



Cluster Frontline Demonstrations (CFLDs) on Biofortified Varieties

Annual Report 2025-26



**ICAR-Agricultural Technology Application Research Institute
Zone-I, Ludhiana-141004, Punjab**

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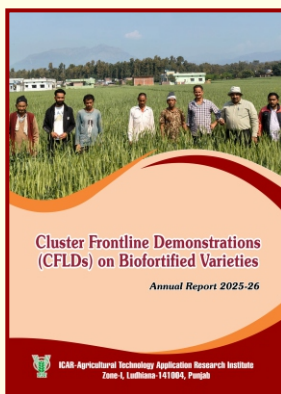


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PREFACE

Micronutrient malnutrition, particularly deficiencies of essential nutrients such as iron and zinc, remains an important challenge to nutritional security despite significant progress in food production. Biofortification offers a sustainable agricultural approach to address this challenge by developing and promoting crop varieties with enhanced nutritional quality, while maintaining desirable yield, adaptability, and agronomic characteristics. Biofortified wheat, particularly zinc-enriched varieties, has considerable potential to contribute to nutritional security through regular consumption while simultaneously providing farmers with productive and economically viable crop options.

Recognizing the importance of biofortification, the Department of Agriculture & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India, initiated the project "Cluster Frontline Demonstrations (CFLDs) on Biofortified Varieties of Rice, Wheat, Barley, Maize, Sorghum, Pearl Millet and Finger Millet during Rabi/Summer 2025-26" under the National Food Security & Nutrition Mission (NFSNM). The project aims to demonstrate the performance of biofortified varieties under farmers' field conditions, promote improved production technologies, enhance farmers' awareness regarding their nutritional and economic benefits, and facilitate their wider adoption. The cluster-based approach provides an effective mechanism for evaluating technologies under real farming situations while creating visible examples for neighbouring farmers.

Under the project, ICAR-ATARI, Ludhiana (Zone-I) coordinated the implementation of Cluster Frontline Demonstrations on biofortified wheat through the KVK network of Punjab, Himachal Pradesh, Uttarakhand and Jammu & Kashmir. The demonstrations were undertaken using biofortified wheat varieties along with the recommended package of practices, including quality seed, timely sowing, balanced nutrient management, efficient weed management, need-based irrigation, and integrated pest and disease management. The programme provided an opportunity to assess the productivity, economics, market acceptance and farmer response to biofortified wheat under diverse agro-climatic conditions.

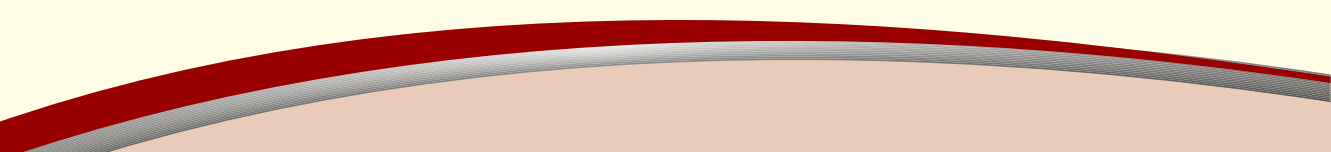
During 2025-26, CFLDs on biofortified wheat covered 658 ha and 1,655 farmers across the four participating states. Punjab accounted for the largest coverage of 474 ha involving 1,106 farmers, followed by Jammu & Kashmir (70 ha; 288 farmers), Himachal Pradesh (60 ha; 155 farmers) and Uttarakhand (54 ha; 106 farmers). The demonstrations established that biofortified wheat can maintain or improve productivity while providing enhanced nutritional value. Average yield advantages were recorded in Himachal Pradesh (37.3%), Jammu & Kashmir (23.5%) and Uttarakhand (16.0%), while Punjab recorded a yield comparable to the existing farmer varieties. The demonstrations also showed favourable economic performance, with improved net returns and Benefit-Cost Ratios across the participating states. In addition, better price realization in Punjab, Himachal Pradesh and Jammu & Kashmir indicated emerging market acceptance of biofortified wheat.

The present report compiles the field performance, yield, economics, price realization, and major findings and lessons learned from the CFLDs conducted during Rabi 2025-26. The findings provide useful field-level evidence regarding the adaptability and economic potential of biofortified wheat and highlight the importance of quality seed, recommended production practices, location-specific varietal selection, farmer awareness, and market linkages for wider adoption.

We extend our sincere appreciation to the Department of Agriculture & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India, for supporting the implementation of the project. We express our sincere gratitude to the Secretary, DARE & Director General, ICAR; Deputy Director General (Extension), ICAR; and the concerned Assistant Directors General (Extension), ICAR, for their valuable guidance, encouragement and continued support in the successful implementation of the project. We also acknowledge the valuable cooperation of the State Agricultural Universities, Directorates of Extension Education, KVK Programme Coordinators/Heads, scientists and field staff involved in planning, conducting and documenting the demonstrations. Special appreciation is extended to the participating farmers whose cooperation and active involvement made the field demonstrations possible.

We congratulate the project team of ICAR-ATARI, Ludhiana, the participating KVKs and all associated stakeholders for their dedicated efforts in implementing the CFLDs and documenting the results. It is hoped that the findings presented in this report will contribute to the wider promotion of biofortified wheat and strengthen efforts towards achieving nutritional security, improved farm profitability and sustainable agricultural development.

Authors



EXECUTIVE SUMMARY

The Cluster Frontline Demonstrations (CFLDs) on Biofortified Varieties during Rabi 2025-26 were implemented through the Krishi Vigyan Kendras (KVKs) of ICAR-ATARI, Zone-I, Ludhiana, to demonstrate the field performance, productivity, economic viability and farmer acceptability of biofortified wheat varieties under diverse agro-climatic conditions. Biofortified wheat varieties with enhanced grain zinc content, improved yield potential and desirable agronomic characteristics were evaluated against locally cultivated farmer varieties using the recommended package of practices.

During the reporting period, CFLDs were conducted across Punjab, Himachal Pradesh, Uttarakhand and Jammu & Kashmir, covering a total of 658 ha and 1,655 farmers. Punjab accounted for the most extensive coverage with 474 ha involving 1,106 farmers, followed by Jammu & Kashmir (70 ha; 288 farmers), Himachal Pradesh (60 ha; 155 farmers) and Uttarakhand (54 ha; 106 farmers). The demonstrations provided an opportunity to assess the performance of biofortified wheat under farmers' field conditions and generate location-specific evidence for wider dissemination.

The demonstrations revealed comparable or higher grain productivity of biofortified wheat across all participating states. In Punjab, biofortified wheat recorded an average yield of 50.77 q/ha, compared with 51.04 q/ha under existing varieties, demonstrating that enhanced nutritional quality could be achieved without a significant yield penalty. In Himachal Pradesh, the average yield was 38.3 q/ha, which was 37.3% higher than the farmer varieties (27.9 q/ha). Uttarakhand recorded an average yield of 48.6 q/ha against 41.9 q/ha, representing a 16.0% increase, while Jammu & Kashmir recorded 37.8 q/ha against 30.6 q/ha, representing a 23.5% increase. The improvement was attributed primarily to the use of suitable biofortified varieties, quality seed, and adoption of the recommended package of practices.

The economic analysis further established the economic viability of biofortified wheat cultivation. Punjab recorded an average gross return of ₹1,33,027/ha, net return of ₹90,033/ha, and B: C ratio of 3.3, compared with 3.2 under farmer practice. In Himachal Pradesh, net returns increased from ₹26,549/ha to ₹50,835/ha, with the B: C ratio improving from 1.6 to 2.2. Uttarakhand recorded an increase in net returns from ₹59,527/ha to ₹74,372/ha and the B:C ratio from 2.7 to 2.9. Jammu & Kashmir also recorded substantial improvement in economic returns, with the B:C ratio increasing from 2.4 to 3.2. These results indicate that the additional investment in quality seed and improved crop management was generally compensated through higher productivity and returns.

Price realization also indicated emerging market acceptance of biofortified wheat. Punjab recorded an average price of ₹2,618/q, compared with ₹2,581/q for existing varieties, with particularly high realization in Ludhiana (₹2,895/q), Muktsar (₹2,886/q), Kapurthala (₹2,694/q) and Barnala (₹2,644/q). Himachal Pradesh recorded ₹2,499/q against ₹2,471/q, while Jammu & Kashmir recorded ₹2,525/q

against ₹2,500/q. In Uttarakhand, the price realization was almost identical (₹2,466/q against ₹2,467/q), indicating that the economic advantage there was primarily driven by higher productivity rather than a price premium. The experience, particularly from Punjab, indicates that consumer awareness regarding the nutritional benefits of zinc-enriched wheat can contribute to better market demand and price realization.

Overall, the CFLDs established that biofortified wheat can combine nutritional enhancement with productivity, profitability and, in several locations, improved market value. The major lessons were the importance of quality seed and recommended production practices, location-specific varietal selection, farmer-field demonstrations, consumer awareness and market linkages. The results provide a strong field-level basis for scaling up biofortified wheat through the KVK network as a dual-benefit technology contributing to both farmers' income and nutritional security.

