



A MULTIDIMENSIONAL ANALYSIS ON FACTORS INFLUENCING THE KNOWLEDGE LEVEL OF GRAPE GROWERS ON DRIP IRRIGATION TECHNOLOGIES AND CULTIVATION PRACTICES UNDER THE PRADHAN MANTRI KRISHI SINCHAYEE YOJANA IN TAMIL NADU

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Abstract

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) is a national mission to improve farm productivity and ensure better utilization of the water resources in the country. Grapes are one of the oldest utilized fruit crops in India. It occupies 1.14 percent of the total area of cultivation with 2.56 percent of the total production of fruits. According to National Horticultural Statistics, In Tamil Nadu 3,000 hectares are used for grape cultivation in twelve districts. Water scarcity is a major problem for grape cultivation here. Drip irrigation under PMKSY to solve this problem properly.

The profile characteristics of the grape growers play a vital role in determining their knowledge level on recommended drip irrigation technologies and cultivational practices. The zero-order correlation co-efficient and linear multiple regression analysis were employed to study the relationship and contribution of characteristics with knowledge level in drip irrigation technologies and cultivational practices. 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 findings revealed that out of sixteen independent variables, eight variables were found to be positive and significant relationship with knowledge level of irrigation technologies and cultivational practices in both correlation and regression analysis.

Key words: PMKSY, drip irrigation, grape growers, irrigational technologies, cultivational practices, characteristics, knowledge level

Introduction

Water is very essential for the healthy growth of farm crops. Every year farmers sow seeds and wait rains to replenish their farms. But due to the climate change, India has been witnessing growing water scarcity over the past several years and ground water also dwindling. Farmers are unable to manage their crops cycles due to unavailability of water both surface and ground. Several farmers have reportedly committed suicides. Due to the evil face of water scarcity, Government of India formulated the scheme “Pradhan Mantri Krishi Sinchayee Yojana” (PMKSY) with the vision of extending the coverage of irrigation and to improving water use efficiency.

The major objective of PMKSY is to achieve

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convergence of investments in irrigation at the field level, expand cultivable area under assured irrigation, improve on-farm water use efficiency to reduce the adoption of precision- irrigation and other water saving technologies, enhance recharge of aquifers and introduce sustainable water conservation practices by exploring the feasibility of reusing treated municipal waste water for peri-urban agriculture and attract greater private investment in precision irrigation system. Ministry of Agriculture promote efficient water application devices like drips, sprinklers, pivots, rain guns in the farm, construction of micro-irrigation structures to supplement source creation activities, extension activities for promotion of scientific moisture conservation and agronomic measures. In Tamil Nadu, this programme is implementing by State Horticulture Department.

Grape (*Vitis vinifera* L.) is one of the finest and the

healthiest fruit. In India, among growing commercial fruit crops grape is most important. It occupies 1.14 percent of the total area of cultivation with 2.56 percent of the total production of fruits. India's share in the global production of grapes is 2.8 percent. Grapes was introduced in Tamil Nadu in 1832 but only in recent years it has come to be recognized as a very rewarding crop. Certain special features lend distinctiveness to Tamil Nadu in many aspects of grape culture. This climate condition renders the harvest of three crops possible in a year or five crops in two years. Thus the crop is available in the market almost throughout the year. According to National Horticultural Statistics, In Tamil Nadu 3,000 hectares are used for grape cultivation in twelve districts but only a few districts concentrate on grape cultivation namely, Theni (2093 hectares), Coimbatore (242 hectares) and Dindigul (105 hectares) districts. Water scarcity is a major problem for grape cultivation here. Drip irrigation under PMKSY to solve this problem properly.

An understanding of appropriate irrigation technologies and positive cultivational practices are very much needed to utilize the PMKSY. The personal, socio-economic and psychological characteristics of the grape growers may play a role in determining their knowledge level on recommended drip irrigation technologies and

Table 1: Relationship between personal, socio-economic and psychological characteristics of respondents and their knowledge level of drip irrigation technologies (n=120).

Variable No.	Independent Variables	Correlation-coefficient'r' value
X ₁	Age	-0.108NS
X ₂	Educational status	0.272**
X ₃	Occupational status	-0.071 NS
X ₄	Farm size	-0.034NS
X ₅	Experience in grape cultivation	0.265**
X ₆	Annual income	0.060 NS
X ₇	Extension agency contact	0.120NS
X ₈	Mass media exposure	0.191*
X ₉	Attitude towards horticultural scheme	0.167NS
X ₁₀	Training undergone	0.221*
X ₁₁	Decision making pattern	0.197*
X ₁₂	Risk orientation	-0.159NS
X ₁₃	Scientific orientation	-0.010NS
X ₁₄	Economic motivation	0.221*
X ₁₅	Innovativeness	0.186*
X ₁₆	Subsidy orientation	0.194*

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

cultivational practices under PMKSY. Keeping this in view, the present study has been made to know the relationship and contribution of characteristics with knowledge level in drip irrigation technologies and cultivational practices.

