

# Dynamic Perception and Relative Advantages of Hybrid Rice Growers and their Constraints

Monu Kumar\*, R.N. Yadav<sup>2</sup>, L.B. Singh<sup>2</sup>, Satya Prakash<sup>3</sup>, Vishal Sahu<sup>1</sup> and Raj Lakshmi<sup>1</sup>

<sup>1,2</sup>*Department of Agricultural Extension Education, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut 250 110, U.P., India*

<sup>3</sup>*Department of Vegetable Science, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut 250 110, U.P., India*

(Received 17 July, 2025; Accepted 11 September, 2025)

## ABSTRACT

The present study was conducted during 2024-25 in the Lucknow division of Uttar Pradesh. An Ex-post facto research design was used for the study and a multistage random sampling procedure follow of selected 160 respondents across Sitapur and Lakhimpur districts. The farmers held highly positive perceptions regarding hybrid rice cultivation. The result reveal that majority of the (91.87%) strongly agreed on its higher yield potential (15-20% more), while most respondents appreciated its traits such as agree high profuse tillering (78.12%), more grains per panicle (73.12%) and uniform maturity majority with strongly agree (52.50%). However the study highlighted a severe gap in extension services over (90.00%) of respondents reported non-availability of training, demonstrations, and exposure visits. Major constraints included the high cost of hybrid seed (77.50%), unavailability of seed in government centres (76.25%), and high input costs (73.12%), along with knowledge gaps in balanced fertilization and plant protection. Strengthening farmer awareness, reducing input costs, and provide timely good quality seed of hybrid rice for enhancing productivity. It looks the varietal potential and relative advantages to improve the farmer's income.

*Keywords: Hybrid rice, Farmers perception, Relative Advantages, Constraints, Yield Potential*

## Introduction

Rice (*Oryza sativa* L.) is belonging to the Poaceae family and approximately 70 percent of its rural households still depend primarily on agriculture for their livelihood (FAO, 2023). With increasing population day by day and declining per capita availability of cultivable land, there is an urgent need to enhance rice productivity. Hybrid rice technology has emerged as a promising solution for food security and improves farmer's income through 15-20 percent higher yield compare to common varieties.

(Yan, *et al.*, 2022). In India rice occupies the first position among the cereals in respect of both area and production. It is also a significant commodity in international trade, with major rice-exporting countries including Thailand, Vietnam, India and the United States.

Rice is primary source of carbohydrate which makes up almost 80 per cent and it is contains 6-7 per cent protein, 7.9 per cent in brown rice and 2-2.5 per cent fat which is lost at the time of milling. The hulling percentage of hybrid rice 66 or 2/3 part of paddy. Hybrid rice is a self-pollinated crop and fruit

(<sup>1</sup>Research Scholar, <sup>2</sup>Professor, <sup>3</sup>Professor)

type is caryopsis. Chinese scientists were the first to discover and utilize germplasm resources, based on their work with the "Green Revolution" gene *sd1* in dwarf breeding efforts. They used *sd1* to create a new rice variety with low stem lodging resistance and applied it to largescale production. In addition, the threeline matching method was performed through national scientific research collaboration, placing China at the forefront of theoretical innovation and practical application in hybrid rice breeding (Zheng *et al.*, 2024).

The agricultural growth rate has fallen sharply, to 1.4 per cent in 2023-24, compared to 4.7 per cent growth rate of 2022-23, mainly because of a drop in the food grain production due to delayed and poor monsoons caused by El-Niño (Economic Survey of India July, 2024). The production of food grains is going to be very critical especially rice which is staple food crop the majority of world population and India is one of the leading countries in production of rice. Moreover, the adoption of hybrid rice directly impacts factor productivity by influencing the efficiency of land, labour, and input use. Understanding how farmers perceive the benefits and challenges of hybrid rice cultivation is vital for formulating effective extension strategies, policy interventions, and research priorities. Despite numerous efforts by government agencies and private seed companies, the adoption rate remains uneven across different regions and farm sizes. This calls for a deeper analysis of the socio-economic and farm-level determinants influencing farmers' adoption decisions and their implications for agricultural productivity. The present study aims to investigate the dynamic nature of farmers' perceptions, identify perceived advantages and limitations of hybrid rice, and examine how these perceptions affect its adoption and the overall factor productivity of rice cultivation in India. The findings will help bridge the gap between research innovations and practical field-level adoption. Hybrid rice is one of the most important crops in the world.