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INTRODUCTION

Micronutrient malnutrition, often referred to as "hidden hunger", continues to be a major public health challenge in India, affecting millions of people despite adequate caloric intake. Deficiencies of essential micronutrients such as iron, zinc, vitamin A, and protein contribute significantly to anaemia, impaired cognitive development, weakened immunity, poor maternal health, and reduced productivity. Conventional interventions such as dietary diversification, food fortification, and nutritional supplementation have made notable contributions; however, ensuring access to nutrient-rich food through sustainable agricultural interventions remains an equally important strategy.

Biofortification has emerged as one of the most promising and cost-effective approaches for addressing hidden hunger. Biofortified crop varieties are developed through conventional plant breeding and modern breeding techniques to contain higher concentrations of essential micronutrients without compromising yield, adaptability, or consumer acceptability. Unlike post-harvest food fortification, biofortification enhances the nutritional quality of crops at the production stage, enabling farm families and consumers to derive nutritional benefits directly from their daily diets. Besides improving nutritional security, biofortified varieties generally possess desirable agronomic traits such as higher yield potential, resistance or tolerance to major diseases and pests, better adaptability to abiotic stresses, and wider environmental suitability.

Recognizing the importance of biofortification in achieving nutritional security, the Government of India has accorded high priority to the promotion of biofortified crop varieties under various national programmes. The National Food Security & Nutrition Mission (NFSNM) aims to enhance food as well as nutritional security through promotion of improved crop technologies and nutritionally enriched varieties. In this context, the Cluster Frontline Demonstration (CFLD) programme serves as an effective extension approach for showcasing the production potential and nutritional advantages of newly released biofortified varieties under farmers' field conditions.

The **Project on "Cluster Frontline Demonstrations (CFLDs) on Biofortified Varieties of Rice, Wheat, Barley, Maize, Sorghum, Pearl Millet and Finger Millet during Rabi/Summer 2025-26"** was approved by the Department of Agriculture & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India under the National Food Security & Nutrition Mission (NFSNM). The project has been implemented by the Extension Division of ICAR through Agricultural Technology Application Research Institutes (ATARIs) and Krishi Vigyan Kendras (KVKs). The approved project provided for demonstrations of biofortified varieties, monitoring and field visits, capacity building of KVK scientists, publication of annual reports, and deployment of technical manpower for effective implementation.

The CFLD programme follows a cluster approach, wherein demonstrations are organized over a minimum cluster area of 10 hectares, with each participating farmer covering 0.40 to 1.00 ha. All demonstrations are mandatorily geo-tagged and monitored through the Krishi Mapper Mobile Application, and primary information relating to demonstration plots, beneficiary farmers and varieties is uploaded before sowing. Demonstrations highlight a single package of improved production

technologies in identified biofortified varieties, enabling neighbouring farmers to observe the performance under real farm conditions. The project also emphasizes distribution of seed and critical inputs, organization of field days, monitoring visits, maintenance of Soil Health Cards, participation of Drone Didis in input application, and systematic documentation of project outcomes.

ICAR-ATARI, Ludhiana (Zone-I) is responsible for coordinating the implementation of the project across **35 Krishi Vigyan Kendras** located in **Punjab, Himachal Pradesh, Uttarakhand, and Jammu & Kashmir**. During **Rabi 2025-26**, the Zone has been allocated demonstrations exclusively on **biofortified wheat**, covering a total area of **2,500 ha** involving **1,000 frontline demonstrations** with a financial allocation of **₹90.00 lakh** for cluster demonstrations (Table 1.1). In addition, provision has been made for the engagement of one Senior Research Fellow (SRF), one Data Entry Operator (DEO), and ten Technology Agents to facilitate implementation and monitoring of the programme.

The primary objective of the programme was to demonstrate the production potential, nutritional advantages, and economic benefits of biofortified wheat varieties under farmers' field conditions while promoting scientific crop management practices. Through large-scale demonstrations, capacity building programmes, field days, and continuous technical guidance by KVKs, the programme seeks to accelerate the adoption of biofortified varieties among farming communities, thereby contributing to enhanced nutritional security, improved farm productivity, and sustainable agricultural development.

Table 1.1 State-wise Physical Targets of CFLDs on Biofortified Wheat allocated to ICAR-ATARI, Ludhiana (Zone-I)

State	No. of KVKs	No. of Demonstrations	Area (ha)
Punjab	22	800	2,000
Himachal Pradesh	4	80	200
Uttarakhand	4	50	125
Jammu & Kashmir	5	70	175
Total (Zone-I)	35	1,000	2,500

Table 1.2 State-wise Achievements of CFLDs on Biofortified Wheat during 2025-26

State	No. of KVKs	No. of Demonstrations	Area (ha)
Punjab	21	1,106	474
Himachal Pradesh	4	155	60
Uttarakhand	4	106	54
Jammu & Kashmir	5	288	70
Total	34	1,655	658

During 2025-26, Cluster Frontline Demonstrations (CFLDs) on biofortified wheat were conducted across **Punjab, Himachal Pradesh, Uttarakhand and Jammu & Kashmir**, covering **658 ha** and **1,655 farmers** (Table 1.2). Punjab recorded the most extensive coverage with **474 ha** involving **1,106 farmers**, followed by Himachal Pradesh (**60 ha; 155 farmers**), Jammu & Kashmir (**70 ha; 288 farmers**) and Uttarakhand (**54 ha; 106 farmers**). The demonstrations provided field-level validation of biofortified wheat varieties under diverse agro-climatic conditions and demonstrated their potential for maintaining or enhancing productivity, improving farm profitability, and contributing to nutritional security.

DEMONSTRATIONS

The demonstrations emphasized the complete package of improved crop production and protection technologies, including the use of biofortified varieties, quality seed, balanced nutrient management, weed management, irrigation scheduling, integrated pest and disease management, and scientific harvesting practices. Detailed information on crop management, grain yield, economic returns, and farmer adoption was systematically documented to assess the productivity and profitability of biofortified wheat under diverse agro-climatic conditions. This report presents the district-wise performance of CFLDs, highlighting the yield advantage, economic benefits, and the potential of biofortified wheat cultivation to enhance farmers' incomes while contributing to improved nutritional security.

PUNJAB

Under the project, KVKs of Punjab have been allocated the largest share of demonstrations in Zone-I, reflecting their strategic importance in wheat production and its potential for large-scale dissemination of biofortified technologies. A total of 800 demonstrations covering 2,000 hectares have been allocated to 22 Krishi Vigyan Kendras (KVKs) across the state. During the reporting period, 21 Krishi Vigyan Kendras (KVKs) conducted Cluster Front Line Demonstrations (CFLDs) on biofortified wheat across Punjab. Against an allocated target of 800 ha, demonstrations were successfully conducted over 474 ha, covering 1,106 farmers (Table 2.1).

The biofortified wheat varieties demonstrated were PBW Zinc 2, PBW Zinc 1, and DBW 371 in selected districts. These biofortified varieties are enriched with higher grain zinc content (40-48 mg/kg) and possess high yield potential, good grain quality, and resistance to major rust diseases, making them suitable for timely sown irrigated conditions. Their performance was evaluated against the popular farmer-grown varieties such as PBW 826, PBW 872, PBW 725, PBW 677, DBW 222, DBW 187, HD 2967 and HD 3086, which are widely cultivated in Punjab due to their high productivity and adaptability. The demonstrations were conducted following the recommended package of practices, including the



