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DETERMINANTS OF KNOWLEDGE LEVEL AMONG WATERMELON GROWERS ON SCIENTIFIC CULTIVATION TECHNOLOGY

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ABSTRACT

Agriculture continues to be a key pillar of the Indian economy, with horticulture contributing significantly to farmers' income and nutritional security. Among horticultural crops, watermelon has gained importance due to its high market demand and short duration nature. Despite the increasing area and production of watermelon in states like Gujarat, especially in Banaskantha district, farmers often do not fully benefit from its potential. Previous studies have mainly focused on adoption and productivity aspects, while knowledge level and its determinants have received relatively less attention, though knowledge is a prerequisite for effective technology use. There is limited empirical evidence on the knowledge status of watermelon growers and the factors influencing it, which restricts the development of targeted extension strategies. The study was conducted in Banaskantha district of Gujarat using an ex-post facto research design. A total of 150 watermelon growers were selected through multistage sampling from three talukas. Data were collected through personal interviews using a structured schedule and analyzed using mean, percentage, standard deviation, correlation and stepwise regression. The results revealed that 65.33 per cent of the growers had medium knowledge, followed by 18.67 per cent low and 16.00 per cent high knowledge, with a mean score of 62.93. Farming experience, extension participation, land holding, area under cultivation and annual income showed positive and highly significant relationships at 1 per cent level, while education, social participation and source of information were significant at 5 per cent level. Stepwise regression indicated that four variables explained 29.40 per cent of the variation in knowledge. The findings are consistent with earlier studies reporting moderate knowledge levels among farmers and highlight the importance of experience and extension exposure in enhancing knowledge. The study suggests strengthening extension services, need-based training and improving access to information sources to enhance farmers' knowledge and promote scientific cultivation practices.

Keywords*: knowledge assessment, regression, correlation, scientific cultivation technology*

INTRODUCTION

Agriculture continues to be the backbone of India's economy with horticulture playing a crucial role in enhancing farmers' income and ensuring food and nutritional security. According to medical science the daily per capita requirement of fruits is about 120 grams and vegetables is 300 grams. Fruits possess high nutritive value next only to milk and provide a continuous source of income to farmers throughout the year.

Watermelon is an important commercial fruit crop cultivated widely in tropical regions due to its high market demand and income generating potential. India ranks as the third largest producer of watermelon in the world with Uttar Pradesh emerging as the leading producing state. Gujarat is also one of the major watermelon growing and exporting states. In Banaskantha district particularly in Deesa taluka watermelon and muskmelon cultivation is prominent during the summer season. The area under watermelon cultivation in the district was about 2540.00 ha with a production of 59,055.00 MT and productivity of 23.25 MT per ha (Anonymous 2024).

Its cultivation requires little care and inputs. It has nutritional value, as well as, good selling price in market and can kept for long time (Bhajipale et al., 2020). Watermelon cultivation has been expanding rapidly because of its profitability short duration and availability of high yielding varieties which help farmers increase income and provide nutritive fodder for livestock. However despite its economic importance many farmers still lack adequate knowledge of scientific cultivation practices. Limited access to extension services technical guidance and reliable information sources often leads to partial adoption of recommended technologies resulting in lower productivity and inefficient use of resources. Therefore improving farmers' knowledge

on scientific watermelon cultivation has become essential for enhancing production efficiency.

Knowledge of scientific cultivation technology is influenced by several personal socio economic communicational and psychological characteristics of farmers which act as facilitators or barriers in knowledge acquisition. Understanding these factors is important for designing effective extension strategies and targeted capacity building programmes.

Although earlier studies have focused mainly on adoption behaviour productivity and economic aspects of horticultural crops limited empirical research has examined the knowledge level of watermelon growers and its determining factors. Systematic assessment of farmers' knowledge status along with associated profile characteristics remains inadequate creating a clear research gap. In this context the present study was undertaken to assess the knowledge level of watermelon growers regarding scientific watermelon cultivation technology and to analyse the influence of personal socio economic communicational and psychological characteristics on their knowledge. The findings of the study are expected to assist extension personnel policy planners and development agencies in designing need based training programmes and appropriate extension interventions for improving farmers' knowledge and promoting scientific watermelon cultivation practices.