Materials and Methods

The study was carried out in selected five 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

The results of association between the personal, socio-economic and psychological characteristics of the respondents and their knowledge level in drip irrigation technologies and cultivational practices under PMKSY are presented in this section.

I. Relationship of profile characteristics of grape growers with the knowledge level of irrigation technologies

The results in Table 1, Exhibited that out sixteen independent variables *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 knowledge level of the respondents in drip irrigation technologies. Among the significant variables, educational status and experience in grape cultivation were found to be significant association at one per cent level of probability, whereas the remaining variables namely mass media exposure, training undergone, decision making pattern, economic motivation, innovativeness and subsidy orientation had significant at five per cent level of probability. The correlation values for the other eight variables showed non-significant association with knowledge level of respondents.

Educational status was highly positive and significantly related to knowledge level at one per cent level of probability. Education increases the ability to understand facts and facilitates proper analysis and interpretation. Educated respondents may have better mass media exposure. It had increased across to communication sources. These may be the reasons for the positive relationship between educational status and knowledge level. This finding derives support from the findings of Niruban Chakkaravarthy (2018).

Experience in grape cultivation had shown positive and highly significant relationship at one per cent level of probability. This may be due to the fact that the respondents with more experience in grape cultivation are mostly old aged persons. It may be stated that more experience in farming would enhanced the higher knowledge in drip irrigation system. Hence, the experience in farming of the respondents resulted in positive and significant relationship with knowledge level. This finding derives support from the Dinesh kumar (2018).

Mass media exposure was found to have positive and significant relationship with the knowledge level of drip irrigation system. Farmers get the information from various sources like the Officials of State Horticulture Department and also from radio, television, newspaper

etc., which might have resulted in grater knowledge of the respondents. This finding is in accordance with that findings of Sivapriyan (2018).

There was positive and significant relationship between training undergone and knowledge level of the respondents. Generally trained farmers have more knowledge about the drip irrigation system than untrained farmers. Hence, a positive relationship obtained. This observation is in agreement with the earlier findings of Sivapriyan (2018).

Decision making pattern exhibited a positive and significant association at five per cent level of probability. It is obvious because the respondents who had higher decision making pattern can able to make quick and timely decision and they had acquired knowledge naturally. This is in conformity with the findings of Niruban Chakkaravarthy (2018).

There was a positive and significant relationship between economic motivation and knowledge level of the respondents. Those who had higher economic motivation can bravely try the new innovation practices and it gives enthusiasm to the farmers to practice the technology, which in turn would have resulted with the higher level of knowledge of the respondents. This finding delivers it support from the findings of Neelamegam (2018).

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

Variable No.	Impendent Variables	Regression co-efficient	Standard error	't' value
X ₁	Age	-0.063	0.385	-0.456 NS
X ₂	Educational status	1.719	0.651	2.640**
X ₃	Occupational status	-0.059	0.879	-0.604NS
X ₄	Farm size	-0.028	0.326	-0.289NS
X ₅	Experience in grape cultivation	0.478	0.198	2.659**
X ₆	Annual income	0.069	0.006	0.703NS
X ₇	Extension agency contact	2.111	1.102	1.915*
X ₈	Mass media exposure	0.126	0.009	1.270 NS
X ₉	Attitude towards horticultural scheme	1.749	1.006	1.738*
X ₁₀	Training undergone	0.678	0.322	2.105*
X ₁₁	Decision making pattern	2.478	2.000	1.418NS
X ₁₂	Risk orientation	0.846	0.512	1.652*
X ₁₃	Scientific orientation	1.418	0.819	1.731*
X ₁₄	Economic motivation	0.012	0.115	0.121NS
X ₁₅	Innovativeness	0.179	0.069	2.319*
X ₁₆	Subsidy orientation	-0.022	0.100	-0.234NS

R²=0.572 F=6.748** a=11.691

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

There was positive and significant relationship between innovativeness and knowledge level of the respondents. Those who are willing to adopt new technologies would search for more information, which in turn would have resulted with higher knowledge level of the respondents. The finding delivers it support from the findings of Sivapriyan (2018).

It was found that the subsidy orientation had positive significant relationship with the knowledge of the respondents. This result might be positive response of beneficiaries, it leads to taking up various activities and it act as motivational factor for beneficiaries for taking up different technologies recommended under PMKSY scheme. This finding delivers it support from the findings of Latha (2015).