Capacity building program in Pathankot, Punjab



Demonstration field in Kapurthala, Punjab

Table 2.1: Performance of CFLDs on Biofortified Wheat in Punjab

S. No.	KVK	Variety		Target Area (ha)	Demo Area (ha)	Farmers (No.)	Yield (q/ha)	
		Local/Check	Demonstration				Local	Demo
1	Amritsar	PBW 725, PBW 826, DBW 303, PBW 677, PBW 766, DBW 187	PBW Zinc 2	50	50.0	67	48.7	49.0
2	Bamala	DBW 222, PBW 826	PBW Zinc 2	50	10.0	25	51.9	54.1
3	Bathinda	PBW 826	PBW Zinc 2	25	25.2	63	49.9	51.0
4	Faridkot	PBW 826, DBW 327, DBW 187, DBW 222, PBW 766	PBW Zinc 2	15	15.0	38	49.3	49.5
5	Fatehgarh Sahib	PBW 826	PBW Zinc 2	10	10.0	25	55.6	50.8
6	Fazilka	PBW 826, DBW 327, PBW 872	DBW 371	25	25.0	63	49.0	52.5
7	Ferozepur	PBW 826	PBW Zinc 1, PBW Zinc 2	50	40.0	100	50.7	52.1
8	Gurdaspur	PBW 826	PBW Zinc 1, PBW Zinc 2	25	24.0	24	51.3	47.8
9	Hoshiarpur	PBW 755, PBW 826, DBW 303, DBW 197, PBW 725, DBW 222, DBW 187	PBW Zinc 2	50	50.0	125	45.5	45.9
10	Jalandhar	PBW 826, PBW 725, PBW 869, DBW 187, HD 3086, HD 3226	PBW Zinc 2	25	15.2	38	51.1	51.6
11	Kapurthala	PBW 826	PBW Zinc 2	50	25.2	63	58.6	57.6
12	Ludhiana	PBW 826	PBW Zinc 2	10	10.0	25	57.8	53.3
13	Mansa	PBW 826	PBW Zinc 1, PBW Zinc 2	25	24.8	62	50.9	52.3
14	Moga	PBW 826, PBW 550, DBW 187, DBW 222, PBW 677	PBW Zinc 2	10	10.0	25	50.8	50.7
15	Mohali	PBW 677, PBW 826, DBW 222, Banshi, HD 2967, DBW 222, Unnat PBW 550	PBW Zinc 2	50	10.0	17	46.9	49.2
16	Muktsar	PBW 826	PBW Zinc 1	25	25.0	63	55.4	51.7
17	Nawanshahr	PB 725, PBW 826, PBW 677	PBW Zinc 2	10	10.0	25	49.0	49.8
18	Pathankot	HD 2967, DBW 222, DBW 187, HD 3086	PBW Zinc 2	25	24.8	62	48.8	51.4
19	Patiala	PBW 826, PBW 872, HD 3086, HD 2967	PBW Zinc 2	10	10.0	25	52.5	50.1
20	Ropar	PBW 826, PBW 725, DBW 222, HD 3086, HD 2967	PBW Zinc 2	50	50.0	125	44.3	45.6
21	Sangrur	PBW 826, PBW 872, DBW 222, HD 3086, PBW 869, DBW 187	PBW Zinc 2	10	9.8	46	53.8	50.1
Total/Average				474	1106	51.04	50.77	

use of quality seed, balanced nutrient management, timely sowing, efficient weed management, need-based irrigation, and integrated pest and disease management.

The demonstrated grain yield ranged from 45.9 to 57.6 q/ha. The highest demonstrated grain yield (57.6 q/ha) was recorded at KVK Kapurthala, followed by KVK Barnala (54.1 q/ha) and KVK Ludhiana (53.3 q/ha). On average, the demonstrated plots recorded a grain yield of 50.77 q/ha, while the average yield under the existing farmer varieties was 51.04 q/ha. Higher demonstrated yields than the existing farmer varieties were recorded at Bathinda, Faridkot, Ferozepur, Hoshiarpur, Jalandhar, Mansa, Nawanshahr, Pathankot, Ropar, Barnala, Mohali and Fazilka, whereas the demonstrated yields in the remaining districts were comparable to or marginally lower than those of the existing farmer varieties.

The results indicate that the biofortified wheat varieties maintained productivity comparable to the widely cultivated commercial varieties while simultaneously offering the added advantage of enhanced grain zinc content, thereby supporting the objective of improving nutritional security without compromising field performance.

The economic analysis of the Cluster Front Line Demonstrations (CFLDs) on biofortified wheat indicated that the demonstrated technology was economically competitive with the existing farmer practices under the prevailing production conditions of Punjab (Table 2.2). The average cost of cultivation under

Table 2.2: Economic Performance of CFLDs on Biofortified Wheat in Punjab

S. No.	KVK	Local Check (₹/ha)				Demonstrations (₹/ha)				Price Realized (₹/q)	
		Gross	Gross	Net	BCR	Gross	Gross	Net	BCR		
		Cost	Return	Return		Cost	Return	Return		Check	Demo
1	Amritsar	40600	125961	80503	3.10	41300	126912	79306	3.07	2586	2590
2	Barnala	44908	136875	91967	3.05	42075	143034	100959	3.40	2637	2644
3	Bathinda	45369	129004	83634	2.84	43530	131917	88387	3.03	2585	2587
4	Faridkot	42654	127664	85010	2.99	42225	127906	85681	3.03	2590	2585
5	Fazilka	44965	126753	81788	2.82	44965	135745	90780	3.02	2585	2586
6	Ferozepur	45300	130981	85681	2.89	43585	134833	91248	3.09	2585	2588
7	Fatehgarh Sahib	37906	135058	97152	3.56	38775	126116	87341	3.25	2429	2483
8	Gurdaspur	42649	132751	90101	3.11	41999	123555	81556	2.94	2588	2585
9	Hoshiarpur	43965	117865	73900	2.68	43841	118636	74795	2.71	2590	2585
10	Jalandhar	40664	132095	91431	3.25	39089	133403	94314	3.41	2585	2585
11	Kapurthala	42064	151551	109487	3.60	42064	155169	113105	3.69	2586	2694
12	Ludhiana	42097	149382	107285	3.55	42097	154294	112197	3.67	2585	2895
13	Mansa	45278	131559	86281	2.91	43585	135308	91723	3.10	2585	2587
14	Moga	35606	131305	95699	3.69	35983	131280	95297	3.65	2587	2589
15	Mohali	37401	121238	83837	3.24	37328	127436	90108	3.41	2585	2590
16	Muktsar	45523	143249	97726	3.15	41523	149223	107700	3.59	2585	2886
17	Nawanshahr	35000	126761	91761	3.62	35000	128771	93771	3.68	2585	2585
18	Pathankot	45304	126373	81069	2.79	43585	133044	89459	3.05	2590	2588
19	Patiala	36710	135714	99004	3.70	36710	129571	92861	3.53	2586	2585
20	Ropar	44317	114638	70321	2.59	44317	117861	73544	2.66	2585	2585
21	Sangrur	37158	139348	102190	3.75	37163	129559	92396	3.49	2590	2585
Average		41688	131720	90032	3.2	40988	133027	91739	3.3	2581	2618



Diagnostic visit in Moga, Punjab



Field day in Hoshiarpur, Punjab

CFLDs was ₹40,988/ha, which was marginally lower than the ₹41,688/ha recorded under the existing farmer practices. This reduction in cultivation cost, coupled with improved returns, highlights the efficient utilization of production inputs under the demonstrated technology.

The demonstrated plots recorded an average gross return of ₹1,33,027/ha and net return of ₹91,739/ha, compared to ₹1,31,720/ha and ₹90,033/ha, respectively, under the existing farmer practices. Consequently, the average benefit-cost ratio increased from 3.2 under farmer practices to 3.3 under CFLDs, indicating the economic feasibility of cultivating biofortified wheat without increasing production costs.

The economic performance of the demonstrated technology varied across locations depending on productivity and local market conditions. KVK Kapurthala recorded the highest gross return (₹1,55,169/ha) and net return (₹1,13,105/ha) under CFLDs, closely followed by KVK Ludhiana, which realized a gross return of ₹1,54,294/ha and a net return of ₹1,12,197/ha. The highest benefit-cost ratio (3.69) was also recorded at KVK Kapurthala, followed by Nawanshahr (3.68), Ludhiana (3.67) and Moga (3.65), demonstrating the higher profitability of the demonstrated technology in these districts.

The cost of cultivation under CFLDs was lower than the existing farmer practice in 11 of the 21 participating KVKs, reflecting efficient resource management under the recommended package of practices. Likewise, higher net returns under CFLDs were realized in the majority of the participating KVKs, confirming the economic advantage of adopting biofortified wheat cultivation.

The average market price realized for the biofortified wheat was ₹2,618/q, compared with ₹2,581/q for the existing farmer varieties. A comparatively higher price realization was recorded in Ludhiana (₹2,895/q), Muktsar (₹2,886/q), Kapurthala (₹2,694/q) and Barnala (₹2,644/q). Farmers in these districts reported that biofortified wheat was marketed directly to known consumers and local buyers after highlighting its nutritional advantage as zinc-enriched wheat, resulting in improved market acceptance and premium prices. The KVKs in these districts also organized farmer awareness programmes and extension activities to promote the nutritional and health benefits of biofortified wheat. These efforts enhanced awareness among both farmers and consumers, facilitating better demand and contributing to higher price realization.



Field day in Kapurthala, Punjab



Field day in Ludhiana, Punjab

Among the participating KVKs, the lowest price realization under CFLDs was recorded at KVK Fatehgarh Sahib, where sales were made directly through FPOs. Overall, the economic analysis demonstrated that biofortified wheat cultivation can provide competitive returns and improved profitability while promoting the production and adoption of nutritionally enriched wheat varieties under farmers' field conditions.

In addition, the biofortified wheat realized an average market price of ₹2,618/q, which was ₹37/q higher than the existing farmer varieties, reflecting the market acceptance and value of biofortified wheat. Overall, the demonstrations established that cultivation of biofortified wheat can enhance farm profitability while contributing to improved nutritional security.

