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KNOWLEDGE OF MAIZE GROWERS ON SCIENTIFIC CULTIVATION PRACTICES

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ABSTRACT

Maize is an important cereal crop contributing significantly to food security, livestock feed, and rural livelihoods worldwide. In Jammu & Kashmir, it plays a vital role in sustaining the agrarian economy, particularly in hilly and rainfed regions. Adoption of scientific cultivation practices is essential for improving maize productivity and farmers' income. Studies in agricultural extension indicate that farmers' knowledge level strongly influences adoption of recommended practices. However, uneven awareness across different practices often constrains effective utilization of improved technologies. There is limited empirical evidence on maize growers' knowledge regarding scientific cultivation practices in Jammu & Kashmir. The study was conducted in three purposively selected districts of Jammu & Kashmir, namely Budgam, Anantnag, and Baramulla, based on maximum area under maize cultivation. A total sample of 298 maize growers was selected. Data were collected using a structured interview schedule and analyzed with appropriate statistical tools. The results revealed that 66.10% of respondents had knowledge of suitable soil type, while 86.58% knew the optimum sowing time and 79.54% the appropriate harvesting time. About 69.46% had knowledge of land preparation, and 67.44% were aware of recommended varieties and sweet corn maize. Knowledge regarding seed rate and plant geometry was reported by 57.04%, seed treatment by 62.76%, and sowing method by 59.06% of respondents. Lower knowledge levels were observed in thinning and gap filling (41.95%) and optimum moisture for shelling (36.24%). Overall, 46.98% had medium knowledge, 27.52% high, and 25.50% low knowledge levels. The findings indicate higher awareness of general practices and lower understanding of technical aspects, consistent with earlier extension studies. This suggests a gap in specialized knowledge among maize growers in the region. Targeted extension interventions and farmer training programmes are needed to improve knowledge of technical practices. Strengthening advisory services can enhance adoption and productivity.

Keywords: *maize cultivation, scientific practices, knowledge, farmers, extension interventions*

INTRODUCTION

Maize is one of the most important food grain crops in the global agricultural economy, valued for its diverse uses as food, feed, fodder, and industrial raw material. It serves as a staple food in more than 20 countries and contributes significantly to livestock and poultry sectors, with nearly two-thirds of global production utilized as feed. Owing to its high yield potential compared to other cereals, maize is often referred to as the miracle crop. Globally, countries like the United States and China dominate maize production, contributing a major share to world output. The expanding role of maize in food systems, bio-industries, and value chains highlights its growing importance in agricultural development and rural livelihoods. (Patel & Joshi, 2022)

In the Indian context, maize ranks among the top cereal crops, with production reaching approximately 35-36 million tonnes cultivated over nearly 10 million hectares. India holds the sixth position globally in maize production, with states like Madhya Pradesh, Karnataka, and Bihar leading in area and output. Despite this progress, productivity levels in several regions remain below global averages due to constraints in adoption of scientific cultivation practices. In Jammu & Kashmir, particularly in the Kashmir valley, maize is the second most important crop after rice and is predominantly cultivated under rainfed conditions in hilly terrains. Tribal communities such as Gujjar and Bakarwal largely depend

on maize for sustenance and livestock feed, making it socio-economically significant in the region. (Sharma et al., 2023)

From an agricultural extension perspective, farmers' knowledge plays a crucial role in the adoption of improved technologies and practices. Studies in extension science emphasize that awareness and understanding of recommended practices directly influence decision-making and productivity outcomes. However, disparities in access to information, training, and advisory services often result in partial or incorrect adoption of technologies. In regions like Jammu & Kashmir, where farming conditions are complex and resource constraints are high, strengthening farmers' knowledge base becomes even more critical for sustainable agricultural development. (Kumar & Singh, 2021)

Although several studies have examined adoption behavior and technological gaps in maize cultivation, limited empirical research has focused specifically on assessing the knowledge levels of maize growers in Jammu & Kashmir. Existing literature indicates that farmers often possess adequate knowledge of general practices but lack awareness of technical aspects such as seed treatment, nutrient management, and post-harvest handling. This highlights a clear research gap in understanding the extent and distribution of knowledge among maize growers in this region. (Patel et al., 2020)

Therefore, the present study is justified in systematically assessing the knowledge levels of maize growers regarding scientific cultivation practices in key maize-growing districts of Jammu & Kashmir. The findings of the study are expected to provide valuable insights for extension professionals, policymakers, and development agencies in designing need-based training programmes and interventions. By identifying knowledge gaps and strengthening extension strategies, the study contributes to enhancing maize productivity, improving farmers' livelihoods, and promoting sustainable agricultural development in the region. (Desai & Mehta, 2022)

OBJECTIVE

Assessment of maize growers knowledge on scientific cultivation practices in Kashmir valley of Jammu and Kashmir.

