROWERS WITH THEIR ADOPTION LEVEL OF DRIP IRRIGATION TECHNOLOGIES IN INDIA

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Abstract

With the global warming, the demand for water in the world is increasing day by day. According to India, the demand for water for agriculture has been increasing over the past few years. The Government of India is proposing various technologies for farming with low water. This project Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) is one of them. All the farmers in the country are benefited by the scheme. Various technologies are being used in this project. Grapes are India's most important fruit crop. The livelihood of millions of farmers in India depends on grape cultivation. It occupies 1.14 per cent of the total area of cultivation with 2.56 per cent of the total production of fruits. Such specialized grape cultivation is complicated by water shortages today. Grape growers who are adopting the technologies of the PMKSY are recovering from a water scarcity. Socioeconomic status of grape growers plays an important role in the adoption of drip irrigation technologies and these factors determine their knowledge of such technologies. In order to know this the study was taken up in the grape predominant district of Dindigul in Tamil Nadu State (India) with a sample size of hundred and twenty grape growers selected based on the random sampling method. The zero-order correlation co-efficient and linear multiple regression analysis were employed to study the relationship and contribution of characteristics with adoption level in drip irrigation technologies. The findings revealed that out of sixteen independent variables, eight variables viz., educational status, experience in grape cultivation, mass media exposure, training undergone, decision making pattern, economic motivation, innovativeness and subsidy were found to have positive and significant relationship with the extent of adoption of drip irrigation technologies. The result of multiple regression showed that 51.90 per cent of variation in the adoption level was explained by the sixteen independent variables selected for the study
***Keywords*:** PMKSY, drip irrigation, grape growers, irrigational technologies, characteristics, adoption level.

Introduction

Drip irrigation is defined as the precise and regulated application of irrigation water and plant nutrients at low pressure and frequency intervals through drippers/emitters directly into the root zone of plant with the help of close network of pipes.

During the early 1940, Sumcha Blase an Israeli Engineer observed that a larger tree near the leaking water supply pipe exhibited a more vigorous growth than the other trees in the area. This led him to the concept of an irrigation system that would apply was drop by drop to plants. Drip irrigation pipes came to be sold outside Israel in 1969 on a commercial venture.

The use of drip irrigation in India starting from the time if initial testing at Tamil Nadu Agricultural University in Coimbatore in 1970, increased rapidly to 55,000 hectares. The technology in India was introduced on a commercial scale only during the Eighth Five Year Plan (1993-98) and during the one decade period 1993-2003 about 0.35 million hectares was brought under the drip irrigation. Later in 2015-2016 drip irrigation takes place as the major component of PMKSY scheme. This scheme covered 4.10 lakhs hectares through drip irrigation.

Compared with surface or sprinkler irrigation technologies, field application efficiency of drip irrigation can be high as 90 percent (Dasberg and Or 1999). Drip technology improves the irrigation efficiency by reducing evaporation from the soil surface, reducing or eliminating runoff and deep percolation, and eliminating the need to drastically over-irrigate some parts of the field to compensate for uneven water application (Larry J Schwankal *et al*., 1999).

The application or injection of fertilizers and other chemicals can also be optimized through the use of drip irrigation, weed growth can be reduced, and salinity problems can be mediated. Relative to highly pressurizes sprinkler irrigation systems, drip irrigation may require less energy. Drip irrigation systems also very adaptable to difficult soil and terrain conditions. It minimise more than fifty per cent of the water utilization and increase yields of most crops by approximately 20-80 per cent.

The socioeconomic status plays a major role in farmer's adoption to this unique drip irrigation system. Therefore, the association between technology adoption and respondents socioeconomic status is examined here and the results found. It can be used to create plans for policy makers.

Materials and Methods

The study was conducted in five selected villages of Attur block of Dindigul district in Tamil Nadu based on the major grape cultivating area. The sample size consisted of 120 grape growers with drip irrigation system under PMKSY. The respondents were interviewed personally through a well structured and pre-tested interview schedule.

Totally sixteen variables were selected for this study. They were Age, Educational status, Occupational status, Farm size, Experience in grape cultivation, Annual income, Extension agency contact, Mass media exposure, Attitude towards horticultural schemes, Training undergone, Decision making pattern, Risk orientation, Economic motivation, Scientific orientation, Innovativeness and Subsidy orientation. The statistical tools used in the study were percentage analysis, zero order correlation and multiple regression analysis.

