# KNOWLEDGE OF WHEAT GROWERS REGARDING IMPROVED WHEAT PRODUCTION TECHNOLOGY IN JAMUI DISTRICT OF BIHAR


## ABSTRACT

Wheat (*Triticum aestivum L.*) is a major cereal crop that plays a crucial role in ensuring food security in India. This study aimed to assess the knowledge level of wheat growers regarding improved wheat production technologies in Jamui district of Bihar. A multistage random sampling technique was employed to select a sample of 120 respondents from 12 villages across two blocks. Primary data were collected through personal interviews using a pre-structured interview schedule. The results revealed that 56.66% of the respondents possessed a medium level of knowledge, while 25% had low knowledge, and 18.34% had high knowledge. Farmers exhibited the highest knowledge regarding sowing time (90.56%), irrigation management (88%), and harvesting (75.34%). Practices like plant growth regulators (45.37%) and intercropping (56.76%) had relatively lower knowledge levels. Correlation analysis showed that variables like age, caste, education, risk orientation, scientific orientation, and extension contact had a significant positive correlation with knowledge level. Annual income, marital status, land holding, family type, and family size exhibited a positive but statistically insignificant correlation, while economic motivation showed a negative correlation with knowledge level.The study highlights the need for strengthening extension services, educational programs, and promoting scientific orientation and risk-taking ability among farmers to enhance their knowledge and facilitate the adoption of improved wheat production technologies, ultimately leading to increased productivity in the region.




## INTRODUCTION

Wheat (*Triticum aestivum L.)* is one of the world's most extensively cultivated cereal crops, surpassed only by maize and rice (FAOSTAT, 2020). It serves as a staple food for approximately 40% of the global population (Giraldo et al., 2019). In India, wheat cultivation plays a crucial role in ensuring food security, with the country being one of the leading producers globally. The three major species of wheat cultivated in India are Triticum aestivum (bread wheat), Triticum durum (macaroni wheat), and Triticum dicoccum (Emmer or Khapli wheat), contributing 95%, 4%, and 1% to the total wheat production, respectively (Singh et al., 2012).Understanding the morphological characteristics of the wheat plant, such as its root system, stem, leaves, inflorescence, and seed structure, is crucial for effective cultivation and management practices. Wheat has two distinct types of roots: seminal roots, originating from the germination of seedlings, and crown roots, also known as clonal roots, arising from the basal node of the plant (Singh et al., 2012).Wheat is a highly adaptable crop, capable of thriving in various soil conditions and climates, making it suitable for bread production and as a dietary staple (Al-Erwy et al., 2016). Its cultivation originated during the Neolithic Revolution, approximately 10,000 years ago, when humans transitioned from hunting and gathering to sedentary agriculture (Giraldo et al., 2019).

Bihar, a state located in the Indo-Gangetic plains, is an important contributor to India's wheat production. In the agricultural year 2020-21, Bihar recorded a wheat production of 6.76 million tonnes from an area of 2.07 million hectares, with a productivity of 3.27 tonnes per hectare (Directorate of Economics and Statistics, Govt. of Bihar, 2021). Jamui District, situated in the eastern part of Bihar, has a total cultivable area of 102,000 hectares, with wheat being one of the major Rabi crops grown in the region (Krishi Vigyan Kendra, Jamui, 2022)Wheat cultivation in Jamui District benefits from the tropical and subtropical conditions of the region. However, despite its potential, the district faces challenges in achieving optimal wheat yields, which can be attributed to various factors, including variations in fertilizer application, ineffective water management practices, and the prevalence of pests and diseases (Sendhil et al., 2014.