OBJECTIVES

(1) To study the knowledge level of watermelon growers about scientific watermelon cultivation technology

(2) To find out the relationship between the profile of the watermelon growers and their knowledge level regarding scientific watermelon cultivation technology

METHODOLOGY

The present study was conducted in Banaskantha district of Gujarat state, which is one of the leading producers of Watermelon in Gujarat. Among the fourteen talukas Deesa, Dantiwada and Palanpur talukas were purposively selected based on maximum area under watermelon cultivation for the study. Five villages from each taluka and 10 farmers from each village were randomly selected as respondents for the study making a sample size of 150 respondents through multistage sampling. *Ex-post facto* research design was employed and data were collected using a pre-tested structured schedule by personal interview method through farm and home visits during February 2025 to March 2025. In addition to the primary data, secondary data for the study was collected from reference books, research papers, journals, reports and postgraduate thesis related to watermelon. Statistical tools like mean, frequency, percentage, standard deviation, Karl Pearson correlation and stepwise regression to draw conclusion. MS Excel 2024 (Version 2408) was used for tabulation and IBM SPSS Statistics (Version 26) software and R studio (version 2024.12.1+563) were used for data analysis. Knowledge level about scientific watermelon cultivation technology is a dependent variable and is defined as the degree of understanding possessed by farmers regarding recommended scientific practices of watermelon cultivation measured through their responses to selected knowledge statements and categorized into low medium and high levels based on the obtained knowledge scores. A total of 10 independent variables namely age, education, farming experience in watermelon cultivation, social participation, extension participation, size of land holding, area under watermelon cultivation, annual income, source of information, risk orientation was used in the study.

RESULTS AND DISCUSSION

Table 1: Knowledge level of watermelon growers about scientific watermelon cultivation technology

(n=150)

Sr. No.	Category	Range	Frequency (*f*)	Per cent (%)
1	**Low Knowledge**	< 52.46 score	28	18.67
2	**Medium Knowledge**	52.46 to 73.40 score	98	65.33
3	**High Knowledge**	> 73.40 score	24	16.00
Mean =62.93			S.D = 10.47	

The distribution of watermelon growers based on their knowledge level of scientific watermelon cultivation technology reveals that a clear majority (65.33%) fall under the medium knowledge category, followed by 18.67 per cent with low knowledge and only 16.00 per cent with high knowledge. The mean knowledge score of 62.93 with a standard deviation of 10.47 indicates a moderate level of knowledge with some variability among the respondents.

This suggests that most farmers possess partial awareness of recommended cultivation practices but may lack comprehensive and in-depth technical understanding. The predominance of medium knowledge could be attributed to moderate exposure to extension services, training programmes and informal information sources such as fellow farmers and local input dealers. However, the relatively lower proportion of farmers in the high knowledge category indicates limited access to advanced scientific information, insufficient training intensity or gaps in effective knowledge

transfer mechanisms. Overall, the findings highlight the need for strengthening extension interventions, capacity building programmes and targeted training to enhance farmers' knowledge towards scientific watermelon cultivation practices. The results are in congruence with the findings of Thorat *et al*. (2014), Shriwas *et al.* (2015), Madhuri *et al.* (2017), Paradva *et al*. (2021), Dey and Bose (2024) and Chauhan *et al*. (2025); Kachchhava *et al.* (2023); Dhananjaya *et al.* (2025); Parmar & Patel (2025); Vegad *et al.* (2021); Mallappa *et al.* (2023) indicating a similar trend of moderate knowledge levels among farmers.