The Uttar Pradesh is the second largest producers of rice in the country after West Bengal. At present 13 lakh hectare area of Hybrid rice in kharif season in Uttar Pradesh. It despite the significant advancement of high production of per unit area and global food security. The shorter growth cycle and economic benefits of the farmers and insect-pest resistant developed rice. But why can't improve area and production of hybrid rice in the state, behind the

reasons high cost of hybrid rice seed compare to conventional rice seeds, less awareness related new technology, variety and improved cultivation practices, thus above these problem solving i was choose this topic. The Socio-personal, economic and psychological attribute of the small and marginal farmers influence higher technology utilization. So, it is necessary to know the knowledge adoption and perception of farmers towards hybrid rice Agriculture Department of Uttar Pradesh (2024).

## Research Methodology

The present study was conducted in the Lucknow division of Uttar Pradesh in the 2024-25 year Lucknow division. In this study the aim was to understand the perception and relative advantages of hybrid rice cultivation among the farmers hybrid rice growers. The ex-post facto or exploratory research design was used for solving of this research problem. Agriculture is still dependent on monsoon; the cultivation of hybrid rice in Uttar Pradesh (UP) is influenced by the region's climate conditions, which vary across different parts of the state. Uttar Pradesh is blessed with the fertile Indo-Gangetic plains and, given the size of the state's geographical area, it is a significant contributor to the food security of the nation. The multistage sampling procedure was followed under the Lucknow region. Out of six two districts Sitapur and Lakhimpur Kheri were selected purposively on the basis of highest area and production under hybrid rice. From each selected block 16 villages were selected randomly. 10 respondents were selected from each village by random sampling technique with the help of Gram sevak, Farmers, ADO agriculture and KVK scientist. The total number of 160 respondents were selected as sample size for the investigation. The interview schedule was prepared in the light of the selected objective. The data was collected through face to face interview from the hybrid rice growers. For the study analysis was done by different statistical tools like ranking, mean and standard deviation.

## Results

### Perception and relative advantage of hybrid rice

The data showed farmer's strong positive perception of hybrid rice growers. The majority (91.87%) strongly agree recognize its 15-20% high yield po-

tential. The low seed rate is another key advantage, with (27.50%) strongly agree and (72.50%) agreeing, indicating cost efficiency in seed requirements. Agronomic benefits are also evident, with (78.12%) agree on profuse tillers of hybrid rice and (73.12%) on more grains per panicle, both contributing to higher output. Grain quality is highly rated, with (72.50%) in agreement, though a small portion (07.50%) disagrees, suggesting minor variability in quality perception of production technology. Uniformity in maturity is well-regarded (52.50%) strongly agree, followed by ease of cultivation is acknowledged by (67.50%) in agree, enhancing its practicality. Hybrid rice is seen as highly responsive regarding fertilizers agree with (73.12%) and less susceptible to insect-pest and disease attacks (78.75%) agree further strengthening production. The farmers perceived susceptibility to climate stress, (36.25%) strongly agree and (63.75%) agree highlighting a critical challenge. Hybrid rice is perceived as highly advantageous due to its superior yield, cost-effective seed use, strong agronomic traits, and resilience to pests and diseases such as

developing climate-resilient varieties or improved farmers produce. The results are similar in the study of Kour *et al.* (2023).

### Ecological Condition

Table 1 the data reveals that the majority of respondents considered soil conditions highly favourable for the crop, with (89.37%) rating it as most suitable and the remaining (10.63%) as suitable. Climate suitability was also high, with a combined (95.62%) finding it most suitable or suitable though opinions were two categories for temperature, (64.37%) rated it as suitable and (34.37%) as most suitable, indicating general satisfaction with thermal conditions. Rainfall was largely deemed suitable (71.87%) rather than most suitable, showing a moderate level of adequacy. The nutrient status of the cultivated soil were predominantly seen as suitable (89.37%), though only a small proportion (07.50%) found it most suitable. The environmental and soil conditions appear favourable, with soil type and nutrient status being the strongest positives, while rainfall and temperature were viewed as adequate but less

