



International Journal of Research in Agronomy

E-ISSN: 2618-0618
P-ISSN: 2618-060X
© Agronomy
NAAS Rating (2026): 5.20
www.agronomyjournals.com
2026; SP-9(10): 104-107
Received: 10-06-2026
Accepted: 15-07-2026

Dr. Raghwendra Singh
ICAR-Agricultural Technology
Application Research Institute
(ATARI), Zone-III, Kanpur, Uttar
Pradesh, India

Dr. Ajay Kumar Singh
ICAR-Agricultural Technology
Application Research Institute
(ATARI), Zone-III, Kanpur, Uttar
Pradesh, India

Dr. Seema Yadav
ICAR-Agricultural Technology
Application Research Institute
(ATARI), Zone-III, Kanpur, Uttar
Pradesh, India

Dr. Preeti Yadav
ICAR-Agricultural Technology
Application Research Institute
(ATARI), Zone-III, Kanpur, Uttar
Pradesh, India

Dr. Somdutt Tripathi
ICAR-Agricultural Technology
Application Research Institute
(ATARI), Zone-III, Kanpur, Uttar
Pradesh, India

Saurabh Raj Pandey
ICAR-Agricultural Technology
Application Research Institute
(ATARI), Zone-III, Kanpur, Uttar
Pradesh, India

Dr. Saurabh Pandey
ICAR-Agricultural Technology
Application Research Institute
(ATARI), Zone-III, Kanpur, Uttar
Pradesh, India

Corresponding Author:
Dr. Ajay Kumar Singh
ICAR-Agricultural Technology
Application Research Institute
(ATARI), Zone-III, Kanpur, Uttar
Pradesh, India

Evaluation of DBW 187 wheat variety under natural farming and farmers' conventional practices in Uttar Pradesh

Raghwendra Singh, Ajay Kumar Singh, Seema Yadav, Preeti Yadav, Somdutt Tripathi, Saurabh Raj Pandey and Saurabh Pandey

DOI: <https://www.doi.org/10.33545/2618060X.2026.v9.i10Sb.6777>

Abstract

The National Mission on Natural Farming (NMNF) is being taken up in Krishi Vigyan Kendras (KVKs) to promote, demonstrate and facilitate the adoption of Natural Farming practices under field conditions. The present study was undertaken to document the comparative performance of Natural Farming and Farmers' Practices in wheat cultivation using field-level demonstration data generated under the NMNF programme in Uttar Pradesh. The programme was spread across 65 KVKs that set up 3 demonstration units in farmers' fields and 1 unit at KVK farm. During the study period, 10 KVKs took up DBW 187 wheat during their demonstrations and data were drawn from these KVKs for comparative analysis. The study was not designed to be a varietal test of DBW 187, but rather it served as a common crop against which the two methods of farming could be compared on the basis of observations that were available. The data related to total area, average yield, and average cost of cultivating under Natural Farming and Farmers Practices were collected on KVK basis. The difference in yield and cost saving in Natural Farming were then computed. The observations of both the practices were matched at KVK level. So, paired sample t-test was used to analyze the difference observed between both practices statistically. Furthermore, the Wilcoxon signed-rank test was performed as a non parametric complementary test, due to the low number of paired observations ($n=10$). The analysis has been based on the evidence collected from KVK demonstrations across various locations regarding the relative yield and cost performance of Natural Farming and existing Farmers' Practices. The results are expected to help with the systematic documentation of NMNF demonstrations and to give evidence from the field to support the strengthening of extension and promotion of NMNF practices related to wheat production.