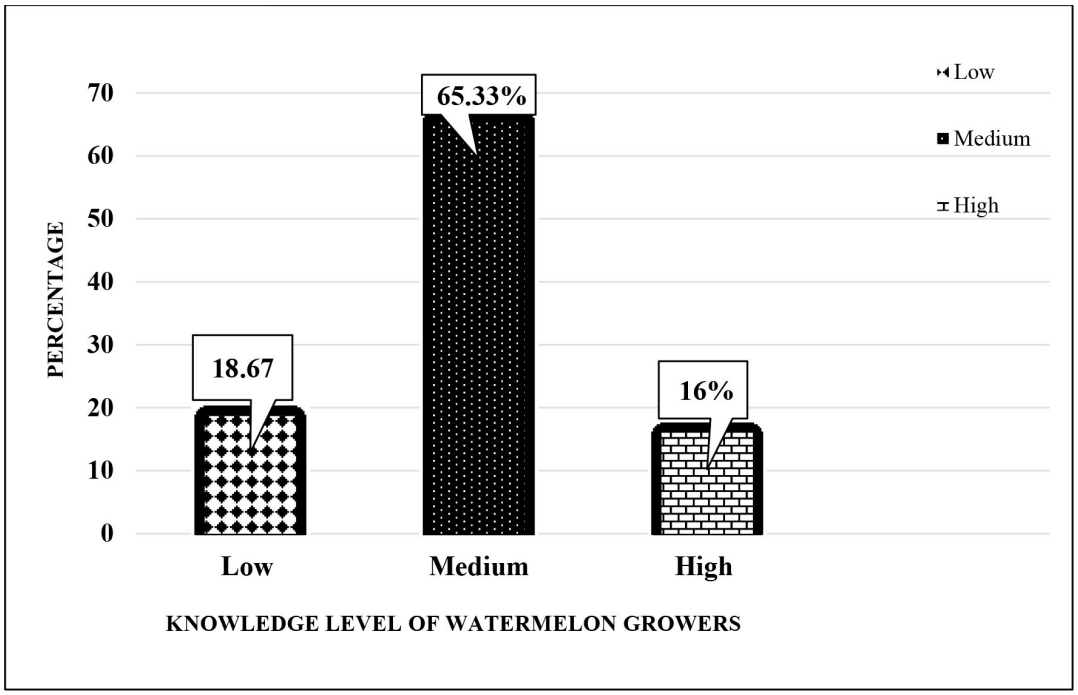

Fig 1: Knowledge level of watermelon growers about the scientific cultivation technology

Table 1: Relationship between the profile of the watermelon growers and their knowledge level regarding scientific watermelon cultivation technology (n=150)

Sr. No.	Profile characteristics	Correlation coefficient ('r' value)
X_1	**Age**	-0.156^{NS}
X_2	**Education**	0.199*
X_3	**Farming experience in watermelon cultivation**	0.407**
X_4	**Social participation**	0.189*
X_5	**Extension participation**	0.338**
X_6	**Size of land holding**	0.356**
X_7	**Area under watermelon cultivation**	0.297**
X_8	**Annual income**	0.292**
X_9	**Source of information**	0.197*
X_{10}	**Risk orientation**	0.158^{NS}
*5% significance level **1% significance level ^{NS} Non- significant		

The results indicate that farming experience in watermelon cultivation, extension participation, size of land holding, area under watermelon cultivation and annual income have a positive and highly significant association (at 1 per cent level) with the knowledge level of watermelon growers. This implies that farmers who are more experienced, economically better positioned and actively engaged with extension activities tend to possess higher knowledge about scientific cultivation practices. Greater area under watermelon and larger land holdings may also encourage farmers to adopt improved practices, thereby enhancing their knowledge through practical exposure and investment orientation.

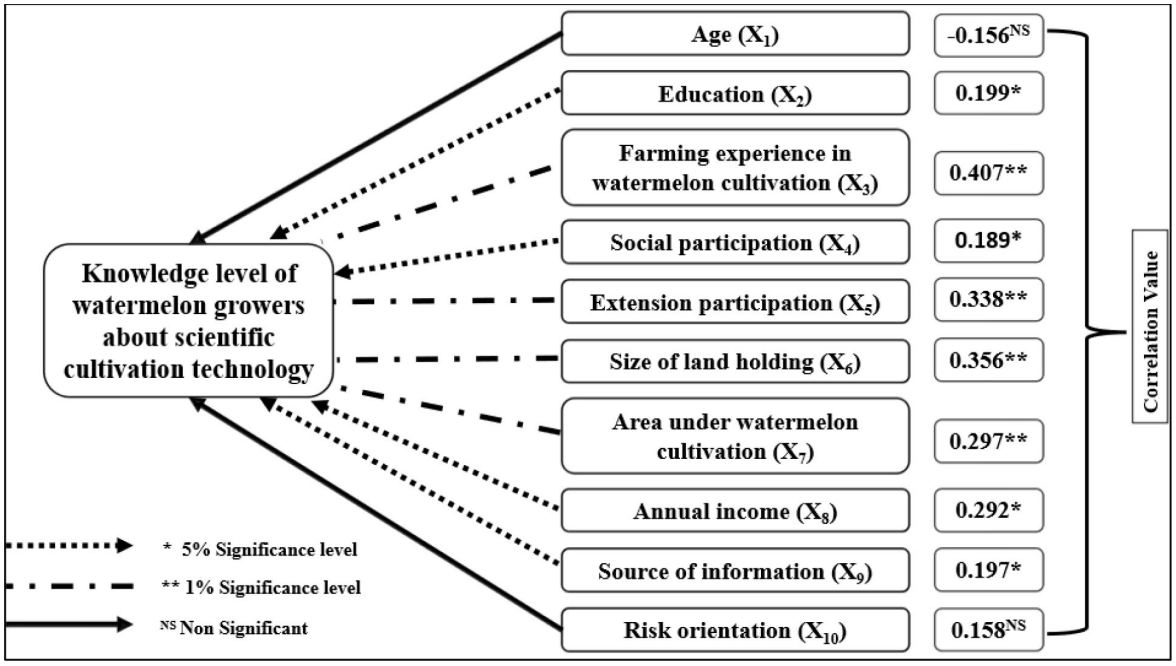

Fig 2: Correlation between the profile of the watermelon growers and their knowledge level regarding scientific watermelon cultivation technology