HIMACHAL PRADESH

During the reporting period, four Krishi Vigyan Kendras (KVKs) in Himachal Pradesh conducted Cluster Front Line Demonstrations (CFLDs) on biofortified wheat. Against an allocated target of 70 ha, demonstrations were successfully conducted over 60 ha, covering 155 farmers. The objective was to evaluate the field performance of biofortified wheat varieties under farmers' conditions in comparison with the existing locally cultivated wheat varieties. The district-wise details of the demonstrations, including area covered, number of participating farmers, varieties demonstrated and grain yield, are presented in Table 2.3.

The demonstrated biofortified wheat varieties, namely PBW Zinc 2, PBW Zinc 1 and DBW 371, are characterized by higher grain zinc concentration, high yield potential (about 5.6-5.8 t/ha under recommended production conditions), desirable grain quality and resistance to major rust diseases.

Table 2.3: Performance of CFLDs on Biofortified Wheat in Punjab in Himachal Pradesh

S. No.	KVK	Variety		Target Area (ha)	Demo Area (ha)	Farmers (No.)	Yield (q/ha)	
		Local Check	Demonstration				Local Check	Demo
1	Bilaspur	HD 3086	PBW Zinc 2	20	10	41	24.9	29.0
2	Sirmour	HD 2967, PBW 343	DBW 371	20	20	50	28.6	44.0
3	Shimla	HPW 236	PBW Zinc 2	10	10	24	20.5	31.1
4	Una	HD 3086	PBW Zinc 1	20	20	40	37.7	49.0
Total/ Average					60	155	27.9	38.3

These were evaluated against the locally cultivated varieties HD 3086, HD 2967, PBW 343 and HPW 236, which are widely grown in the state due to their adaptability under mid-hill production systems. The demonstrations were conducted by adopting the recommended package of practices, including quality seed, balanced nutrient management, timely sowing, efficient weed management, need-based irrigation and integrated pest and disease management.



Demonstration field in Shimla, Himachal Pradesh

The biofortified wheat varieties performed consistently well under the agro-climatic conditions of Himachal Pradesh. Demonstrated grain yield ranged from 29.0 to 49.0 q/ha, whereas the yield of the existing farmer varieties ranged from 20.5 to 37.7 q/ha. The highest demonstrated yield (49.0 q/ha) was recorded at KVK Una, followed by KVK Sirmour (44.0 q/ha). On average, the demonstrated plots produced 38.3 q/ha, which was 10.4 q/ha (37.3%) higher than the average yield of the existing farmer varieties (27.9 q/ha). The highest yield advantage was recorded at KVK Sirmour (15.4 q/ha), followed by KVK Una (11.3 q/ha) and KVK Shimla (10.6 q/ha). The consistent yield advantage across all participating KVKs highlights the productivity, adaptability, and nutritional benefits of biofortified wheat under the mid-hill conditions of Himachal Pradesh, demonstrating its potential for wider adoption to enhance both farm productivity and nutritional security.

The economic analysis revealed that the adoption of biofortified wheat under CFLDs resulted in substantially higher economic returns than the existing farmer practices (Table 2.4). On average, the cost of cultivation under CFLDs was marginally higher (₹44,659/ha) than under farmer practice (₹42,112/ha), primarily due to the adoption of quality seed and recommended crop management practices. However, this additional investment was compensated by significantly higher returns.

Table 2.4: Economic Performance of CFLDs on Biofortified Wheat in Himachal Pradesh

S. No.	KVK	Local Check (₹/ha)				Demonstrations (₹/ha)				Price Realized (₹/q)	
		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR	Check	Demo
1	Bilaspur	44572	60448	15876	1.36	48760	70502	21742	1.45	2426	2429
2	Sirmour	45676	69530	23854	1.52	47677	111599	63922	2.34	2431	2536
3	Shimla	36000	53333	17333	1.48	40000	80925	40925	2.02	2602	2602
4	Una	42200	91335	49135	2.16	42200	118952	76752	2.82	2426	2428
Average		42112	68661	26549	1.6	44659	95495	50835	2.2	2471	2499



Diagnostic visit in Bilaspur, Himachal Pradesh



Field day in Una, Himachal Pradesh

The average gross return under CFLDs was ₹95,495/ha, compared with ₹68,661/ha under the existing farmer practice, increasing to ₹26,834/ha. Similarly, the average net return increased from ₹26,549/ha under farmer practice to ₹50,835/ha under CFLDs, registering an additional net income of ₹24,286/ha. The average benefit-cost ratio also improved from 1.6 under the existing practice to 2.2 under the demonstrated technology, indicating the superior economic viability of biofortified wheat cultivation.

Among the participating KVKs, KVK Una recorded the highest benefit-cost ratio (2.82) under CFLDs, followed by KVK Sirmour (2.34) and KVK Shimla (2.02). The highest gross return (₹1,18,952/ha) and net return (₹76,752/ha) were recorded at KVK Una. The favourable performance may be attributed to the agro-climatic conditions of the Una district, which closely resemble those of the adjoining Punjab plains, coupled with the adoption of intensive input management practices. In addition, the demonstrated biofortified wheat seed was promoted among potato-growing farmers, where its relatively shorter duration facilitated timely sowing after potato harvest, thereby enhancing its suitability and economic performance under the prevailing cropping system.

The average market price realised for biofortified wheat was ₹2,499/q, compared with ₹2,471/q for the existing farmer varieties, indicating a modest price advantage for biofortified wheat in the local market. Overall, the economic analysis demonstrated that biofortified wheat cultivation was more profitable than the existing farmer practice under the mid-hill conditions of Himachal Pradesh.

UTTRAKHAND

Under the Cluster Frontline Demonstrations (CFLDs) on Biofortified Varieties during *Rabi* 2025-26, four Krishi Vigyan Kendras (KVKs) in Uttarakhand were allocated demonstrations covering 125 hectares to evaluate the field performance, economic viability, and farmer acceptability of biofortified wheat varieties under diverse production environments.

During the reporting period, four Krishi Vigyan Kendras (KVKs) in Uttarakhand implemented Cluster Front Line Demonstrations (CFLDs) on biofortified wheat over an area of 54 ha, covering 106 farmers. The programme aimed to assess the field performance of biofortified wheat varieties in comparison with the prevailing farmer varieties under local production conditions. The district-wise details of the demonstrations, including area covered, participating farmers, varieties evaluated and grain yield, are presented in Table 2.5.

Table 2.5: Performance of CFLDs on Biofortified Wheat in Uttarakhand

S. No.	KVK	Variety		Target Area (ha)	Demo Area (ha)	Farmers (No.)	Yield (q/ha)	
		Local Check	Demonstration				Local Check	Demo
1	Champawat	DBW 343	DBW 303	10	10	25	36.4	39.7
2	Dehradun	PBW 343	DBW 327	10	10	26	39.3	49.7
3	Haridwar	HD 2967	DBW 303, DBW 371	14	14	35	46.3	54.8
4	U S Nagar	DBW 343	DBW 303	20	20	20	45.6	50.2
Total/ Average					54	106	41.9	48.6

The CFLDs featured the biofortified wheat varieties DBW 303, DBW 327 and DBW 371, which are characterized by high yield potential, improved nutritional quality and tolerance to major wheat diseases. These were evaluated against the widely cultivated varieties DBW 343, PBW 343 and HD 2967 using the recommended production technologies comprising quality seed, balanced nutrient management, timely sowing, effective weed control, need-based irrigation and integrated pest and disease management.



Sowing of wheat (DBW 327) in Dehradun, Uttarakhand



Germinated wheat (DBW 327) in Dehradun, Uttarakhand

The improved varieties recorded grain yields ranging from 39.7 to 54.8 q/ha, whereas the existing farmer varieties yielded 36.4 to 46.3 q/ha. The highest yield (54.8 q/ha) was obtained at KVK Haridwar, followed by U.S. Nagar (50.2 q/ha) and Dehradun (49.7 q/ha). Overall, the average grain yield under CFLDs was 48.6 q/ha, compared with 41.9 q/ha under the existing farmer practice, representing an increase of 6.7 q/ha (16.0%). The maximum yield advantage was recorded at KVK Dehradun (10.4 q/ha), followed by Haridwar (8.5 q/ha) and U.S. Nagar (4.6 q/ha). The yield improvement observed across all participating KVKs indicates that the demonstrated biofortified wheat varieties can be successfully integrated into the existing production systems of Uttarakhand while simultaneously contributing to enhanced productivity and nutritional security.

The economic analysis revealed that the cultivation of biofortified wheat under CFLDs was economically remunerative compared to the existing farmer practice (Table 2.6). On average, the cost of cultivation under CFLDs was ₹45,547/ha, which was marginally higher than the farmer practice (₹43,977/ha) due to the adoption of quality seed and the recommended crop

Table 2.6: Economic Performance of CFLDs on Biofortified Wheat in Uttarakhand

S. No.	KVK	Local Check (₹/ha)				Demonstrations (₹/ha)				Price Realized (₹/q)	
		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR	Check	Demo
1	Champawat	40000	88260	48260	2.21	40000	96273	56273	2.41	2425	2425
2	Dehradun	66104	95362	29258	1.44	69248	120700	51453	1.74	2427	2429
3	Haridwar	42605	112416	69811	2.64	45141	132935	87794	2.94	2428	2426
4	US Nagar	27200	117979	90779	4.34	27800	129767	101967	4.67	2587	2585
Average		43977	103504	59527	2.7	45547	119919	74372	2.9	2467	2466

management practices. However, the additional investment resulted in substantially higher economic returns.