**MATERIAL AND METHODS:**

The present study was conducted in the Jamui district of Bihar (latitude 24°55'N & 23°74'N and longitude 86°13'E & 12°86'E) during the wheat growing season in 2023-2024. A multistage random sampling technique was employed to select the respondents. From the 10 blocks in Jamui, Jhajha and Gidhaur blocks were randomlyselected. Five villages were randomly chosen from these two blocks, totaling 12 villages. Using proportional allocation, 12 wheat-growing farmers were randomly selected from each village, resulting in a total sample size of 120 respondents. Primary data were collected through personal interviews using a pre-structured interview schedule to gather information on the respondents' socio-economic characteristics, knowledge levels regarding improved wheat production technologies, and constraints faced in wheat cultivation. The collected data were coded, tabulated, and analyzed using the Statistical Package for Social Sciences (SPSS) software. Descriptive statistics, such as frequency, percentage, mean, and standard deviation, were employed to summarize the data. Correlation analysis investigated the relationship between the independent variables and recommended practices' knowledgelevels.The knowledge level of farmers in adopting the recommended practices were ranked based on the mean score obtained for each statement.

**Statistical methods used:**

**1. Percentage (%):**

The frequency of a particular cell was divided by the total number of respondents or (MPS) in that particular category and multiplied by 100 for calculating the percentage.

**2. Average ($\overline{X}$):**

The average ($\overline{X}$)wascalculated by adding the total scores obtained by the respondents and divided itby thetotal number of respondents using the following formula:

$$(\overline{X}) = \frac{\sum X}{N}$$

Where,

$\overline{X}$ = Average or mean

$\sum X$ = Total number of scores obtained by respondents

N = Total number of respondents

**3. Standard deviation (σ):**

S.D. is the square root of mean of the squares of all deviations, the directions being measured from the arithmetic mean of the distribution. It is commonly developed by symbol (σ).

$$\text{S.D. } (\sigma) = \frac{\sqrt{\sum d^2}}{n}$$

Where,

σ = Standard deviation

d = Deviation of variables mean

M = Total number of items

**4. Correlation Coefficient (r):**

The coefficient of simple correlation (r) in a measure of the mutual relationship between two variables that in *i.e.* x and y, where relationship is measured and commonly termed as product movement correlation coefficient and is computed by the following formula:

$$Correl(X,Y) = \frac{\sum (x-\bar{x})(y-\bar{y})}{\sqrt{\sum (x-\bar{x})^2 \sum (y-\bar{y})^2}}$$

Where,

r = Correlation in coefficient

X = mean of all the observation

xi = observation of the variable

Yi = observation of the variables

$\bar{Y}$ = mean of all the observation

**RESULTS:**

**Table 1 Distribution of respondents according to their knowledge level. n=120**

| S.No. | Categories | f | % |
|---|---|---|---|
| **1.** | Low level (below 15) | 30 | 25.00 |
| **2.** | Medium level (16 to 25) | 68 | 56.66 |
| **3.** | High level (26above) | 22 | 18.34 |
| | **Total** | **120** | **100.00** |

**Mean= 16.28, S.D.= 1.6, Min.= 15, Max.= 26,**

**f**= Frequency, **%**= Percentage

The data presented in Table 1 indicates that a majority of the wheat producers, specifically 56.66 percent, possessed a moderate level of knowledge. This was followed by 25.00 percent who had a low level of knowledge and 18.34 percent who had a high level of knowledge.

**Table 2: Knowledge level of farmers regarding improved wheat practices**

| S. No. | Cultivation Practices | MPS | Rank |
|---|---|---|---|

| | | | |
|---|---|---|---|
| **1.** | Field preparation | 71.00 | IV |
| **2.** | High yielding varieties | 68.00 | VI |
| **3.** | Sowing time | **90.56** | **I** |
| **4.** | Spacing | 63.00 | IX |
| **5.** | Fertilizer application | 63.67 | VIII |
| **6.** | Irrigation management | **88.00** | **II** |
| **7.** | Plant growth regulator | 45.37 | XI |
| **8.** | Intercropping | 56.76 | X |
| **9.** | Weed management | 69.00 | V |
| **10.** | Plant protection measure | 65.00 | VII |
| **11.** | Harvesting | **75.34** | **III** |