Further, education, social participation and source of information exhibit a positive and significant relationship (at 5 per cent level) with knowledge level. Educated farmers are generally more receptive to new technologies and better able to understand scientific recommendations. Similarly, farmers with higher social participation and better access to information sources are more likely to interact, share experiences and stay updated, which contributes to improved knowledge levels.

The risk orientation shows a positive but non-significant relationship, indicating that although risk-taking farmers may be slightly more inclined towards acquiring knowledge, the effect is not strong enough to be statistically confirmed. Age exhibits a negative and non-significant relationship with knowledge level, suggesting that older farmers may be relatively less inclined towards learning or adopting new scientific practices, but the relationship is weak and not statistically significant. The results are in congruence with the findings of Chauhan (2022) and Raval (2023).

Table 2: Factors defining the variance embedded in the predicted variable (knowledge level of farmers regarding scientific watermelon cultivation technology)

Model	Predictors variables	R	R Square	Adjusted R square	Std. Error
1	Farming experience in watermelon cultivation (X_3)	0.451[a]	0.204	0.198	9.380
2	Farming experience in watermelon cultivation (X_3), Size of land holding (X_6)	0.515[b]	0.265	0.255	9.043
3	Farming experience in watermelon cultivation (X_3), Size of land holding (X_6), Extension participation (X_5)	0.540[c]	0.291	0.277	8.908
4	Farming experience in watermelon cultivation (X_3), Size of land holding (X_6), Extension participation (X_5), Source of information (X_9)	0.559[d]	0.313	0.294	8.803

The R value keeps on increasing from model-1 to model-4 indicating a strong positive relationship between the joint effect of combined predictor variables and knowledge level of farmers. Standard error in the model-1 is 9.380 and it keeps on decreasing as more predictor variables were added in each step indicating that the model's predictions are more precise with the inclusion of predictor variable in successive model.