Keywords: Natural farming, farming practices, wilcoxon signed-rank test and demonstration

Introduction

Wheat (*Triticum aestivum* L.) is one of the major food crops in India and is an important source of food security and livelihood to millions of wheat farming families. Uttar Pradesh is a significant State of the country with a significant contribution in the production of Food-grain in India. Recent agricultural statistics show that Uttar Pradesh had about 20.96 million ha under food grains in 2023-24, with production of 60.29 million tonnes, highlighting the importance of crop productivity and sustainable production practices in the state (Department of Agriculture & Farmers Welfare [DA&FW], 2025) [3]. The constant intensification of agriculture has resulted in farmers' higher productivity, but input cost, soil health, resource use efficiency, and environmental sustainability concerns have highlighted the need to seek alternative ways of crop production. In India, Natural farming (NF) is gaining more attention as an agroecological farming method that focuses on biological methods, locally available resources, soil cover, recycling of farm resources and lesser use of synthetic farming inputs. Velmurugan *et al.* (2026) [9] recently defined natural farming as a farming method based on traditional knowledge and agroecological principles and said that it can contribute towards sustainable and climate-resilient farming. But, the performance of natural farming cannot be taken for granted from crop, variety, soil and agroclimate. Wheat is a nutrient demanding cereal crop, and availability of nutrients during the critical growth stages is closely linked to crop establishment and biomass production

and grain yield. Experimental evidence in recent years has shown that wheat can react quite differently to the natural than to the conventional farming method. In one of their experiments, Behera and Chandrashekara (2023) ^[1] found that the package of practices led to better economic returns, grain yield and straw yield compared to natural and organic farming treatments under irrigated wheat. Likewise, in their two-year study, Saini *et al.* (2025) ^[8] found significantly increased wheat yields with conventional tillage compared to the natural farming treatment, highlighting the need to consider the effect of natural farming under specific crop and production conditions and not generalise across all situations. Meanwhile, studies have suggested that natural farming could have benefits other than the short-term production of the crop, such as better soil biological properties and sustainability of resources. Gajjar *et al.* (2026) ^[5] conducted a comparative study between natural farming and conventional farming in wheat and found better soil health indicators and soil microbial characteristics with natural farming treatments, with some treatments showing similar grain yields to the conventional system. The authors also emphasized that soil type, climatic conditions and the availability of livestock resources can influence the effectiveness and economic viability of natural farming. The results showed that at the field level, both the productivity and the economic performance should be taken into account when assessing natural farming. Selection of suitable wheat varieties is also crucial for obtaining satisfactory productivity under alternative production system. Breeds have variations in yield potential, adaptation and response to nutrient and crop-management conditions. Under organic production systems, wheat varieties have been shown to be highly variable across terms of yield and economic return, highlighting the need for variety specific assessment in low-external-input production systems (Yadav *et al.*, 2020) ^[10]. The evaluation of a popular variety, like DBW 187, under natural farming practice, therefore, could be a source of field-level information for farmers and extension agencies. Systematic field evaluation of improved varieties under natural farming is of special relevance in Uttar Pradesh where wheat has an important place in the agricultural production system. Field demonstration under the condition of farmers can give the concrete evidence of crop performances under natural farming system as compared to the regular farming practices followed by the farmers. These studies can also be useful to determine if a specific wheat variety can be utilized economically and productively under natural farming practices. In view of this, the present study was conducted to test the performance of DBW 187 wheat variety with natural farming and farmers own practice of conventional agriculture in Uttar Pradesh. The study compares the performance of DBW 187 under the two approaches of management with specific focus on productivity of crop and economic performance. The results will give some field evidence to farmers, extension and agriculture institutions on the suitability of DBW 187 in natural farming systems.