II. contribution of profile characteristics of grape growers with the knowledge level of irrigation technologies

The data in Table 2, indicate that the R^2 value was 0.572 which revealed that 57.20 percent of variation in the knowledge level of the farmers about drip irrigation technology was explained by sixteen variables selected for the study. Since the 'F' value was significant at one per cent level of probability, the prediction equation was fitted for knowledge level of the respondents as given below.

$$Y = 11.691 - 0.063 (X_1) + 1.719 (X_2) - 0.059 (X_3) - 0.028 (X_4) + 0.478 (X_5) + 0.069 (X_6) + 2.111 (X_7) + 0.126 (X_8) + 1.749 (X_9) + 0.678 (X_{10}) + 2.478 (X_{11}) + 0.846 (X_{12}) + 1.418 (X_{13}) + 0.012 (X_{14}) + 0.179 (X_{15}) - 0.022 (X_{16})$$

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 knowledge 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

Table 3: Relationship between personal, socio-economic and psychological characteristics of respondents and their knowledge level in cultivation practices in grapes (n=120).

Variable No.	Independent Variables	Correlation-coefficient 'r' value
X_1	Age	-0.015NS
X_2	Educational status	0.310**
X_3	Occupational status	-0.071 NS
X_4	Farm size	0.076NS
X_5	Experience in grape cultivation	0.267**
X_6	Annual income	-0.013NS
X_7	Extension agency contact	0.243NS
X_8	Mass media exposure	0.211*
X_9	Attitude towards horticultural scheme	-0.110NS
X_{10}	Training undergone	0.214*
X_{11}	Decision making pattern	0.211*
X_{12}	Risk orientation	-0.013NS
X_{13}	Scientific orientation	-0.018NS
X_{14}	Economic motivation	0.231*
X_{15}	Innovativeness	0.205*
X_{16}	Subsidy orientation	0.241*

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

scheme, training undergone, risk orientation, scientific orientation and innovativeness were significant at five per cent level of probability.

The strength of contribution of these variables revealed that a unit increase *ceteris paribus* 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 knowledge level by 1.719, 0.478, 2.111, 1.749, 0.678, 0.846, 1.418 and 0.179 units respectively. This meant that drip technology practicing farmers who possessed educational status and experience in grape cultivation, extension agency contact, attitude towards horticultural scheme, training undergone, risk orientation, scientific orientation and innovativeness would have higher knowledge level in drip irrigation technologies under PMKSY.

The other variables did not show significant effect on the knowledge level in drip irrigation technologies.

III. relationship of profile characteristics of grape growers with the knowledge level of cultivational practices

The results in Table 3, Exhibited that out sixteen independent variables *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 knowledge level of the respondents in cultivation practices in grapes. Among the significant variables, educational status and experience in grape cultivation were found to be significant association at one per cent level of probability, whereas the remaining variables namely mass media exposure, training undergone, decision making pattern, economic motivation, innovativeness and subsidy orientation had significant at five per cent level of probability. The correlation values for the other eight variables showed non-significant association with knowledge level of respondents.

Educational status was positively and highly significantly related to knowledge level. Education increases the ability to understanding the difficult cultivation practices. Educational status helps to observe the practices and technologies accurately for farming works. These may be the reasons for the positive relationship between educational status and knowledge level. This finding derives support from the findings of Suramwad Snehal (2014).

Experience in grape cultivation had shown positive and highly significant relationship at one per cent level of probability. This may be due to the fact that the respondents with more experience in grape farming are mostly old aged persons. It may be stated that more experience in farming would enhanced the higher knowledge in cultivation practices of grapes. This finding derives support from the Dasharath Dodamani (2014).

Mass media exposure is found to have positive and significant relationship with the knowledge level of grape cultivation practices. Farmers get the information from various sources like the Officials of State Horticulture Department and also from mass media, which might have resulted in grater knowledge of the respondents. This finding is in accordance with that findings of Sivapriyan (2018).

There was positive and significant relationship between training undergone and knowledge level of the respondents. Generally the trained farmers had more knowledge about the cultivation practices than untrained farmers. Hence, a positive relationship obtained. This observation is in agreement with the earlier findings of Niruban Chakkaravarthy (2018).

Decision making behavior exhibited a positive and significant association at five per cent level of probability. It is obvious because the respondents who had higher

decision making behavior can able to make quick decision and they can able to handle any tricky situation in farming. This is in conformity with the finding Niruban Chakkaravarthy (2018).

There was a positive and significant relationship between economic motivation and knowledge level of the respondents. Those who had higher economic motivation can bravely try the new innovation practices. This findings delivers it support from the findings of Neelamegam (2018).

There was positive and significant relationship between innovativeness and knowledge level of the respondents. Those who are willing to adopt new practices would search for more information and gain more knowledge. The findings deliver it support from the findings of Sivapriyan (2018).