Results and Discussion

Association between the socio-economic status of respondents towards their extent of adoption level in drip irrigation technologies

Association between personal, socio-economic and psychological characteristics of respondents with their adoption level is presented in this section. The zero-order correlation co-efficient and multiple regression analysis were employed to study the relationship and contribution of characteristics with adoption level in drip irrigation practices and the results are presented in this section.

(A) Relationship

In order to assess the relationship between personal, socio-economic and psychological characteristic of the grape growers and their adoption level on drip irrigation technology, zero order correlation co-efficient was worked out and the results are presented in Table1.

Table 1 : Relationship between personal, socio-economic status of respondents and their adoption level in drip irrigation technologies. **(n=120)**

Variable No.	Independent Variables	Correlation– coefficient 'r' value
X_1	Age	-0.048NS
X_2	Educational status	0.285**
X_3	Occupational status	0.091NS
X_4	Farm size	-0.021NS
X_5	Experience in grape cultivation	0.269**
X_6	Annual income	-0.181 NS
X_7	Extension agency contact	0.113NS
X_8	Mass media exposure	0.186*
X_9	Attitude towards horticultural scheme	-0.017NS
X_{10}	Training undergone	0.219*
X_{11}	Decision making pattern	0.210*
X_{12}	Risk orientation	0.094NS
X_{13}	Scientific orientation	-0.026NS
X_{14}	Economic motivation	0.216*
X_{15}	Innovativeness	0.191*
X_{16}	Subsidy orientation	0.187*

** - Significant at 1% level
* - Significant at 5 % level
NS – Non-significant

The results of correlation analysis in Table-1 showed that out of sixteen variables studied viz., educational status, experience in grape cultivation, mass media exposure, training undergone, decision making pattern, economic motivation, innovativeness and subsidy orientation had shown positive and significant relationship with adoption behavior of the respondents. Among the significant variables, only the educational status and experience in grape cultivation were found to be significant at one per cent level of probability whereas the remaining variables viz., mass media exposure, training undergone, decision making pattern, economic motivation, innovativeness and subsidy orientation were significant at five per cent level of probability. The correlation values for the remaining eight variables showed non-significant association with adoption level of respondents.

Educational status was found to have positive and significant relationship with the adoption behavior of respondents with one per cent level of probability. Obviously, educated respondents develop a positive attitude towards every possible source of knowledge and it leads to increased adoption. This finding is in conformity with the findings of Niruban Chakkaravarthy (2018).

Positive and significant relationship was found to exist between experience in grape cultivation and adoption at one per cent level of probability. This might be due to the reason that farming experience would have influenced the respondents to looking forward to new technologies to adopt in order to increase their profit. This derives support from the findings of Neelamegam (2018).

Mass media exposure showed a positive and significant relationship at five per cent level of probability. This implied that mass media exposure had got direct influence on the extent of adoption of drip irrigation system. Farmers with high mass media exposure would have acquired more knowledge about the latest technologies and would have enhanced interest for higher level of adoption. This finding is in agreement with the findings Sivapriyan (2018).

Training undergone showed a positive and significant relationship at five per cent level of probability. This might be due to the training directly influenced the adoption behavior of the respondents. Farmers having more training got acquired knowledge to adopt new technologies. This finding derives support from Sivapriyan (2018).

Positive and significant relationship was found to exist between decision making pattern and adoption at five per cent level of probability. This might be due to the reason that decision making pattern would have influenced the respondents to take the timely and quick decision about the scheme to adopt it. This finding is in the agreement with the findings of Niruban Chakkaravarthy (2018).

Economic motivation showed a positive and significant relationship at five per cent level of probability. This proves that the economic motivation influence the adoption because the high economic motivation encourage the farmers to take

a new step bravely and confidently. This finding is in conformity with the findings of Neelamegam (2018).

Innovativeness showed a positive and significant relationship. This proves that the innovativeness of the farmers leads to adopt the new technologies as soon as possible. This proves that the innovativeness influence the adoption behavior directly. This finding is in conformity with the findings of Sivapriyan (2018).

Subsidy orientation had a positive and significant relationship at five per cent level of probability. Obviously subsidy orientation motivates the farmers to try the new technology, because it supports even small and marginal farmers financially and gives enthusiasm to take new step on their farming. This finding is in conformity with the findings of Latha (2015).

(B) Contribution

In order to find out which of the independent variables explained the variation in the dependent variables and also to know the extent of contribution made by these variables, multiple regression analysis was carried out and the results are presented in this section.

The results of multiple regression analysis of the characteristics with adoption behavior are presented in the Table-2.