Research Methodology

The present study was conducted as a part of the National Mission on Natural Farming (NMNF) being implemented in Uttar Pradesh through National Krishi Vigyan Kendras (NKVKs) where overall goal is to promote and demonstrate Natural Farming practices in field conditions. Each KVK in the project set up three demonstration units in the farmers' fields and one unit on the KVK farm. The present comparative analysis was made with the observations of 10 out of the 65 KVKs who cultivated DBW 187 wheat during the study period under their natural farming demonstrations. The study was not a varietal trial of DBW 187; however, for the purpose of comparing Natural Farming with Farmers' Practices, the wheat variety cultivated at these 10 KVKs was DBW 187 and the available demonstration data for this variety was used. The data pertaining to Natural Farming and Farmers' Practices have been compiled at KVKs level for the total area (ha), average yield (q/ha) and average cost of cultivation (₹/ha). Based on the above observations, the yield difference (q/ha) and cost saving under Natural Farming (₹/ha) were calculated. The Natural Farming and Farmers' Practices observations for each KVK was assumed to be a pair of observations and used for the comparison between same KVK/location. Differences were summarized by descriptive statistics and a paired sample t-test was used to determine if the mean differences between the two farming practices were statistically significant. Being there is only limited number of paired KVK observations ($n = 10$) and to avoid relying just on the normality assumption, the non-parametric Wilcoxon signed-rank test was also used as a complementary statistical test. The level of significance for the statistical analysis was taken at 5 per cent ($p < 0.05$). Therefore the analysis was focused on documenting the comparative field performance and economic implication of Natural Farming versus Farmers' Practices, instead of comparing the inherent performance of the wheat variety, based on the observations made over 187 DBW and available from the 10 participating KVKs.

Result and Discussion

The comparative performance of wheat under Natural Farming (NF) and Farmers' Practices (FP) was assessed through multi-location demonstrations conducted by KVKs across Uttar Pradesh. The assessment focused primarily on cultivated area, average grain yield and cost of cultivation, along with the differences in yield and cost savings achieved under natural farming. The results provide an overview of the relative production performance and input-use economics of wheat under the two management practices across diverse agro-ecological conditions. The findings obtained from the participating KVKs are presented in Table 1 and are discussed with respect to location-wise variation in productivity and cultivation expenditure.

Table 1: Comparative Performance of DBW 187 Wheat under Natural Farming and Farmers' Practices across Different KVKs

Name of KVK	Under Natural farming			Under Farmers Practices			Yield Difference (q/ha)	Cost saving in Natural Farming (Rs/ha)
	Total Area (ha)	Average Yield (q/ha)	Average cost of cultivation (Rs/ha)	Area (ha)	Average Yield (q/ha)	Average cost of cultivation (Rs/ha)		
Bahraich-I	0.2	29.7	26860	7.2	52.33	42482	-22.63	15622
Siddharthnagar	1.75	15.86	23200	12.1	33.32	38160	-17.46	14960
Sant Kabir Nagar	3.2	16.75	18885	3.2	28.01	26500	-8.26	7615
Amethi	4.93	26.54	29871	4.93	37.06	36471	-10.52	6600
Jhansi	0.4	15	24250	0.4	31.5	29500	-16.5	5250
Jalaun	15	15.44	18800	13	21.86	29987	-6.12	11187
Banda	6	15.55	18975	6.4	21.44	29175	-5.89	10200
Fatehpur	2.4	15.63	18760	2.8	18.04	37414	-2.41	18654
Bijnore	3.6	35.89	17933	3.6	53.30	48355	-17.41	30422
Budaun	1	32.5	24180	1	47.50	44710	-15	20530