METHODOLOGY

The present study was conducted in the Kashmir Valley, which comprises ten districts, namely Anantnag, Kulgam, Pulwama, Shopian, Budgam, Srinagar, Ganderbal, Bandipora, Baramulla and Kupwara. Among these, three districts namely Budgam (central region), Anantnag (south region), and Baramulla (north region) were purposively selected due to their comparatively larger area under maize cultivation and higher concentration of registered maize growers. This purposive selection ensured adequate representation of major maize-growing regions and enhanced the relevance and reliability of findings. The population for the study comprised all registered maize growers having more than two kanals of land under maize cultivation, and the sampling frame was prepared in consultation with the respective Chief Agriculture Officers of the selected districts.

A multistage sampling technique was followed, wherein two subdivisions from each district and three zones from each subdivision were selected purposively based on higher maize grower concentration. Subsequently, a proportionate random sampling method was adopted for the final selection of respondents. The sample size of 298 maize growers was determined using Slovin's formula, ensuring representativeness and minimizing sampling error. The study followed ex-post-facto design It is systematic inquiry in which the researcher does not have direct control of independent variables because their manifestations have already occurred and they cannot be manipulated. The research strategy adopted was a survey method, suitable for collecting standardized data from a large population.

Determination of sample size by Slovin's formula given as:

$n= N/ (1+Ne^2)$

n = Sample size

N = Total population (1173)

e = Margin of error (0.05)

The knowledge level of maize growers was operationally defined as the level to which a maize grower had awareness of recommended maize production technology, measured through a structured knowledge test developed for the study. The response to the knowledge items were scored by giving 1 score to recommended knowledge, 0 score for not recommended knowledge answer, 1 score to 'Yes' and 0 score to 'No' knowledge answers.

Data were collected through a well-structured interview schedule administered personally to the respondents in their local context. Ethical considerations were duly maintained by obtaining informed consent

from respondents, ensuring confidentiality, and using the data strictly for academic purposes. The collected data were coded, tabulated, and analyzed using appropriate statistical tools such as frequency, percentage, mean, standard deviation, and Pearson's correlation coefficient. The analysis was carried out using IBM SPSS Statistics.

However, limitations of the study include the use of purposive sampling at initial stages, which may limit generalizability, and reliance on self-reported data, which may introduce response bias. Despite these limitations, the study provides valuable insights into the knowledge level and associated factors among maize growers in the Kashmir Valley.

RESULTS AND DISCUSSION

Maize growers' knowledge on scientific cultivation practices was assessed under following heads:

(1) Land preparation and sowing

(2) Weed and fertilizer management

(3) Disease and insect pest management

(4) Harvesting

Table-1: Distribution of respondents according to their knowledge regarding land preparation and sowing.

(n=298)

Sr. No.	Particulars	Budgam (n=100)	Anantnag (n=89)	Baramulla (n=109)	Total (n=298)
		Knowledge	Knowledge	Knowledge	
1	**Soil type suitable for maize cultivation**	78 (78.00)	58 (65.16)	61 (55.97)	197 (66.10)
2	**Optimum Sowing time**	89 (89.00)	74 (83.14)	95 (87.15)	258 (86.58)
3	**Pulverization and levelling of land**	78 (78.00)	60 (67.41)	69 (63.30)	207 (69.46)
4	**Varieties released by SKUAST-K**	69 (69.00)	52 (58.43)	79 (72.48)	201 (67.44)
5	**Seed rate and plant geometry**	57 (57.00)	53 (59.55)	60 (55.04)	170 (57.04)
6	**Sweet corn maize**	65 (65.00)	69 (77.52)	67 (61.47)	201 (67.44)
7	**Seed treatment**	67 67.00)	56 (62.93)	64 (58.72)	187 (62.76)
8	**Sowing Method**	58 (58.00)	61 (68.53)	57 (52.30)	176 (59.06)
9	**Thinning & gap filling**	39 (39.00)	38 (42.70)	48 (44.03)	125 (41.95)
10	**Mixed cropping and intercropping**	71 (71.00)	48 (53.94)	41 (37.61)	160 (53.70)

The data presented in the table 1 revealed that, majority i.e., 66.10 per cent had knowledge regarding soil type suitable for maize cultivation. 86.58 per cent had knowledge regarding optimum sowing time of maize crop. 69.46 per cent had knowledge regarding pulverization and levelling of land. 67.44 per cent had knowledge regarding varieties released by SKUAST-K. 57.04 per cent had knowledge regarding seed rate and plant geometry. 67.44 per cent had knowledge regarding sweet corn maize. 62.76 per cent had recommended knowledge regarding seed treatment. 59.06 per cent had knowledge regarding sowing method of the maize crop. 41.95 per cent had knowledge regarding thinning & gap filling. 53.70 per cent had knowledge regarding mixed cropping/intercropping.