Table 2 : Contribution of personal, social-economic and psychological characteristics of respondents towards their adoption level of drip irrigation technologies. **(n=120)**

Variable No.	Impendent Variables	Regression co-efficient	Standard error	't' value
X_1	Age	0.004	0.349	0.031NS
X_2	Educational status	2.316	0.949	2.640**
X_3	Occupational status	0.141	0.797	1.431NS
X_4	Farm size	-0.060	0.295	-0.627NS
X_5	Experience in grape cultivation	0.498	0.192	2.593**
X_6	Annual income	1.216	0.978	1.243NS
X_7	Extension agency contact	0.162	0.030	1.695*
X_8	Mass media exposure	-0.044	0.008	-0.445NS
X_9	Attitude towards horticultural scheme	0.479	0.246	1.947*
X_{10}	Training undergone	1.698	0.998	1.701*
X_{11}	Decision making pattern	0.053	0.449	0.540NS
X_{12}	Risk orientation	0.849	0.578	1.692*
X_{13}	Scientific orientation	2.198	1.106	1.987*
X_{14}	Economic motivation	-0.041	0.104	-0.433NS
X_{15}	Innovativeness	0.946	0.501	1.888*
X_{16}	Subsidy orientation	0.157	0.090	1.631NS

R^2 =0.519 F= 6.412** a=10.572

**-Significant at 1 % level

*-Significant at 5% level

NS-Non-significant

It could be observed from the Table-2, exhibited that the R^2 value was 0.519 which implied that 51.90 per cent variations in the independent variables included in the study. Since the 'F' value 6.142 was found to be significant at 0.01 per cent of probability. The prediction equation was fitted for adoption level of the respondents as given below. There existed a linear functional contribution between the independent variables and adoption levels. The prediction equation for the respondents is as follows

$$Y= 10.572 + 0.004(X_1) + 2.316(X_2) + 0.141(X_3) - 0.060(X_4) +0.498 (X_5) + 1.216(X_6) + 0.162(X_7) -0.044(X_8) + 0.479(X_9) +1.698 (X_{10}) + 0.053(X_{11}) + 0.849(X_{12}) + 2.198 (X_{13}) - 0.041 (X1_4) + 0.946(X_{15}) + 0.157(X_{16})$$

It could be seen from the above equation that the regression co-efficient of the variables viz., educational status(X_2), experience in grape cultivation (X_5), extension agency contact (X_7), attitude towards horticultural scheme (X_9), training undergone (X_{10}), risk orientation (X_{12}), scientific orientation (X_{13}) and innovativeness (X_{15}) were found to be positive significant contributing towards the adoption level of the respondents. Among the significant variables, educational status and experience in grape cultivation were found to be significant at one per cent level of probability whereas the remaining variables viz., extension agency contact, attitude towards horticultural scheme, training undergone, risk orientation, scientific orientation and innovativeness were significant at five per cent level of probability.

The analysis revealed as ceteris paribus as one unit increase in educational status(X_2), experience in grape cultivation (X_5), extension agency contact (X_7), attitude towards horticultural scheme (X_9), training undergone (X_{10}), risk orientation (X_{12}), scientific orientation (X_{13}) and innovativeness (X_{15}) would increase the adoption level by 2.316, 0.498, 0.162, 0.479, 1.698, 0.849, 2.198 and 0.946 respectively. The results of multiple regressions in the case of remaining eight variables were not found to be significant.

Conclusion

Based on the findings of this study, the calculated 'r' value of the respondents of the PMKSY scheme revealed that the variables such as educational status, experience in grape cultivation, mass media exposure, training undergone, decision making pattern, economic motivation, innovativeness and subsidy orientation had shown positive and significant relationship with adoption behavior of the respondents. Whereas age, annual income, farm size, attitude towards horticultural scheme and scientific orientation had a negative relationship with the adoption level and variables

such as occupational status, extension agency contact and risk orientation had non-significant relationship with the adoption level of the respondents.

The calculated 't' value revealed that variables such as educational status, experience in grape cultivation, extension agency contact, attitude towards horticultural scheme, training undergone, risk orientation, scientific orientation and innovativeness were found to be positive significant contributing towards the adoption level of the respondents. Whereas experience in grape cultivation, mass media exposure and economic motivation had a negative relationship and the variables such as age, occupational status, annual income, decision making pattern, subsided orientation had a non-significant relationship with the adoption level of the respondents towards the drip irrigation technologies.

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