The data presented in the table number 1 show a clear difference in the performance of wheat under Natural Farming (NF) and Farmers' Practices (FP) across ten KVK locations of Uttar Pradesh. The comparison shows that, in the period of demonstration, average yield with natural farming was lower than yield with farmers' usual practice, but the cost of cultivation with natural farming was significantly less. In all the 10 KVKs, 38.48 ha was covered under natural farming, while 54.63 ha was the area covered by farmer's practices. There was the difference in area of natural farming among the KVKs: Jalaun (15 ha), Banda (6 ha) & Amethi (4.93 ha). The range of these variations suggests that the size of the natural-farming demonstrations varied significantly between locations, likely due to the different degrees of implementation and farmer participation. Average yield under natural farming ranged from 15.00 to 35.89 q/ha while under farmers' practices they ranged from 18.04 to 53.30 q/ha. The best performance under natural farming was in Bijnore (35.89) followed by Budaun (32.50) and Bahraich-I (29.70). On the other hand, farmers' practices showed the maximum yield in Bijnore (53.30 q/ha), Bahraich-I (52.33 q/ha) and Budaun (47.50 q/ha). In this way, the practice of farmers yielded higher in all the 10 locations with a yield difference of 2.41 to 22.63 q/ha. The yield gap is relatively large for Bahraich-I (22.63 q/ha), Siddharthnagar (17.46 q/ha), Bijnore (17.41 q/ha), Jhansi (16.50 q/ha) and Budaun (15.00 q/ha) and thus the productivity gap is very large at these locations. On the other hand, the least difference was found at Fatehpur (2.41 q/ha), Banda (5.89 q/ha) and Jalaun (6.12 q/ha). This relatively low yield differential could be a sign of adaptability of natural farming to local agro-ecological conditions, but this would need more information on soil, varieties, climate, farming methods and the time that has passed since the adoption of natural farming in these locations. One of the great benefits of natural farming was cost cutting. Farmers' practices at all the ten KVKs were more expensive than the cost of cultivation in the natural farming. The savings varied from ₹5,250/ha in Jhansi to ₹30,422/ha in Bijnore. The highest savings were observed in Bijnore (₹30,422/ha), Bahraich-I (₹15,622/ha), Siddharthnagar (₹14,960/ha), Jalaun (₹11,187/ha), and Banda (₹10,200/ha). The findings show that natural farming significantly lowered the amount of money spent on crop production, especially in situations where farmers' farming practices resulted in a relatively high external input expenditure. Overall, the productivity of the demonstrations in natural farming was about 19.45 q/ha as compared to 32.51 q/ha in farmers' farming practices on an area weighted basis.

Meanwhile, the area weighted average cost of cultivation was around ₹20,608 per ha under natural farming practices and ₹35,587 per ha under farmers' practices. Therefore, natural farming led to a savings of about ₹14,979/ha (42.1%) of the cultivation cost and yield was about 40.2% less than farmers practice. The figures in this tabulation should be taken with a pinch of salt as the two production systems were not in the same area at all locations and the tabulation is based on demonstration data at the KVK level and not a controlled experimental setup. These results highlight an important yield-cost trade-off, then. In the reported demonstrations, higher physical yield was achieved by farmers' farming systems while lower production expenditure was always demonstrated by natural farming. Hence, when evaluating the two production systems' economic performance, yield should not be the only criterion. A comprehensive economic evaluation should also include gross return, net return, benefit-cost ratio, input-output ratio and market prices, especially the price premium that might be achieved for natural or chemical-free products. The findings also point out the crucial role of assessing natural farming in a location-specific manner. The small difference in yield in the three locations (Fatehpur, Banda and Jalaun) and significant cost savings indicate that these sites may warrant further study via replicated demonstrations and extended monitoring. On the other hand, areas of high yield differentials should be investigated for sitespecific adaptations of crop establishment, nutrient availability, weed control, irrigation, variety choice and farmers' ability to implement the package of natural farming practices recommended in the area (Chatrath *et al.*, 2019; Gupta *et al.*, 2020) [2, 6].

Statistical results

Parameter	Natural Farming	Farmers' Practices	Mean Difference (NF – FP)	Paired <i>t</i>	<i>p</i> -value
Average yield (q/ha)	21.89	34.44	-12.55	-6.26	0.00015
Cost of cultivation (₹/ha)	22,171.40	36,275.40	-14,104	-5.80	0.00026

The corresponding Wilcoxon signed-rank test also showed $p = 0.00195$ for both yield and cost, confirming the statistical significance of the paired differences.