These results are in line with recent extension research, which has consistently reported that farmers tend to have better knowledge of traditional and visible practices compared to technical interventions requiring specialized training. Similar findings were reported by Rathod et al., (2024), who observed that a majority of maize growers had adequate knowledge of sowing time and land preparation but lacked sufficient understanding of plant spacing, seed treatment, and intercultural operations. The moderate level of awareness regarding intercropping (53.70%) and seed treatment (62.76%) further supports the notion that although some improved practices have

reached farmers, their depth of understanding remains limited. Thus, the present findings corroborate earlier studies and reinforce the need for strengthening extension efforts to enhance farmers' knowledge of technical and yield-enhancing practices.

Table-2: Distribution of respondents according to their knowledge regarding weed and fertilizer management.

(n=298)

Sr. No.	Particulars	Budgam (n=100)	Anantnag (n=89)	Baramulla (n=109)	Total (n=298)
		Knowledge	Knowledge	Knowledge	Knowledge
1	**Weed management**	52 (52.00)	58 (65.16)	60 (55.04)	170 (57.04)
2	**Fertilizer management**	33 (33.00)	31 (34.84)	37 (33.95)	101 (33.90)
3	**Micronutrient application**	13 (13.00)	17 (19.10)	21 (19.26)	51 (17.11)
4	**Split doses of urea**	43 (43.00)	45 (50.57)	61 (55.97)	149 (50.00)
5	**Application of FYM**	81 (81.00)	63 (70.79)	78 (71.55)	222 (74.50)

The data presented in the table 2 reveals that, more than half of the respondents i.e., 57.04 per cent had knowledge regarding weed management. 33.90 per cent had knowledge regarding fertilizer management. 17.11 per cent had knowledge regarding micronutrient application**.** 50.00 per cent had knowledge regarding split doses of urea. 74.50 per cent had knowledge regarding application of FYM.

Similar findings were reported by Patel et al., (2021), who observed that while farmers had good knowledge of organic manures and basic weed management, there existed significant gaps in their understanding of scientific fertilizer use and micronutrient management. Thus, the present study corroborates earlier research and highlights the need for focused extension efforts to improve farmers' knowledge of nutrient management practices.

Table-3: Distribution of respondents according to their knowledge regarding disease and pest management

(n=298)

Sr. No.	Particulars	Budgam (n=100)	Anantnag (n=89)	Baramulla (n=109)	Total (n=298)
		Knowledge	Knowledge	Knowledge	
1.	**Diseases and insect pests management**	62 (62.00)	51 (57.30)	58 (53.21)	171 (57.39)

The data presented in the table 3 reveals that, majority i.e., 57.39 per cent had knowledge regarding diseases and insect pests.

These results are consistent with recent studies, which have reported moderate levels of farmer knowledge regarding pest and disease management in maize. For instance, a study conducted in Nepal found that while farmers had some awareness of major insect pests, many lacked comprehensive knowledge about disease identification and management practices, and a large proportion were unable to recognize specific diseases or natural enemies Adhikari et al., (2024). Similarly, research on maize farmers indicated that although a majority could identify common pests and their symptoms, gaps remained in understanding advanced management practices and integrated pest control strategies Poudel et al., (2023). Thus, the present findings align with earlier research, suggesting that farmers generally possess basic awareness of pest and disease problems but lack in-depth technical knowledge required for effective and sustainable pest management. This highlights the continued need for strengthening extension services, particularly in integrated pest and disease management practices.