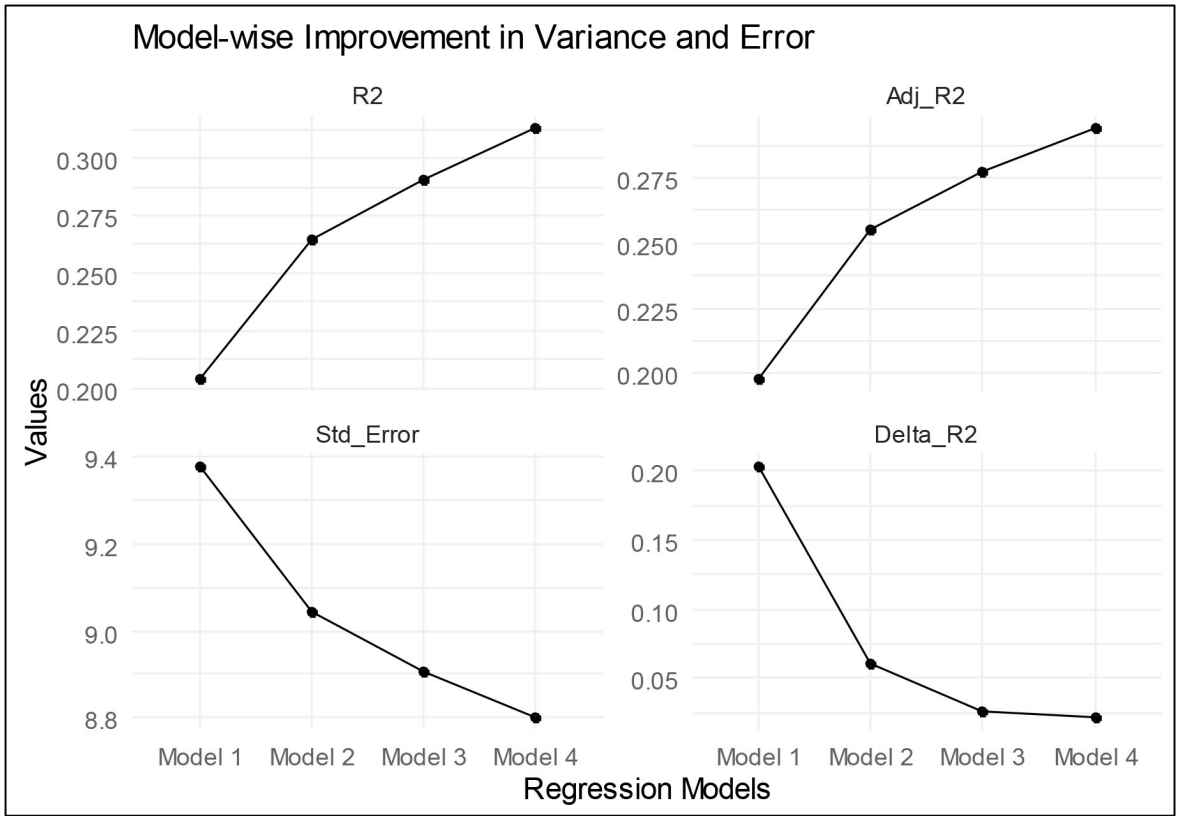

Fig 3: Model-wise Improvement in Explained Variance (R^2), Adjusted R^2 and Standard Error of Knowledge Level Regression Models of Watermelon Growers

Farming experience alone explained 19.80 per cent of the variance in the variable knowledge level in model-1 and when land holding is added in the model-2 their combined effect increased to 25.50 per cent and similarly extension participation in model-3 gave a combined effect of 27.70 per cent variance. In the final model with the addition of source of information, a combined effect could be seen and 29.40 per cent variance in the variable knowledge level of farmers regarding scientific watermelon cultivation technology could be explained.

Farming experience found to play a significant role in explaining greater knowledge level among farmers regarding scientific watermelon cultivation technology because farmers with a more farming experience are likely to be gain better knowledge of scientific technology through practical learning and observation. Managing more land also pushes farmers to stay updated and use improved methods to get good results. So, their bigger land size helps them gain more knowledge through better access and experience. Farmers with higher extension activities gain regular exposure to updated agricultural information, expert guidance, and practical demonstrations. Farmers who use more sources of information like radio, TV, mobile, or experts get regular updates about farming. This helps them learn new and better ways of cultivation, increasing their knowledge level. The combination of farming experience, land holding, extension participation and source of information gives the most comprehensive model for predicting knowledge level. This progression shows that while farming experience is the most important predictor, adding land holding, extension participation and source of information increase the model's explanatory power. Each new variable brings joint effect to understanding what drives knowledge level among watermelon growers.

Stepwise regression showed that about 29.40 per cent variance explained by four predictor variables farming experience, land holding, extension participation and source of information in predicting knowledge level. But still, there are still many variables that have defined the overall knowledge level, but not included in the study and further study can be done by including more variables. The results are in congruence with the findings of Das *et al*. (2026).

CONCLUSION

The study revealed that the majority (65.33%) of watermelon growers possessed a medium level of knowledge regarding scientific watermelon cultivation technology, while 18.67 per cent and 16.00 per cent of respondents had low

and high levels of knowledge, respectively. Overall, a large proportion (84.00%) of growers fell under low to medium knowledge categories, indicating scope for improvement. The findings further indicated that farming experience, extension participation, size of land holding, area under watermelon cultivation and annual income had a positive and highly significant association with knowledge level. In addition, Education, social participation and source of information showed a positive and significant relationship. However, age and risk orientation were found to have a non-significant association with knowledge level. Stepwise regression analysis revealed that farming experience, land holding, extension participation and source of information together explained 29.40 per cent of the variation in knowledge level, with farming experience emerging as the most influential factor. The study highlights the need to strengthen extension services and improve access to reliable information sources to enhance farmers' knowledge. Organizing need-based training programmes, demonstrations and regular field visits can play a crucial role in promoting scientific watermelon cultivation practices and improving farmers' overall knowledge level.

RECOMMENDATION

Based on the findings of the study it is recommended that extension agencies and Krishi Vigyan Kendras should strengthen need based training programmes demonstrations and regular field visits to enhance farmers' knowledge on scientific watermelon cultivation technology particularly among growers possessing low and medium knowledge levels. Further policy makers extension organizations and agri tech firms should improve farmers' access to reliable information through strengthened digital extension services including mobile based advisories social media platforms and localized communication strategies which can facilitate timely dissemination of scientific practices and ultimately improve farmers' overall knowledge and adoption behaviour.

CONFLICT OF INTEREST

There is no conflict of interest among any authors regarding publication of the research paper in the journal as well as in the content.

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