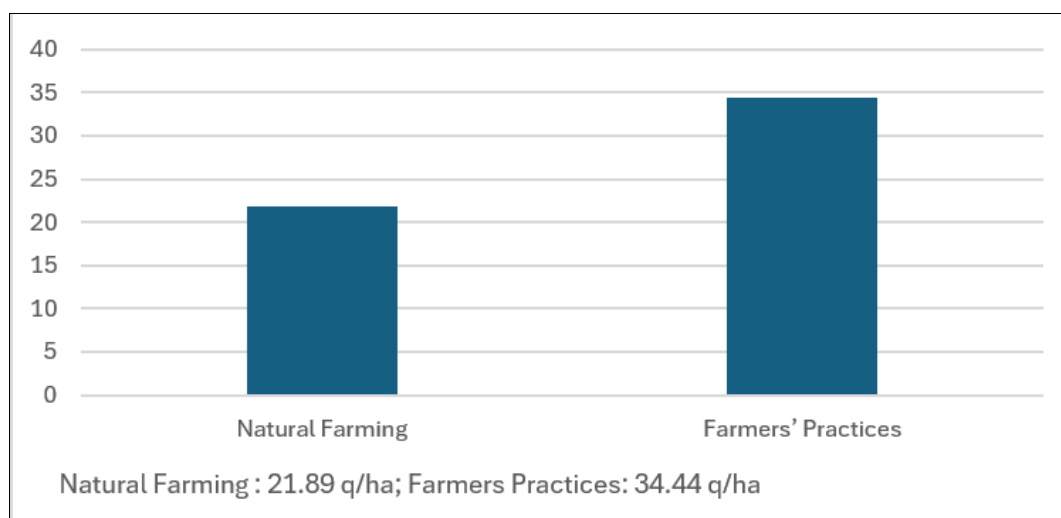


Fig 1: Average yield under natural farming and farmers practices

The performance of wheat under Natural Farming was compared with Farmers' Practices across 10 KVKs of Uttar Pradesh. As both observations were available from the same KVKs, paired-samples t-test was used to test if the difference between the two production practices was statistically significant. A non-parametric confirmation was also made using the Wilcoxon signed rank test. The mean wheat yield in Natural Farming was 21.89 q/ha while Farmers' Practices gave the wheat yield of 34.44 q/ha. The mean difference was negative number, i.e. -12.55 q/ha which means that the present set of observations showed that the average yield under the Natural Farming was 12.55 q/ha less. This difference was found to be statistically significant based on the paired t-test ($t_9 = -6.26$, $p < 0.001$). A Wilcoxon signed rank test also showed a significant difference ($p = 0.00195$). Under Natural Farming, the mean cost of cultivation was ₹22,171/ha while it was ₹36,275/ha in Farmers' Practices. Therefore, it could be concluded that Natural Farming was able to save about ₹14,104/ha or 38.9% of the cultivation cost on average. The difference between cultivation cost was statistically significant ($t_9 = -5.80$, $p < 0.001$); moreover, the Wilcoxon signed-rank test showed that this difference was statistically significant ($p = 0.00195$). The overall data clearly show that both wheat yield and cost of cultivation were significantly reduced on Natural Farming as compared to Farmers' Practices in the 10 KVK observations. Thus, the present results indicated that there is a compromise between reduction in growing cost and reduction in yield in Natural Farming practice. A multi-season and larger scale observation would be needed to determine if there is any change in yield gap as the result of longer-term adoption of Natural Farming and improved soil and crop-management practices.