The average gross return under CFLDs was ₹1,19,919/ha, compared with ₹1,03,504/ha under the existing farmer practice, registering an additional gross return of ₹16,415/ha. Similarly, the average net return increased from ₹59,527/ha under farmer practice to ₹74,372/ha under CFLDs, providing an additional net income of ₹14,845/ha. The average benefit-cost ratio also improved from 2.70 under the existing practice to 2.90 under the demonstrated technology, indicating the superior economic viability of biofortified wheat cultivation.

Among the participating KVKs, KVK U.S. Nagar recorded the highest benefit-cost ratio (4.67), followed by KVK Haridwar (2.94) and KVK Champawat (2.41) under CFLDs. KVK Haridwar achieved the highest gross return (₹1,32,935/ha), while KVK U.S. Nagar recorded the highest net return (₹1,01,967/ha), reflecting the greater profitability of the demonstrated technology. The improved economic performance was primarily attributed to the replacement of older farmer varieties with high-yielding biofortified wheat varieties, adoption of the recommended package of practices, and effective crop management. In addition, a part of the produce was marketed through government procurement centres, ensuring assured procurement and remunerative prices, which further contributed to better economic returns. The average market price realised for biofortified wheat (₹2,466/q) was almost at par with that of the existing farmer varieties (₹2,467/q), indicating that the higher economic returns from CFLDs were primarily driven by improved productivity and better crop management rather than price advantage.

JAMMU AND KASHMIR

Under the Cluster Frontline Demonstrations (CFLDs) on Biofortified Varieties during Rabi 2025-26, five Krishi Vigyan Kendras (KVKs) in Jammu & Kashmir were allocated demonstrations covering 175 hectares to evaluate and demonstrate the field performance, economic viability, and farmer acceptability of biofortified wheat varieties under local agro-ecological conditions.

During the reporting period, five Krishi Vigyan Kendras (KVKs) in Jammu & Kashmir conducted Cluster Front Line Demonstrations (CFLDs) on biofortified wheat over the entire allocated area of 70 ha, covering 288 farmers. The demonstrations were undertaken to assess the field performance of biofortified wheat varieties under farmers' conditions in comparison with the prevailing farmer-grown

wheat varieties. The district-wise details of the demonstrations, including area covered, number of participating farmers, varieties demonstrated and grain yield, are presented in Table 2.7.

Table 2.7: Performance of CFLDs on Biofortified Wheat in Jammu and Kashmir

S. No.	KVK	Variety		Target Area (ha)	Demo Area (ha)	Farmers (No.)	Yield (q/ha)	
		Local Check	Demonstration				Local Check	Demo
1	Jammu	HD 2967	DBW 187, PBW Zinc 2, DBW 303	10	10	72	38.1	41.5
2	Kathua	HD 2967	DBW 187	20	20	50	36.5	42.3
3	Reasi	PBW 175	JAUW 672	10	10	84	22.2	29.0
4	Samba	HD 2967	DBW 187	20	20	50	27.6	45.6
5	Bandipora-I	SW 1	Shalimar Wheat 3	10	10	32	28.5	30.6
Total/Average					70	288	30.6	37.8

The demonstrations comprised the biofortified wheat varieties DBW 187, PBW Zinc 2, DBW 303, JAUW 672 and Shalimar Wheat 3, which are characterized by high yield potential, improved grain quality, enhanced nutritional value and tolerance to major wheat diseases. These varieties were evaluated against the locally cultivated varieties HD 2967, PBW 175 and SW 1, which are widely grown across different agro-climatic regions of the Union Territory. The demonstrations were conducted by adopting the recommended package of practices, including the use of quality seed, balanced nutrient management, timely sowing, effective weed management, need-based irrigation and integrated pest and disease management.

The biofortified wheat varieties performed favourably across the participating KVKs, with demonstrated grain yield ranging from 29.0 to 45.6 q/ha, compared with 22.2 to 38.1 q/ha under the existing farmer varieties. The highest demonstrated grain yield (45.6 q/ha) was recorded at KVK Samba, followed by KVK Kathua (42.3 q/ha) and KVK Jammu (41.5 q/ha). On average, the demonstrated plots produced 37.8 q/ha, which was 7.2 q/ha (23.5%) higher than the average yield of the existing farmer varieties (30.6 q/ha). The maximum yield advantage (18.0 q/ha) was recorded at KVK Samba, followed by KVK Reasi (6.8 q/ha) and KVK Kathua (5.8 q/ha). The consistent improvement in productivity across all the participating KVKs demonstrates the adaptability and production potential of biofortified wheat under the diverse production



Demonstration field at maturity in Jammu, Jammu & Kashmir



Field Day at Bandipora, Jammu & Kashmir

environments of Jammu & Kashmir and reinforces its suitability for wider dissemination to enhance both farm productivity and nutritional security.

The economic analysis indicated that the cultivation of biofortified wheat under CFLDs was economically superior to the existing farmer practice (Table 2.8). On average, the cost of cultivation under CFLDs was ₹32,901/ha, which was marginally lower than the existing farmer practice (₹34,082/ha), reflecting efficient adoption of the recommended production technologies. This reduction in cultivation cost, coupled with higher productivity, resulted in substantially improved economic returns.

Table 2.8: Economic Performance of CFLDs on Biofortified Wheat in Jammu and Kashmir

S. No.	KVK	Local Check (₹/ha)				Demonstrations (₹/ha)				Price Realized (₹/q)	
		Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR	Check	Demo
1	Jammu	32200	99937	67737	3.10	33000	107434	74434	3.26	2623	2589
2	Kathua	32915	88537	55622	2.69	33822	102492	68670	3.03	2425	2425
3	Reasi	39296	57625	18329	1.47	26681	78143	51462	2.93	2596	2695
4	Samba	22000	67027	45027	3.05	22000	113180	91180	5.14	2425	2482
5	Bandipora-I	44000	69264	25264	1.57	49000	74417	84193	1.52	2430	2432
Average		34082	76478	42396	2.4	32901	95133	62232	3.2	2500	2525

The average gross return under CFLDs was ₹95,133/ha, compared with ₹76,478/ha under the existing farmer practice, resulting in an additional gross return of ₹18,655/ha. Similarly, the average net return increased from ₹42,396/ha under farmer practice to ₹62,232/ha under CFLDs, providing an additional net income of ₹19,837/ha. The favourable agro-climatic conditions, timely sowing, assured irrigation, adoption of recommended crop management practices and use of quality seed contributed to higher productivity and profitability. The average benefit-cost ratio improved markedly from 2.4 under the existing practice to 3.2 under the demonstrated technology, highlighting the greater profitability of biofortified wheat cultivation.

Among the participating KVKs, KVK Samba recorded the highest benefit-cost ratio (5.14) under CFLDs, followed by KVK Jammu (3.26) and KVK Kathua (3.03). KVK Samba also achieved the highest gross return (₹1,13,180/ha) and net return (₹91,180/ha), demonstrating the highest economic gain from the demonstrated technology. The average market price realised for biofortified wheat was ₹2,525/q, compared with ₹2,500/q for the existing farmer varieties, indicating a modest price advantage for biofortified wheat. The key factors contributing to the improved performance included the adoption of recommended agronomic practices, timely crop management interventions, implementation of Integrated Pest Management (IPM) practices, and the use of quality seed of biofortified wheat varieties.



Field day in Una, Himachal Pradesh



Diagnostic visit in Champawat, Uttarakhand



Field day in Samba, Jammu & Kashmir

MAJOR FINDINGS & LESSONS LEARNED

The Cluster Frontline Demonstrations (CFLDs) on biofortified wheat provided valuable field-level evidence on the productivity, economic performance, market acceptance, and adoption potential of biofortified varieties across diverse agro-climatic conditions of Zone-I. The findings highlight the extent to which these varieties can combine nutritional enhancement with comparable or improved crop productivity and farm profitability. The experience gained through implementation also provides important lessons regarding varietal suitability, recommended crop management, farmer participation, market awareness, and the need for sustained extension support for wider adoption and scaling of biofortified wheat.

PUNJAB

The CFLDs on biofortified wheat in Punjab demonstrated that **nutritional enhancement can be achieved without compromising productivity**. The average grain yield of biofortified wheat (50.77 q/ha) remained almost at par with the existing commercial varieties (51.04 q/ha), while providing the added benefit of enhanced zinc content. The demonstrations generated higher gross returns, net returns, and a better Benefit-Cost Ratio (3.3), mainly due to improved crop management and lower cultivation costs. Biofortified wheat also realized a **premium market price of ₹2,618/q compared to ₹2,581/q** for conventional wheat, particularly in districts such as Ludhiana, Muktsar, Kapurthala and Barnala, reflecting increasing consumer awareness and market acceptance of nutritionally enriched wheat.