Table-4: Distribution of respondents according to their knowledge regarding harvesting and post harvesting practices (n=298)

Sr. No.	Statements	Budgam (n=100)	Anantnag (n=89)	Baramulla (n=109)	Total (n=298)
		Knowledge	Knowledge	Knowledge	
1	**Appropriate harvesting time**	84 (84.00)	80 (89.89)	73 (66.98)	237 (79.54)
2	**Maize Sheller**	53 (53.00)	73 (82.02)	62 (56.89)	188 (63.08)
3	**Optimum moisture percentage for shelling**	46 (46.00)	22 (24.72)	40 (36.70)	108 (36.24)

The data presented in the table 4 revealed that, majority i.e., 79.54 per cent had knowledge regarding appropriate harvesting time. 63.08 per cent had knowledge regarding maize sheller. 36.24 per cent had knowledge regarding optimum moisture percentage for shelling of maize.

This suggests that farmers are relatively more aware of visible and commonly practiced post-harvest operations, while technical aspects requiring precise scientific understanding, such as moisture management, are less understood. These results are consistent with earlier studies, which reported that farmers generally possess adequate knowledge of harvesting practices due to their direct involvement and experience, but lack sufficient awareness of scientific post-harvest parameters like moisture content.

Thus, the present findings align with earlier research of Bello et al., (2020), highlighting that although farmers are knowledgeable about general harvesting practices, there is a consistent gap in understanding scientific post-harvest management, particularly moisture control.Top of Form

Table-5: Distribution of respondents according to their overall knowledge regarding scientific cultivation practices (n=298)

Sr. No.	Overall Knowledge	District			
		Budgam	Anantnag	Baramulla	Total
1	**Low** (< 8.10)	33 (33.00)	26 (29.21)	17 (15.60)	76 (25.50)
2	**Medium** (8.10- 16.35)	38 (38.00)	41 (46.07)	61 (55.96)	140 (46.98)
3	**High** (16.35 & above)	29 (29.00)	22 (24.72)	31 (28.44)	82 (27.52)
Total		100 (100.00)	89 (100.00)	109 (100.00)	298 (100.00)

Regarding overall knowledge, data presented in the table 5 reveals that 46.98 per cent of the maize growers belonged to medium category of knowledge, 27.52 per cent belonged to high category of knowledge and 25.50 per cent belonged to low category of knowledge.

The possible reason for having majority of maize growers in medium to high knowledge category might be that, as every individual tries to acquire knowledge regarding different operations related to his crop like fertilizer application, weed management , adoption of improved varieties, spacing, harvesting time, etc. to get assured yield. The above findings are in confirmation of the results of the study conducted by the (Rathod et al., 2020; Ikpe et al., 2024; Mallappa et al., 2023; Pratik & Vinaya, 2022)

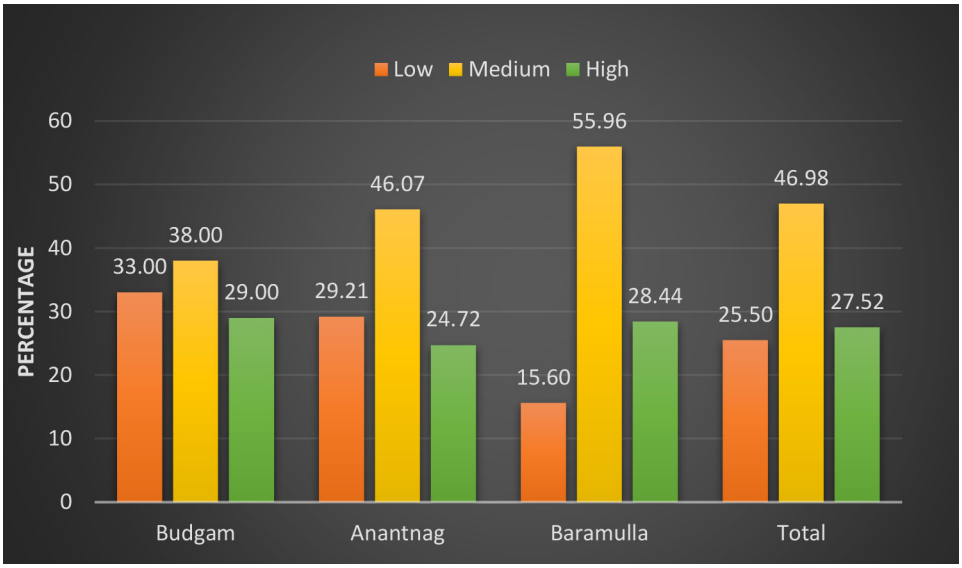

Fig. 1: Distribution of maize growers according to their overall Knowledge

Relationship of independent variables of maize growers with their knowledge level

In order to study the nature of relationship between independent variables of maize growers and their knowledge level, Pearson's correlation analysis was followed using standard statistical packages software (SPSS).