**Table 1.** Perception and relative advantage of hybrid rice regarding production technology

n=160

S. No.	Particulars	Strongly Agree F (%)	Agree F (%)	Disagree F (%)
Perception and Relative Advantage				
1.	High yielder (15-20%)	147(91.87)	13(08.12)	00(00.00)
2.	Low seed rate	44(27.50)	116(72.50)	00(00.00)
3.	Profuse tillering	32(20.00)	125(78.12)	05(03.12)
4.	More grain per panicle	43(26.87)	117(73.12)	00(00.00)
5.	Good grain quality	22(13.75)	116(72.50)	22(13.75)
6.	Susceptible to climate stress	58(36.25)	102(63.75)	04(02.50)
7.	Uniformity regarding maturity	84(52.50)	75(46.87)	00(00.00)
8.	Easy to cultivate	37(23.12)	108(67.50)	21(13.12)
9.	Very responsive to fertilizer	32(20.00)	117(73.12)	11(06.87)
10.	Less insects-pests and diseases attack	28(17.50)	126(78.75)	06(03.75)
Ecological Condition				
1.	Soil	137(85.62%)	17(10.63%)	06(03.75%)
2.	Climate	78(48.75%)	75(46.87%)	07(04.37%)
3.	Temperature	55(34.37%)	103(64.37)	02(01.25)
4.	Rainfall	41(25.62)	115(71.87)	04(02.50)
5.	Nutrients status in cultivated soil	12(07.50)	143(89.37)	05(03.12)
Agricultural services for capacity development				
1	Training	12(07.50)	27(16.87)	121(75.63)
2	Demonstration	08(05.00)	16(10.00)	136(85.00)
3	Exposure visit	14(08.75)	22(13.75)	124(77.50)
4	Literature for knowledge/skills up gradation	17(10.63)	42(26.25)	101(63.12)
5	Time to time technical guidance with expert	11(06.87)	21(13.12)	128(80.00)

Strongly Agree\*, Agree\*, Disagree\*

optimal. The results are similar in the study of Khan *et al.* (2022).

### Agricultural services

The data analyze that agricultural services a serious gap in the availability of essential extension and capacity building facilities for hybrid rice cultivation farmers. The majority of respondents reported that services such as training (75.62%), demonstrations (85.00%), exposure visits (90%), literature for knowledge/skill up Gradation (63.12%) and timely technical guidance from experts (80.00%) are not available to them. Only a small proportion of farmers found these services to be easily available, with the highest being literature (10.62%) and training (07.50%). Occasional availability was relatively better in literature (26.25%) and training (16.87%), but still inadequate. The findings indicate a severe gap in the availability of essential extension services, which could hinder farmers' capacity to adopt improved practices effectively.

Table 2. The data evident that measure constraint faced by farmers in hybrid rice cultivation. The primary constraints of high seed costs (74.86) assign rank 1<sup>st</sup> followed by unavailability of seeds in government centers (71.43) rank 2<sup>th</sup> and expensive agro-based inputs (68.95) ranking 3<sup>rd</sup> the top three barriers. Knowledge gaps, including lack of awareness about hybrid varieties (54.91) rank 4<sup>th</sup>. The e-NAM and regulated markets (57.90) assign rank 5<sup>th</sup>, after that plant protection measures (49.59) rank gained 6<sup>th</sup> and balanced fertilizer use (48.32), rank 7<sup>th</sup>, highlighting the need for farmer education. Environmental challenges like weather fluctuations (40.56) and floods (36.86), along with logistical issues like

fertilizer unavailability (34.89), rank lower (8<sup>th</sup> to 10<sup>th</sup>). Finally shortage of skilled labour at peak time garret mean score (32.90) assigned rank 11<sup>th</sup> the least significant. To boost adoption, interventions should focus on subsidizing seeds, improving seed availability, educating farmers on modern practices and market access, and implementing climate-resilient strategies. The findings are similar constraints of hybrid rice growers (Upadhyay *et al.*, 2021).

### Conclusion

This study clearly reveals that Climate and soil nutrient status of the cultivated land are suitable for growing hybrid rice in research area. The ecological condition is suitable for cultivation of hybrid rice. However, the adoption potential of hybrid rice is significantly hindered by critical challenges. The high input costs especially the high cost of hybrid rice seed, and limited availability of quality seed through government sale centre. The knowledge and skill gaps persist, as indicated by limited awareness of hybrid varieties, balanced fertilizer use, market linkages, and plant protection measures negatively affected of farmers. The severe lack of training, demonstrations, exposure visits, and expert guidance further restricts farmers' ability to fully exploit the benefits of hybrid rice technology. Constraints such as high cost of seed and high inputs cost are affected to the farmers sharply. The effective adoption of hybrid rice, policy and extension efforts must focus on reducing seed and input costs, ensuring timely seed availability, and strengthening farmer training and advisory support. The outcomes of the study will be gainful and useful for adminis-