There was found that the subsidy orientation had positive significant relationship with the knowledge of the respondents. It acts as motivational factor for beneficiaries for taking up different practices recommended for grape cultivation. This finding delivers it support from the findings of Latha (2015).

IV. contribution of profile characteristics of grape growers with the knowledge level of cultivational practices

The data in Table 4 indicate that the R² value was

Table 4: Contribution of personal, social-economic and psychological characteristics of respondents towards their knowledge level of cultivation practices in grapes (n=120).

Variable No.	Impendent Variables	Regression co-efficient	Standard error	't' value
X ₁	Age	-0.007	0.477	-0.051 NS
X ₂	Educational status	1.098	0.406	2.704**
X ₃	Occupational status	-0.059	1.088	-0.589NS
X ₄	Farm size	0.032	0.403	0.332NS
X ₅	Experience in grape cultivation	0.619	0.247	2.506**
X ₆	Annual income	-0.013	0.007	-0.127NS
X ₇	Extension agency contact	1.498	0.800	1.872*
X ₈	Mass media exposure	-0.150	0.011	-1.480 NS
X ₉	Attitude towards horticultural scheme	0.712	0.392	1.816*
X ₁₀	Training undergone	1.121	0.489	2.292*
X ₁₁	Decision making pattern	-0.014	0.613	-0.137NS
X ₁₂	Risk orientation	2.478	1.141	2.171*
X ₁₃	Scientific orientation	1.479	0.742	1.991*
X ₁₄	Economic motivation	-0.047	0.143	-0.480NS
X ₁₅	Innovativeness	0.819	0.418	1.959*
X ₁₆	Subsidy orientation	0.077	0.213	0.789NS

R²=0.561 F=6.512** a=9.643 ** - Significant at 1% level
 * - Significant at 5% level NS- Non-significant

0.561 which revealed that 56.10 percent of variation in the knowledge level of the farmers about cultivation practices of grapes was explained by sixteen variables selected for the study. Since the 'F' value was significant at one per cent level of probability, the prediction equation was fitted for knowledge level of the respondents as given below.

$$Y = 9.516 - 0.007 (X_1) + 1.098 (X_2) - 0.059 (X_3) + 0.032 (X_4) + 0.619 (X_5) - 0.013 (X_6) + 1.498 (X_7) - 0.150 (X_8) + 0.712 (X_9) + 1.121 (X_{10}) - 0.014 (X_{11}) + 2.478 (X_{12}) + 1.479 (X_{13}) - 0.047 (X_{14}) + 0.819 (X_{15}) + 0.077 (X_{16})$$

It could be seen from the above equation that the regression co-efficient of the variables viz., educational status (X₂), experience in grape cultivation (X₅), extension agency contact (X₇), attitude towards horticultural scheme (X₉), training undergone (X₁₀), risk orientation (X₁₂), scientific orientation (X₁₃) and

innovativeness (X_{15}) were found to be positive significant contributing towards the knowledge 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 strength of contribution of these variables revealed that a unit increase ceteris paribus in educational status (X_2), experience in grape cultivation (X_3), 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 knowledge level by 1.098, 0.619, 1.498, 0.712, 1.121, 2.478, 1.478, 0.819 units respectively. This meant grape farmers who possessed educational status and experience in grape cultivation, extension agency contact, attitude towards horticultural scheme, training undergone, risk orientation, scientific orientation and innovativeness would have higher knowledge level in grape cultivation practices.

The other variables did not show significant effect on the knowledge on grape cultivation practices.

Conclusion

The calculated 'r' value of beneficiaries of PMKSY scheme showed that the variables 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 knowledge level of the respondents in drip irrigation technology. Whereas age, occupational status, farm size, risk orientation and scientific orientation had a negative relationship with the knowledge level and annual income, extension agency contact and attitude towards horticultural scheme had non-significant relationship with the knowledge 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 knowledge level of the respondents. Whereas age, occupational status, farm size and subsidy orientation were negative relationship with the knowledge level and annual income, mass media exposure, decision making pattern and economic motivation had non-significant relationship with the

knowledge level of the respondents.

The calculated 'r' value of the respondents in knowledge level of grape cultivation practices showed that 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. The remaining eight variables age, occupational status, annual income, attitude towards horticultural schemes, risk orientation, scientific orientation had negative relationship and farm size, extension agency contact had non-significant relationship with the knowledge level of the respondents towards grape cultivation practices.

The calculated 't' value showed that 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 knowledge level of the respondents. Whereas age, occupational status, annual income, mass media exposure, decision making pattern, economic motivation had negative relationship and farm size, subsidy orientation had a non significant relationship with the knowledge level.

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