The main reason for using correlation is that it helps to quantify how strongly two variables are associated. It indicates whether the relationship **is** positive (both variables increase together), negative (one increases while the other decreases), or negligible (no meaningful relationship)**.** In your research, this is essential to understand which socio-economic and psychological factors are linked with higher knowledge levels among maize growers. Further, correlation analysis is appropriate because it allows the researcher to test statistical significance, helping to identify whether the observed relationships are real or occurred by chance. For example, variables like education and extension contact showed a significant positive correlation, meaning they meaningfully influence knowledge levels, while others showed non-significant relationships, indicating weaker or inconsistent influence.

Table 6 reveals that the education, economic motivation, innovative proneness, source of information and extension contacts, were significantly and positively correlated with the knowledge level of the maize growers. However age, family size, land holding, annual income, experience in maize cultivation, material possession and livestock possession had positive but non-significant relation with the knowledge level of the maize growers. The findings are in line with the studies (Ikpe et al., 2024; Rathod et al., 2024; Vegad et al., 2021; Mallappa et al., 2023; Pratik & Vinaya, 2022)

Table-6: Relationship of Independent variables of maize growers with their knowledge level

Sr. No.	Independent variables	Correlation coefficients	P value
X_1	**Age**	0.526	0.256
X_2	**Education**	0.556**	0.000
X_3	**Occupation**	0.280	0.132
X_4	**Family size**	0.169	0.066
X_5	**Land holding**	0.112	0.223
X_6	**Annual income**	0.478	0.311
X_7	**Experience in maize cultivation**	0.053	0.566
X_8	**Material possession**	0.476	0.217
X_9	**Livestock Possession**	0.35	0.218
X_{10}	**Economic motivation**	0.512**	0.001
X_{11}	**Innovative proneness**	0.323**	0.002
X_{12}	**Source of information**	0.429**	0.000
X_{13}	**Extension contacts**	0.253**	0.005

'p' value less than 0.01 implies that correlation is significant

CONCLUSION

Maize productivity in Jammu & Kashmir is constrained by gaps in farmers' knowledge of scientific cultivation practices, particularly in technical and

management aspects. The study revealed that while a high proportion of farmers possessed knowledge of general practices such as optimum sowing time (86.58%) and harvesting time (79.54%), comparatively lower knowledge was observed in critical technical areas like fertilizer management (33.90%), micronutrient application (17.11%), thinning and gap filling (41.95%), and optimum moisture for shelling (36.24%). Overall, the majority (46.98%) of maize growers fell under the medium knowledge category, followed by 27.52% in high and 25.50% in low knowledge categories.

The findings clearly indicate that maize growers have adequate awareness of basic agronomic practices but lack sufficient knowledge in specialized and yield-enhancing practices. This reflects an incomplete understanding of scientific cultivation, which may limit productivity gains despite favourable awareness of general operations. To bridge these gaps, there is a need for targeted, location-specific extension interventions focusing on nutrient management, crop establishment, and post-harvest practices. Strengthening farmer training and advisory services will enhance the adoption of comprehensive scientific practices, thereby improving maize productivity and livelihoods in the region.

IMPLICATIONS

(1) **Targeted training on nutrient and micronutrient management is urgently needed:** The study revealed very low knowledge levels regarding fertilizer management (33.90%) and micronutrient application (17.11%), particularly across all three districts. This indicates a critical gap in scientific nutrient management practices. Extension agencies in Budgam, Anantnag, and Baramulla should prioritize location-specific training programmes focusing on balanced fertilization, micronutrient use, and split application of fertilizers to enhance soil fertility and crop productivity under rainfed conditions.

(2) **Strengthening awareness on post-harvest management practices:** While knowledge of harvesting time was high (79.54%), only 36.24% of respondents were aware of optimum moisture content for shelling. This gap suggests potential post-harvest losses and reduced grain quality. Therefore, extension interventions should emphasize practical demonstrations on moisture management and improved shelling techniques, especially in Baramulla and Anantnag where knowledge levels are comparatively lower.

(3) **Focused extension efforts on crop establishment and advanced practices:** Moderate to low knowledge was observed in practices such as thinning & gap filling (41.95%), intercropping (53.70%), and seed rate & plant geometry (57.04%). Since these practices directly influence plant population and yield, district-level extension programmes should promote hands-on training and field demonstrations on crop establishment techniques. This is particularly important in rainfed and hilly areas of Kashmir where optimal plant stand is crucial for maximizing productivity. Top of Form

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CONFLICT OF INTEREST

This is to declare that there is “No conflict of interest” among researchers

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