**MPS = Mean Percent Score**

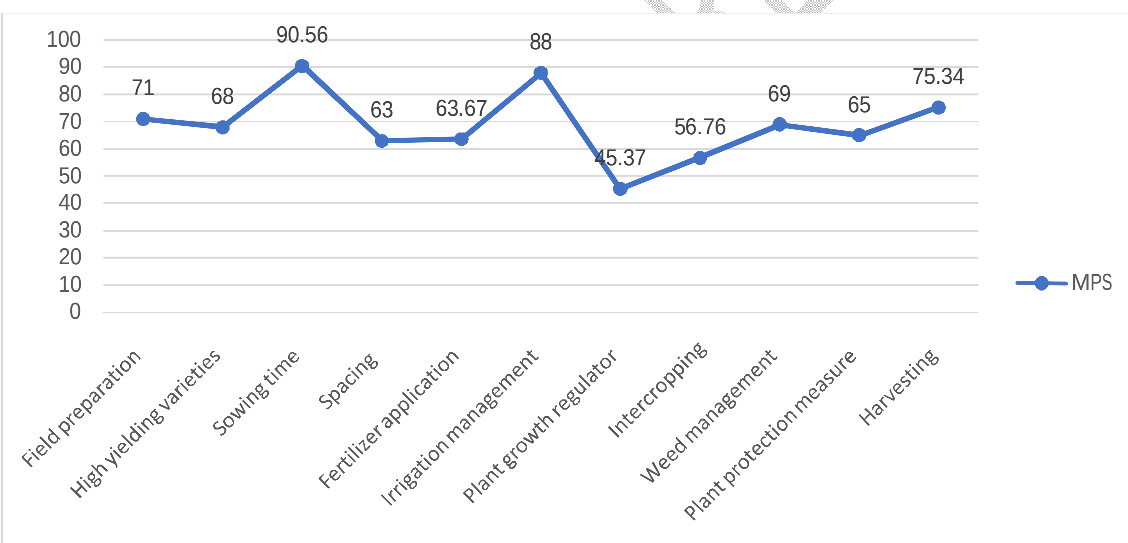


**Figure 1: Shows the Knowledge level of farmers regarding various improved wheat practices**

Based on the information presented in Table 2, the knowledge levels of eleven agricultural crop production methods were investigated. Regardingthe Mean Percentage Score (MPS), the sowing time obtained the greatest possible score of 90.56, so obtaining the top spot. In tight pursuit, irrigation management achieved an MPS of 88.00, which allowed them to secure the second spot. Because it received an MPS of 75.34, harvesting was ranked third on the list. Field preparation and weed management came in second and third, respectively, with MPS scores of 71.00 and 69.00, placing them in fourth and fifth place, respectively. It was determined that high-producing cultivars, which had an MPS of 68.00, secured the sixth seat. The plant protection measures, the application of fertilizer, and the spacing of plants achieved grades VII, VIII, and IX, respectively, with MPS values of 65.00, 63.67, and 63.00, the respective scores. After receiving MPS scores of 56.76 and 45.37, respectively, intercropping and plant growth regulators were positioned at positions X and XI, respectively. These two practices inhabited the lowest ranks.

**Table3: Correlation coefficient between different variables and knowledge level of farmers regarding improved wheat production technology**

| S. No. | Variables | Correlation coefficient |
|---|---|---|
| **1.** | Age | 0.600** |
| **2.** | Caste | 0.420** |
| **3.** | Education | 0.730** |
| **4.** | Annual income | 0.111* |
| **5.** | Marital status | 0.118* |
| **6.** | Land holding | 0.100* |
| **7.** | Type of family | 0.125* |
| **8.** | Size of family | 0.78* |
| **09.** | Social participation | $0.021^{NS}$ |
| **10.** | Risk orientation | 0.635** |
| **11.** | Economic motivation | $-0.035^{NS}$ |
| **13.** | Scientific orientation | 0.396** |
| **14.** | Extension contacts | 0.621** |

***Statistically significant at a significance level of 0.05**
****Statistically significant at a significance level of 0.01**

According to the findings presented in Table 3, it can be observed that among the sixteen variables examined, namely age, caste, education, material ownership, risk orientation, scientific desire, and extended contact, a strong positive correlation was observed with knowledge level. The study revealed that variables such as annual income, marital status, land holding, type of family, size of family, and social involvement did not exhibit statistical significance. However, they did have a positive correlation with knowledge level.