**Table 2.** Constraints of hybrid rice growers in adoption of rice production technology  
N=160

S. No.	Particulars	Garret Mean Score	Rank
1.	High cost of agro-based input	68.95	3 <sup>th</sup>
2.	Unavailability of skilled labour at peak time	32.90	11 <sup>th</sup>
3.	High cost of hybrid rice seed	74.86	1 <sup>st</sup>
4.	Lack of knowledge of hybrid variety	54.91	4 <sup>th</sup>
5.	Lake of knowledge e-NAM and regulated market	57.90	5 <sup>th</sup>
6.	Lake of knowledge of about balance fertilizer	48.32	7 <sup>th</sup>
7.	Flood occurs due to heavy rain	36.86	9 <sup>th</sup>
8.	Some time unavailability of fertilizer	34.89	10 <sup>th</sup>
9.	Fluctuation of weather condition	40.56	8 <sup>th</sup>
10.	Lack of knowledge about plant protection measures	49.59	6 <sup>th</sup>
11.	Unavailability of hybrid rice seed in Govt. sale centres	71.43	2 <sup>nd</sup>

trates, policymakers, scientists, extension workers, researcher, NGOs, etc. Hybrid rice research often involves international collaborations, pooling resources and expertise from different countries and institutions. Global research networks facilitate the sharing of knowledge and technology, accelerating the development and adoption of hybrid rice.

**Conflict of Interest - None**

## References

- Cidro, D.A. and Radhakrishna, R.B. 2006. Farmers' and extension agents' perceptions of the Philippines hybrid rice program. *Journal of International Agriculture and Extension Education*. 13(3): 19-32.
- Halimi, A.M.O.M. and Subramanian, U. 2024. Rice Farmer's Perception and Factors Influencing Intention and Attitude on Adoption of Hybrid Rice. *ASEAN Journal on Science and Technology for Development*. 40(3): 1-6.
- Khan, N.A., Shah, A.A., Chowdhury, A., Tariq, M.A.U.R. and Khanal, U. 2022. Rice farmers' perceptions about temperature and rainfall variations, respective adaptation measures, and determinants: implications for sustainable farming systems. *Frontiers in Environmental Science*. 10: 997673.
- Kour, R., Slathia, P.S., Peshin, R., Sharma, B.C., Samanta, A. and Kumar, R. 2023. Knowledge Level of the Farmers about Hybrid Rice Cultivation in Jammu District. *Indian Journal of Extension Education*. 59(4): 120-124.
- Masere, T.P. and Worth, S.H. 2022. Factors influencing adoption, innovation of new technology and decision-making by small-scale resource constrained farmers: The perspective of farmers in lower Gweru, Zimbabwe. *African Journal of Food, Agriculture, Nutrition and Development*. 22(3): 20013-20035.
- Nirmala, B., Vasudev, N. and Suhasini, K. 2013. Farmer's perceptions on hybrid rice technology: a case study of Jharkhand.
- Pandey, S. and Bhandari, H. 2009. Economics of hybrid rice in tropical Asia: major issues and opportunities. *Accelerating hybrid rice development. Los Baños (Philippines): International Rice Research Institute*. p, 535-548.
- Rout, D.S., Nandy, A. and Jayasingh, D.K. 2025. Perception of the rice growers of Bhadrak district of Odisha towards hybrid rice cultivation. *HORIZON*, 12(3), 1-11.
- Shah, M.M., Grant, W.J. and Stocklmayer, S. 2015. Farmers' perception of risk in cultivating hybrid rice in Bangladesh. *South African Journal of Agricultural Extension*. 43(2): 17-29.
- Singh, P.K. and Varshney, J.G. 2010. Adoption level and constraints in rice production technology. *Plant Protection*. 64: 53-00.
- Upadhyay, S., Singh, V.K., Verma, A.P., Verma, A.K. and Asha, K. 2021. Constraints analysis in hybrid paddy farming in eastern zone of Uttar Pradesh using garet ranking technique. *International Journal of Current Microbiology and Applied Sciences*. 10(02): 791-796.
- Yan, Z., Chen, F., Mishra, A.K. and Sha, W. 2022. An economic assessment of adoption of hybrid rice: Micro-level evidence from southern China. *Frontiers in Sustainable Food Systems*. 6: 1066657.
- Zheng, X., Wei, F., Cheng, C. and Qian, Q. 2024. A historical review of hybrid rice breeding. *Journal of Integrative Plant Biology*. 66(3): 532-545.