HIMACHAL PRADESH

The demonstrations in Himachal Pradesh recorded a **37.3% increase in grain yield** over the existing farmer varieties, highlighting the superior productivity and adaptability of biofortified wheat under mid-hill conditions. Although the cost of cultivation increased marginally due to the adoption of quality seed and improved production technologies, the higher productivity resulted in significantly improved gross returns, net returns, and Benefit-Cost Ratio. Biofortified wheat realized an average market price of **₹2,499/q**, compared with **₹2,471/q** for existing varieties, indicating a modest price premium and growing market acceptance. The improved economic performance demonstrates the suitability of biofortified wheat for enhancing both farm profitability and nutritional security.

UTTARAKHAND

The CFLDs in Uttarakhand consistently outperformed the existing farmer practices, recording an average **16.0% increase in grain yield** across all participating KVKs. The higher productivity translated into significantly improved gross returns, net returns, and Benefit-Cost Ratio despite a marginal increase in cultivation cost. However, unlike the other states, **biofortified wheat realized almost the same market price (₹2,466/q) as the existing varieties (₹2,467/q)**, indicating that the additional economic

gains were derived primarily from increased productivity and improved crop management rather than any market price premium. These findings confirm the technical and economic superiority of biofortified wheat under the production environments of Uttarakhand.

JAMMU & KASHMIR

The demonstrations in Jammu & Kashmir established the adaptability of biofortified wheat across diverse agro-ecological conditions, recording a **23.5% increase in grain yield** over the existing farmer varieties. A distinct feature observed in the state was that the recommended production technology reduced the average cost of cultivation while simultaneously improving productivity, resulting in substantially higher gross returns, net returns, and Benefit-Cost Ratio. Biofortified wheat also realized a **higher average market price of ₹2,525/q compared to ₹2,500/q** for conventional wheat, providing an additional economic incentive for farmers. The combined effect of higher productivity, lower production costs, and better price realization significantly enhanced farm profitability.

LESSONS LEARNED

- ❖ **Biofortified wheat can enhance nutritional quality without compromising productivity.** The CFLDs demonstrated that biofortified wheat performed at par with or better than existing farmer varieties across the participating states. In Himachal Pradesh, for example, the average yield was **38.3 q/ha compared with 27.9 q/ha**, representing a **37.3% increase**; Uttarakhand recorded **48.6 q/ha against 41.9 q/ha (16.0% increase)**, while Jammu & Kashmir recorded **37.8 q/ha against 30.6 q/ha (23.5% increase)**. In Punjab, the yield of biofortified wheat (**50.77 q/ha**) was comparable with existing varieties (**51.04 q/ha**), demonstrating that enhanced nutritional quality can be achieved without a significant yield penalty.
- ❖ **Quality seed and the recommended production package are critical for realizing the potential of biofortified varieties.** The demonstrations adopted quality seed, timely sowing, balanced nutrient management, effective weed control, need-based irrigation, and integrated pest and disease management. The economic results indicate that the additional investment associated with improved inputs and management was generally compensated by higher productivity and returns. In Himachal Pradesh, the additional cultivation cost of about **₹2,547/ha** over farmer practice was accompanied by an additional **₹26,834/ha gross return** and **₹24,286/ha net return**.
- ❖ **Higher productivity was the principal driver of economic gains.** The results from Uttarakhand clearly demonstrate this lesson: the average market price of biofortified wheat was **₹2,466/q**, almost identical to **₹2,467/q** for existing varieties, yet the demonstrated technology increased yield by **16%** and raised net returns from **₹59,527/ha** to **₹74,372/ha**. Similarly, in Himachal Pradesh, the higher yield resulted in an increase in net returns from **₹26,549/ha** to **₹50,835/ha**, despite a higher cost of cultivation. Thus, wider adoption can remain economically attractive even in markets where a premium price is not yet established.
- ❖ **Biofortified wheat demonstrated clear economic viability across the states.** In Punjab, the CFLDs recorded an average gross return of **₹1,33,027/ha**, net return of **₹91,739/ha**, and B:C ratio

of **3.3**, compared with 3.2 under farmer practice. Himachal Pradesh recorded a B: C ratio of **2.2 against 1.6**, while Uttarakhand improved from **2.7 to 2.9**. Jammu & Kashmir also recorded a substantial improvement in profitability, with the average B: C ratio increasing from **2.4 to 3.2**. These results establish that biofortified wheat can provide a competitive economic proposition under diverse production environments.

- ❖ **Market acceptance is emerging and can provide an additional economic incentive.** Punjab recorded an average price of **₹2,618/q** for biofortified wheat against **₹2,581/q** for existing varieties, with particularly high realization in Ludhiana (**₹2,895/q**), Muktsar (**₹2,886/q**), Kapurthala (**₹2,694/q**) and Barnala (**₹2,644/q**). Himachal Pradesh also recorded a modest premium of **₹2,499/q against ₹2,471/q**, while Jammu & Kashmir recorded **₹2,525/q against ₹2,500/q**. These premiums indicate emerging consumer recognition of the nutritional value of zinc-enriched wheat.
- ❖ **Consumer awareness directly influences price realization.** The higher prices observed in several Punjab districts were associated with direct marketing to known consumers and local buyers, supported by KVK awareness programmes highlighting the nutritional benefits of zinc-enriched wheat. This indicates that nutritional characteristics need to be communicated effectively to consumers to create differentiated demand. Thus, extension activities should address not only farmers but also consumers, traders, FPOs and other market actors.
- ❖ **Performance is location-specific and varietal selection should consider local conditions.** Considerable variation was observed among KVKs. In Himachal Pradesh, yields ranged from **29.0 to 49.0 q/ha**, with KVK Una recording 49.0 q/ha and Sirmour showing the highest yield advantage of **15.4 q/ha**. In Uttarakhand, yields ranged from **39.7 to 54.8 q/ha**, with Haridwar recording the highest yield of 54.8 q/ha. Such variation highlights the importance of matching varieties with local agro-climatic conditions, cropping systems, soil and irrigation availability.
- ❖ **CFLDs provide strong field evidence for farmer adoption.** During the reporting period, CFLDs covered **658 ha** and **1,655 farmers** across Punjab, Himachal Pradesh, Uttarakhand and Jammu & Kashmir. Punjab accounted for the largest coverage (**474 ha and 1,106 farmers**), followed by Jammu & Kashmir (**70 ha; 288 farmers**), Himachal Pradesh (**60 ha; 155 farmers**) and Uttarakhand (**54 ha; 106 farmers**). Such demonstrations provide farmers with direct evidence of yield, profitability, crop performance and market potential under their own production conditions.
- ❖ **Nutritional benefits need to be linked with market development.** The demonstrations show that the economic advantage of biofortified wheat can arise from both productivity improvement and, where awareness exists, better price realization. However, the near-identical prices in Uttarakhand (**₹2,466/q vs ₹2,467/q**) indicate that nutritional superiority does not automatically translate into a market premium. Consumer awareness, product identification, assured procurement, direct marketing, FPO participation and appropriate market linkages are therefore necessary to convert the nutritional advantage into sustained economic benefits for farmers.

- ❖ **CFLDs provide an effective platform for scaling biofortified varieties.** The programme combines field demonstration, farmer participation, improved seed, recommended production practices, yield assessment, economic analysis and market evaluation within a single intervention. The evidence generated across different agro-climatic environments provides a strong basis for identifying suitable varieties and production practices and for planning wider dissemination. The results also demonstrate the important role of KVKs in linking **technology demonstration, farmer awareness, nutritional security and market development**.
- ❖ **Biofortified wheat should be promoted as a dual-benefit technology.** The overall experience shows that biofortification should not be viewed only as a nutritional intervention. The demonstrated varieties have shown potential for **higher or comparable yield, improved profitability and, in several locations, better market price realization**, while simultaneously enhancing the nutritional value of wheat. This combination of **productivity + profitability + nutritional security** provides a stronger basis for large-scale promotion and sustainable adoption of biofortified wheat.

CONCLUSION

The Cluster Frontline Demonstrations across all four states clearly demonstrated that **biofortified wheat varieties are technically feasible, economically viable, and capable of enhancing nutritional security without compromising productivity**. The demonstrations consistently showed that adoption of **quality seed, recommended package of practices, balanced nutrient management, timely sowing, and improved crop management** were the principal factors responsible for higher yields and improved profitability. While Punjab, Himachal Pradesh, and Jammu & Kashmir also recorded **modest price premiums** for biofortified wheat, indicating growing consumer awareness and market acceptance, the experience from Uttarakhand showed that **even without a price advantage**, biofortified wheat remained more profitable because of its superior productivity and efficient crop management. These findings suggested that the economic success of biofortified wheat depends primarily on yield enhancement and improved production practices, while increased consumer awareness can further augment farmers' income through better market prices. Overall, the CFLDs have demonstrated that large-scale promotion of biofortified wheat through KVKs can simultaneously contribute to **higher farm income, improved nutritional security through enhanced zinc intake, and sustainable wheat production**, making it a promising intervention for scaling up under the National Food Security & Nutrition Mission.