A lack of statistical significance and a negative correlation were observed between economic motivation and knowledge level. This implies that an increase in the value of these variables corresponds to an increase in the knowledge level of cultivation practices.

**DISCUSSION:**

The finding that a majority (56.66%) of respondents had a medium level of knowledge about improved wheat production practices, with only 18.34% having high knowledge, indicates there is still considerable room for improvement in farmers' technical knowledge in this region. This aligns with other studies that have found moderate knowledge levels among wheat farmers in various parts of India (Kumar et al., 2021; Patodiya, 2018).

The practices with the highest knowledge levels - sowing time (90.56%), irrigation management (88%), and harvesting (75.34%) - likely reflect areas where extension efforts have been most successful or where farmers have gained knowledge through experience. The high awareness of proper sowing time is particularly encouraging, as timely sowing is crucial for optimal wheat yields (Sadras et al., 2015). However, the lower knowledge levels for practices like plant growth regulators (45.37%) and intercropping (56.76%) suggest these are areas where additional extension efforts may be needed.

Compared to a study by Patidar and Patidar (2015) in Rajasthan, which found overall knowledge levels of improved wheat practices to be around 65%, the results from Jamui district appear slightly lower. This may reflect regional differences in extension services or adoption of technologies. However, the knowledge levels for individual practices broadly align with patterns seen in other studies, with basic agronomic practices generally better understood than more advanced technologies (Singh et al., 2016).

The strong positive correlations found between knowledge levels and factors like education, age, risk orientation, and extension contacts align with findings from numerous other studies on agricultural knowledge and technology adoption (Kumbhare & Singh, 2011; Al-Zahrani et al., 2019). The positive influence of education underscores the importance of improving overall educational access in rural areas as a long-term strategy for agricultural development.

The positive correlation with age suggests that experience plays a role in knowledge accumulation. However, this should be interpreted cautiously, as other studies have found mixed or negative relationships between age and adoption of new technologies (Kumar & Godara, 2017). The strong influence of extension contacts highlights the critical role of agricultural extension services in disseminating knowledge. This aligns with findings by Dhruw et al. (2012) emphasizing the impact of extension on maize technology adoption.

Interestingly, economic motivation showed a negative (though non-significant) correlation with knowledge levels. This contrasts with some studies that have found economic factors to be key drivers of technology adoption (Sabi et al., 2014). Further research may be needed to understand the complex relationship between economic factors and knowledge acquisition in this specific context.

**IMPLICATIONS FOR PRACTICE AND POLICY:**

The findings have several implications for improving wheat production practices in Jamui district:

1. Extension efforts should be intensified, particularly focusing on areas where knowledge levels are lower, such as plant growth regulators and intercropping.
2. Given the strong influence of education, policies supporting rural education may have long-term benefits for agricultural knowledge and productivity.
3. The positive impact of risk orientation suggests that programs to enhance farmers' risk management skills and willingness to innovate could be beneficial.
4. Extension strategies should leverage experienced farmers' knowledge while ensuring younger farmers are also engaged.
5. The lower knowledge levels for some advanced practices indicate a need for more hands-on training and demonstrations of these technologies.

**LIMITATIONS AND FUTURE RESEARCH:**

This study was limited to the Jamui district, and caution should be exercised in generalizing the findings to other regions. The reliance on verbal responses may have introduced some bias. Future research could benefit from:

1. Expanding the geographical scope to allow for regional comparisons within Bihar.
2. Incorporating objective measures of knowledge alongside self-reported data.
3. Longitudinal studies to track changes in knowledge levels over time and in response to specific interventions.
4. In-depth qualitative research to better understand the barriers to knowledge acquisition and adoption for specific practices.