Conclusion

The present study conducted on NMNF demonstration data of 10 KVKs across Uttar Pradesh where DBW 187 wheat was grown, found that there is a definite trade-off between productivity and cost of cultivation between Natural Farming (NF) and Farmers' Practices (FP). In both cases, natural farming had significantly lower cost of cultivation, with a mean of ₹22,171/ha compared to ₹36,275/ha under farmers' practices, which means a saving of around ₹14,104/ha (38.9%) as compared to farmers' practices. The mean wheat yield with Natural Farming was 21.89 q/ha while it was 34.44 q/ha with Farmers' Practices yielding an average difference of 12.55 q/ha. The differences in yield ($t_9 = -6.26$, $p < 0.001$) and cost of cultivation ($t_9 = -5.80$, $p < 0.001$) was statistically significant as measured using the paired t-test; the Wilcoxon signed-rank test also showed significant differences ($p = 0.00195$). From the present demonstrations the results revealed that Natural Farming was associated with relatively high production cost which was not observed in the Farmers' Practices but on the other hand, Natural Farming was associated with relatively low wheat yield compared to Farmers' Practices. As such, the findings should not be merely viewed as yield advantage or disadvantage; they should be viewed as a need to analyse the yield/cost relationship and overall farm profitability in terms of gross returns, net returns, benefit/cost ratio and market prices. The differences in yield gaps and cost savings between KVKs further highlight the need to understand and manage on location basis. Multi-season demonstrations, better crop and nutrient management and systematic monitoring of soil and economic indicators are necessary to assess if productivity gaps can be decreased over time and to build robust evidence of the effective promotion and scaling of Natural Farming under the NMNF programme.

References

1. Behera AK, Chandrashekara CP. Effect of natural farming, organic farming, and recommended package of practices on yield and economics of irrigated wheat (*Triticum aestivum*). The Indian Journal of Agricultural Sciences. 2023;93(1):102-105. DOI:10.56093/ijas.v93i1.121619.
2. Chatrath R, Singh GP, Kumar S, Gupta V, Mamrutha HM. DBW 187 (Karan Vandana): A high yielding wheat variety for irrigated timely sown conditions of North Eastern Plain Zone. Indian Journal of Genetics and Plant Breeding. 2019;79(3):634-635.
3. Department of Agriculture & Farmers Welfare. Agricultural statistics at a glance 2024-25. New Delhi: Directorate of Economics and Statistics, Ministry of Agriculture & Farmers Welfare, Government of India; 2025.
4. Effect of cultivation practices on productivity and nutrient dynamics of wheat varieties under northern hill zone of India. Journal of Scientific Research and Reports. 2025;31(8):55-63.
5. Gajjar KK, Chaudhary MC, Patel SP, Vasa N, Maniyar RM, Agrawal D, et al. Natural farming as a sustainable agricultural approach enhances soil health and microbial diversity in wheat cultivation: A metagenomic perspective. Frontiers in Agronomy. 2026;8. DOI:10.3389/fagro.2026.1755662.
6. Gupta V, Mamrutha HM, Jasrotia P, Bhardwaj SC, Kashyap PL, Gangwar OP, et al. Development and evaluation of high yielding, multiple disease resistant bread wheat variety—Karan Vandana (DBW187). Journal of Cereal Research. 2020;12(1):44-49. DOI:10.25174/2582-2675/2020/99622.
7. Mishra B. Assessing farm income and input efficiency under zero-budget natural farming in India. The Indian Economic Journal. 2026;74(1):10-25. DOI:10.1177/00194662241265469.
8. Saini A, Manuja S, Kumar S, Upadhyay RG, Sahoo C. Response of tillage methods on yield of wheat (*Triticum aestivum*) cultivars. The Indian Journal of Agricultural Sciences. 2025;95(5). DOI:10.56093/ijas.v95i5.136736.
9. Velmurugan A, Ravisankar N, Swarnam TP, Thakur JK. Harnessing natural farming for sustainable agro-ecosystems and SDG advancement in India. Indian Farming. 2026;76(7):48-50.
10. Yadav SK, Sharma SK, Choudhary R, Jain RK, Jat G. Yield performance and economics of wheat varieties under organic farming. The Indian Journal of Agricultural Sciences. 2020;90(11):2225-2232. DOI:10.56093/ijas.v90i11.108600.