ANNEXURES

Annexure-I

F.No. 18-2/2025-NFSNM (171916)

भारत सरकार / Government of India

कृषि एवं किसान कल्याण मंत्रालय / Ministry of Agriculture & Farmers Welfare
कृषि एवं किसान कल्याण विभाग / Department of Agriculture & Farmers Welfare
फसलें एवं पीएचएमएफ प्रभाग / Division of Crops & PHMF

Krishi Bhawan, New Delhi

Dated: 6th November, 2025

To,

The DDG (Agri. Extn.)
ICAR, Division of Agriculture Extension
Krishi Anusandhan Bhawan,
Pusa, New Delhi-110012

Subject: Administrative approval for the Project on "Cluster Frontline Demonstrations (CFLDs) of Biofortified varieties of Rice, Wheat, Barley, Maize, Sorghum, Pearl Millet and Finger Millet during Rabi / Summer 2025-26" funding under NFSNM-reg.

Sir,

I am directed to refer to Extension Division of ICAR's emails dated 03.10.2025 and 29.10.2025 on the subject cited above and to convey the approval of the competent authority for the aforesaid project for funding under National Food Security & Nutrition Mission (NFSNM) for implementation during the financial year 2025-26 with a total outlay of **Rs.8,61,42,300** (Eight crore sixty one lakh forty two thousand three hundred only). Component-wise budget of the project are as under:

(Rs. In Lakhs)

S. No.	Components / Interventions	Unit Cost/ Rate	Target proposed by ICAR		Target approved by GOI	
			Phy.	Fin.	Phy.	Fin.
1.	Cluster Demonstrations ^A	Rice @ Rs. 9,000/Ha Wheat @ Rs. 9,000/Ha Coarse Cereals (Maize & Barley) @ Rs. 7,500/Ha for Barley & Maize varieties @Rs.11,500/Ha Maize Hybrid, Nutri-Cereals (Jowar, Bajra, Ragi) @ Rs. 7,500/Ha	11781Ha.	1088.365	8540 Ha.	797.175
2.	TA for monitoring & field visits of FLDs*	Rs.1,00,000/ATARI		9.00		0.00
3.	Printing of Annual Reports*	Rs.1,00,000/ATARI		9.00		
4.	Training programme of scientific in-charge of FLD in KVKs	@ Rs.30000 per four session/KVK		73.80		0.00
5.	Misc. Exp.	Rs.30,000/ATARI		2.70		

6/11/25

6.	Manpower - Contractual staff					
	a) SRF [#]	As per approved norms of ICAR.	10 Nos.	63.00	1 Nos.	6.048
	b) DEO [#]		10 Nos.	36.00	1 Nos.	3.600
	c) Technology Agent at KVK level ^{\$}		107 Nos.	64.20	91 Nos.	54.60
	GRAND TOTAL			1346.065		861.423

[^] The project for organising CFLD on Pulses during 2025-26 has already been approved, hence CFLD on Pulses is not considered in the project. Delhi and Andaman & Nicobar Islands are not covered under NFSNM, therefore, targets proposed for these are not considered.

^{*} The cost of demonstration includes organization of field day (Rs.250/Ha), distribution of publicity materials (Rs.250/Ha) and monitoring visit of scientists/officials (Rs.300/Ha). Therefore, separate budget for these activities is not considered.

[#] SRF and DEO for ATARI-I, Ludhiana is considered for engaging in rabi/summer season, as the manpower of remaining ATARIs were covered either in CFLD Pulses or Model Pulse Village programme.

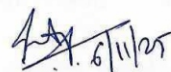
^{\$} Technology Agent (TA) (@ Rs. 10,000/month) may be engaged for rabi/summer season in those KVKs which are not covered under CFLD Pulses and Model Pulse Village project as well as KVKs covering an area greater than 50 Ha.

2. The ATARI and KVK wise budget outlay for implementation of the project for 2025-26 is at **Annexure-I**. The Biofortified varieties used in CFLDs during 2025-26 should be notified after the year 2015 (2016 and onwards).

3. The project has been approved subject to the terms and conditions mentioned at **Annexure-II**.

Enclosed: As mentioned above

Yours faithfully,



(Somanath Agasimani)
Assistant Commissioner (Crops)

Copy to:

1. Deputy Director General (CS), Krishi Bhawan, New Delhi
2. Assistant Director General (Agriculture Extension), ICAR, New Delhi.
3. Director, ATARI, Zone-I, II, III, IV, V, VIII, IX, X & XI.
4. Director, Crops Development Directorate, DWD-Gurugram, DJD-Kolkata, DSD-Lucknow, DOD-Hyderabad, DMD-Jaipur, DPD-Bhopal, DCD-Nagpur and DRD Patna.
5. Director, ICAR-IIWBR, Karnal, ICAR-IIMR, Hyderabad, ICAR-IIMR, Ludhiana, ICAR-IIRR, Hyderabad.

ANNEXURE-I

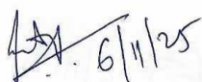
ATARI and KVK wise budget outlay for implementation of the project during 2025-26																				
ATARI	Implementing ATARI / KVK	State	Demonstrations								SRF		DEO		Technology Agent at KVK @10000/- per month	Total (Rs. in lakh)				
			Wheat	Barley	Maize		Rice		Sorghum		Pearlmillet		Fingermillet	Phy. (ha)			Fin. (Rs. in lakh)	Phy. (No.)	Fin. (Rs. in lakh)	
					Rabi	Summer	Summer	Rabi	Summer	Rabi	Summer	Summer								Rabi
ATARI-I, Ludhiana	ATARI-I, Ludhiana	Punjab												0.000	1	6.048	1	3.600	9.648	
			50										50	4.500				1	0.600	5.100
			25										25	2.250						2.250
			25										25	2.250						2.250
			50										50	4.500				1	0.600	5.100
			25										25	2.250						2.250
			25										25	2.250						2.250
			50										50	4.500				1	0.600	5.100
			25										25	2.250						2.250
			25										25	2.250						2.250
			50										50	4.500				1	0.600	5.100
			25										25	2.250						2.250
			25										25	2.250						2.250
			25										25	2.250						2.250
25										25	2.250						2.250			

12/6/25

Jammu & Kashmir	Pathankot	50														50	4,500						1	0.600	5,100
	Patala	50														50	4,500						1	0.600	5,100
	Ropar	50														50	4,500						1	0.600	5,100
	Sangrur	50														50	4,500						1	0.600	5,100
	Barnala	50														50	4,500						1	0.600	5,100
	Mohali	50														50	4,500						1	0.600	5,100
	Tarnataran	25														25	2,250								2,250
	Fazilka	25														25	2,250								2,250
	Bilaspur	20														20	1,800								1,800
	Sirmour	20														20	1,800								1,800
	Una	20														20	1,800								1,800
	Shimla	20														20	1,800								1,800
	Champawat	10														10	0,900								0,900
	Dehradun	10														10	0,900								0,900
	Haridwar	10														10	0,900								0,900
US Nagar	20														20	1,800								1,800	
Uttarakhand	Jammu	10														10	0,900								0,900
	Kathua	20														20	1,800								1,800
	Reasi	10														10	0,900								0,900
	Samba	20														20	1,800								1,800
	Bandipora-I	10														10	0,900								0,900
Sub Total	1000	0	0	0	0	0	0	0	0	0	0	0	0	0	1000	90,000	1	6,048	1	3,600		10	6,000	105,648	

Terms and conditions for implementation of the project

1. The Extension Division of ICAR, in collaboration with ATARIs and relevant ICAR-Institutes, will oversee the overall implementation.
2. CFLDs will be organized by KVKs under the supervision of ATARIs and concerned ICAR Institutes.
 - The CFLDs should be organized as per NFSNM Guidelines 2025-26.
 - The CFLDs will be organized for Biofortified varieties of Wheat, Barley, Maize, Rice, Sorghum, Pearl millet and Finger millet.
 - Each crop's CFLDs should follow a cluster approach, covering a minimum of 10 hectares per cluster.
 - The area under CFLDs for individual farmers shall be between 0.40 and 1.00 hectares.
 - ICAR to maintain and submit quarterly the log of no. of farmers visited the CFLD during the season.
3. **The CFLDs will be mandatorily mapped and monitored through the Krishi Mapper Mobile application.**
4. Primary data such as district, location of plot, beneficiary farmers, crop variety to be updated on Krishi Mapper app prior to sowing season.
5. Efforts should be made to evenly distribute the CFLD among the selected farmers of a cluster uniformly.
6. Each CFLD may highlight a single set of improved package of practices in the identified crop, as planned by the Extension Division of ICAR, in collaboration with ATARIs and relevant ICAR-Institutes. These clusters should be designed to enable farmers from at least five nearby villages to visit and learn from the demonstration.
7. For subsequent clusters showcasing the same package of practices, a similar strategy should be employed to ensure uniform distribution across the district, thereby enhancing outreach and learning opportunities.
8. It should be ensured that same farmers shall not be repeated in a CFLD for at least two years.
9. Under CFLDs, package kits (including Seed, IPM, and INM material) should be given to farmers at the time of sowing.
10. The use of chemical fertilizers as inputs is not permitted. However, nano-fertilizers approved under the Fertilizer Control Order (FCO) may be utilized as critical inputs in the cafeteria, following the SAUs/CAUs/ICAR's package of practices, including the recommended dosage, stage, and method of application for the specific crop and state.