5. Investigating the relationship between knowledge levels and actual farm productivity to assess the practical impact of improved knowledge.

**CONCLUSION**

This study in Jamui district of Bihar assessed the knowledge levels of wheat growers regarding improved wheat production technologies. The results show that the majority of farmers possess moderate knowledge, with critical practices like sowing time, irrigation management, and harvesting being well understood. However, areas such as plant growth regulators and intercropping need more focus. Significant correlations were found between knowledge levels and factors like education, age, caste, risk orientation, and extension contacts. To enhance wheat yields and achieve food security in the region, it is essential to implement targeted educational and extension programs that address these knowledge gaps and leverage influential factors.

## Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.



**REFERENCES:**


- Abubaker, H. O., Ahmad, R., & Kamal, M. (2020). Ancient Egypt, wheat, and bread. Eur. J. Nutr. Food Saf, 12, 105-119.
- Al-Erwy, A. S., Yadav, S., & Yahya, K. Z. (2016). Factors affecting the stability of wheat germ oil during accelerated oxidation conditions. International Journal of Food Properties, 19(9), 1961-1972.
- Al-Ghumaiz, N. S., Al-Ghamdhi, J. A., Motawee, M., & Assiri, M. G. (2020). Characterization of the effects of abiotic stresses on wheat grains. International Journal of Agricultural and Biological Engineering, 13(2), 181-187.
- Al-Zahrani, K. H., Khan, A. Q., Baig, M. B., Mubushar, M., & Herab, A. H. (2019). Perceptions of wheat farmers toward agricultural extension services for realizing

sustainable biological yields. Saudi Journal of Biological Sciences, 26(7), 1503–1508. https://doi.org/10.1016/j.sjbs.2018.05.024

- Dhruw, K. S., Sengar, R. S., & Yadaw, K. N. (2012). Level of knowledge and adoption about recommended maize production technology. Agriculture Update, 7(3/4), 311-315.
- Directorate of Economics and Statistics, Government of Bihar. (2021). Agricultural Statistics at a Glance 2021. Retrieved from https://krishi.bih.nic.in/
- Faisal, M., & Farooq, S. (2019). Wheat cultivation under extreme environmental conditions. In Plant cultivation under extreme environmental conditions (pp. 99-119). CRC Press.
- FAOSTAT. (2020). Food and Agriculture Organization of the United Nations. Retrieved from http://www.fao.org/faostat/en/#data/QC
- Giraldo, P., Benavente, E., Manzano-Agugliaro, F., & Gimenez, E. (2019). Worldwide research trends on wheat and barley: A bibliometric comparative analysis. Agronomy, 9(7), 352.
- Gupta, R., Mishra, A. K., & Sehgal, A. (2014). Regional study on agricultural growth and development in Bihar. Agricultural Economics Research Review, 27(2), 219-234.
- Hammad, H. M., Abdelrahman, M., Moustafa, Y. M., Alqarawi, A. A., Labhane, N., El-Sayed, M. A., & Aldjain, I. M. (2020). Comparative study of different wheat (Triticum aestivum L.) cultivars for morphological, biochemical and yield traits under drought stress in an arid region. Agronomy, 10(10), 1516.
- Hazari, B., Pandey, R., Singh, A. K., Tripathi, R., Kumar, S., & Jha, G. K. (2019). Genetic divergence for fiber content and nutritional quality in wheat genotypes. Journal of Cereal Research, 11(1), 46-51.
- Krishi Vigyan Kendra, Jamui. (2022). District Profile. Retrieved from https://kvk.icar.gov.in/
- Kumar, A., & Godara, A. K. (2017). Knowledge and attitude of farmers towards zero-tillage technology in Haryana. Agricultural Science Digest-A Research Journal, 37(3), 203-208.
- Kumar, D. (2010). A study on adoption of recommended wheat production technology among the farmers of Bilaspur district of Chhattisgarh state [Doctoral dissertation, Indira Gandhi Krishi Vishwavidyalaya Raipur)].

- Kumar, N., Godara, A. K., Malik, A. K., Kumar, R., Dhayal, B. L., & Jitarwal, O. P. (2021). Knowledge level of farmers about wheat seed production technology in Haryana.
- Kumbhare, N. V., & Singh, K. (2011). Adoption behaviour and constraints in wheat and paddy production technologies. Indian Research Journal of Extension Education, 11(3), 41–44.
- Patidar, S., & Patidar, H. (2015). A study of perception of farmers towards organic farming. International Journal of Application or Innovation in Engineering and Management, 4(3), 269-277.
- Patodiya, R. S. (2018). Knowledge and adoption of scientific wheat cultivation practices in Rajasthan. Indian Research Journal of Extension Education, 18(1), 93–95.
- Rasul, F., Cheema, M. A., Sattar, A., Siddiqui, S., & Akram, M. (2015). Evaluating impact of agriculture on environmental effluents. Ecol. Process, 4(1), 1-8.
- Sabi, S., Natikar, K. V., & Pati, S. L. (2014). Knowledge and technological gap in adoption of recommended cultivation practices in wheat in Karnataka. Karnataka Journal Agricultural Sciences, 27(4), 485-488.
- Sadras, V. O., Cassman, K., Banga, P. K., Grassinin, P., Teixeira, E. I., Yang, R. P., & Gont, P. L. M. (2015). Yield gap analysis of agriproduction systems: Case studies of wheat in Australia and Sothern Brazil. Food and Agriculture Organization of the United Nations.
- Sendhil, R., Lama, T. D., Kushwaha, S., & Singh, A. (2014). Wheat production in India: Trends and prospects. Management, 3(4), 197-202.
- Sharma, R. K., Singh, R. K., & Singh, S. P. (2015). Sustainable production and productivity of wheat under rice-wheat cropping system. Journal of Wheat Research, 7(2), 31-36.
- Singh, K., Suri, V. K., Singh, G., Sharma, S., & Ghosh, A. (2017). Bioinventis and Biochemistry of Wheat Crop. In Bioinventis and Biochemistry of Wheat Crop (pp. 1-28). CRC Press.
- Singh, P., Choudhary, M., & Lakhera, J. P. (2016). Knowledge and attitude farmers towards improved wheat production technology. Indian Research Journal of Extension Education, 14(2), 54-59.
- Singh, S. B. (2017). Impact of frontline demonstrations on yield of wheat (Triticum aestivum) under rain fed condition

- Singh, S., Singh, G., Singh, P., & Singh, N. (2012). Nutritional quality of wheat for general health and disease management. Wheat: Prospects for Global Food Security, 255-276.
- Tewari, S. K., Singh, R. K., Sharma, R. K., Kumari, R., Panday, D., & Kumar, N. (2017). Nutrient deficiency and acquisition of wheat genotypes under conservation agriculture on contrasting soils. Bangladesh Journal of Botany, 46(2), 519-526.
- Xu, A., Najeeb, U., Umar, G., Tan, A., Wan, A., Guo, D., ... & Asif, M. (2020). Climate change and grain crops in Pakistan: An overview. Environmental Science and Pollution Research, 27(10), 10635-10647.
- Yildirim, M., Barutcular, C., Sabah, E., Tosun, M., & Konuskan, O. (2016). Analysis of the yield components of bread wheat (Triticum aestivum L.) varieties registered in Turkey. Turkish Journal of Agriculture and Forestry, 40(2), 166-176.
- Zain, W. N. H. M., Radziah, N. W. M., Bundan, M. P., Ahmad, S. H., & Radzi, M. W. (2015). Analysis on the chemical composition of legume and cereal based foodstuffs. In Journal of Physics: Conference Series (Vol. 546, No. 1, p. 012008). IOP Publishing.