 6/11/25

11. The cost of demonstrations include organization of field day, distribution of publicity materials and monitoring visit of scientists/officials as given below:

For Distribution of publicity materials (during field day or trainings), display board, etc.	Rs. 250/Ha
For organizing Field Day	Rs. 250/Ha
For visits of Scientists/Officials for Monitoring	Rs. 300/Ha
	Rs. 800/Ha

12. The Soil Health Card is mandatory for all demonstration plots. Details of soil health card (SHC) must be updated in the Soil Health portal before the start of demonstration.
13. The Drone Didis shall participate in IPM/INM/Nano-fertilizer applications, with remuneration provided at prevailing market rates from the total approved assistance allocated for the demonstration.
14. For KVKs under NGOs, funds will be routed through the concerned ATARI for implementing CFLDs. Accordingly, the funds proposed by ICAR for demonstrations, Technology Agent etc., for these KVKs is assigned to concerned ATARIs. These ATARIs will transfer these funds to concerned KVKs under NGOs and shall not utilize any portion of these funds at ATARI level.
15. The Extension Division of ICAR to ensure to forward crop-wise and institute-wise details of beneficiary farmers captured through Krishi Mapper and report the same for subsequent release of funds.
17. The Extension Division of ICAR and the relevant ICAR-Institute shall submit a detailed report after every season, outlining the impact evaluation and outcomes of CFLDs.
18. ICAR to ensure submission of physical & financial progress report, Utilization certificate (UC) & other relevant documents.
19. KVK shall invite well in advance the Crop Development Directorates (CDD), representative of State Govt. and concerned ICAR institute for all important events including field day, sharing of details of cluster, crop cutting experiments, etc.
20. Concerned Crop Development Directorates (DWD for wheat, DRD for rice, DMD for Millets, maize & barley) would monitor the activities of the CFLD programme in coordination with other CDDs in their assigned states.
21. Hiring/recruitment/walk in interview of supporting staff (SRF/DEO/Technology Agents) involved in implementation of the project to be made fresh each year and as per the norms of ICAR.
22. The Biofortified varieties used in CFLDs during 2025-26 should be notified after the year 2015 (2016 and onwards).

 6/11/25

GFR 12-A

[(See Rule 238 (1))]

**FORM OF UTILIZATION CERTIFICATE
FOR AUTONOMOUS BODIES OF THE GRANTEE ORGANISATION**

AUDIT UTILIZATION CERTIFICATE FOR THE YEAR 2025-26 in respect of recurring/non-recurring
GRANTS-IN-AID/SALARIES/CREATION OF CAPITAL ASSETS

- Name of the scheme: **CFLDs on Biofortified Varieties in respect of ICAR-ATARI, Zone-I, Ludhiana**
- Whether recurring or non-recurring grants : **Recurring**
- Grants position at the beginning of the Financial year :
 - Cash in Bank **Rs. 0**
 - Unadjusted advances **-**
 - Total **Rs. 0**
- Details of grants received , expenditure incurred and closing balances:(Actuals)

Unspent Balances of Grants received years [figure as at Sl. No. 3 (iii)]	Interest Earned thereon	Interest deposited back to the Government	Grant received during the year			Total Available funds (1+2-3+4)	Expenditure incurred	Closing Balances (5-6)
1	2	3	4			5	6	7
-	-	-	Sanction No.(i)	Date (ii)	Amount (iii)	-	-	-
0	0	0	F. NO. 18-2/2025-NFSM	18.11.2025	241200	241200	232418	8782 – 8782* (lapsed in CSNA) = 0

*Rs. 8782/- lapsed in CSNA as on 31.03.2026. So the closing balance as on 31.03.2026 is Rs.0/-.

Component wise utilization of grants:

Grant-in-General	Grant-in-aid-salary	Grant-in-aid-creation of capital assets	Total
--	232418	-	232418

Details of grants position at the end of the year

- Cash in Bank **Rs. 0/-**
- Unadjusted Advances **-**
- Total **Rs. 0/-**

23/06/2026
ASHISH SANTOSH MURARJ
 Scientist (AE)
 Indian Council of Agricultural Research
 Agricultural Technology Application
 Research Institute, Zone-1
 PAU Campus, Ludhiana-141004

28/6/26
प्रमोद शर्मा / PERMOD SHARMA
 वित्त एवं लेखा अधिकारी
 Finance & Accounts Officer
 भारतीय कृषि अनुसंधान परिषद
 Indian Council of Agricultural Research
 कृषि प्रौद्योगिकी अनुसंधान संस्थान
 Agricultural Technology Application Research Institute
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 Zone-1, PAU Campus, Ludhiana-141004

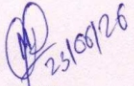
Bheoran
 निदेशक/Director
 भा.कृ.अनु.प.-कृषि प्रौद्योगिकी अनुसंधान संस्थान
 ICAR-Agricultural Technology Application Research Institute
 क्षेत्र-1, पं.क.वि.परिसर, लुधियाना-141004, पंजाब
 Zone-1, PAU Campus, Ludhiana-141004, Punjab

Certified that I have satisfied myself that the conditions on which grants were sanctioned have been duly fulfilled/are being fulfilled and that I have exercised following checks to see that the money has been actually utilized for the purpose for which it was sanctioned:

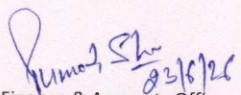
- i. The main accounts and other subsidiary accounts and registers (including assets registers) are maintained as prescribed in the relevant Act/Rules/Standing instructions (mention the Act/Rules) and have been duly audited by designated auditors. The figures depicted above tally with the audited figures mentioned in financial statements/accounts.
- ii. There exist internal controls for safeguarding public funds/assets, watching outcomes and achievements of physical targets against the financial inputs, ensuring quality in asset creation etc. & the periodic evaluation of internal controls is exercised to ensure their effectiveness.
- iii. To the best of our knowledge and belief, no transactions have been entered that are in violations of relevant Act/Rules/Standing instructions and scheme guidelines.
- iv. The responsibilities among the key functionaries for execution of the scheme have been assigned in clear terms and are not general in nature.
- v. The benefits were extended to the intended beneficiaries and only such areas/districts were covered where the scheme was intended to operate.
- vi. The expenditure on various components of the scheme was in the proportions authorized as per the scheme guidelines and terms and conditions of the grants-in-aid.
- vii. It has been ensured that the physical and financial performance under **Cluster Frontline Demonstrations on Biofortified Varieties (CFLDs on Biofortified Varieties) for the year 2025-26** has been according to the requirements, as prescribed in the guidelines issued by Govt. of India and the performance/targets achieved statement for the year to which the utilization of the fund resulted in outcomes given at Annexure-I duly enclosed.
- viii. The utilization of the fund resulted in outcomes given at Annexure-II duly enclosed (to be formulated by the Ministry/Department concerned as per their requirements/specifications.)
- ix. Details of various schemes executed by the agency through grants-in-aid received from the same Ministry or from other Ministries are enclosed at Annexure-II (to be formulated by the Ministry/Department concerned as per their requirements/specifications).

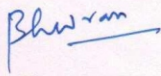
Kind of checks:

Vouchers


25/09/26
Nodal Officer
CFLDs on Biofortified
Varieties

ASHISH SANTOSH MURA
Scientist (AE)
Indian Council of Agricultural Research
Agricultural Technology Application
Research Institute, Zone-1
PAU Campus, Ludhiana-141004


8/3/26
Finance & Accounts Officer
(FAO)
प्रमोद शर्मा / PERMOD SHARMA
वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
भारतीय कृषि अनुसंधान परिषद
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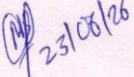

Director

निदेशक/Director
भा.कृ.अनु.प.-कृषि प्रौद्योगिकी अनुप्रयोग अनुसंधान संस्थान
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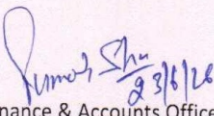
Statement of Expenditure

Head	Opening Balance as on 1.04.2025	Budget Estimate 2025-26	Funds Released during 2025-26	Expenditure during 2025-26	Amount in Rupees		
					Closing Balance as on 31.03.2026	Lapsed	Net Balance
SRF salary	0	604800	141200	133916	7284	7284	0
DEO salary	0	360000	100000	98502	1498	1498	0
Total	0	964800	241200	232418	8782	8782	0

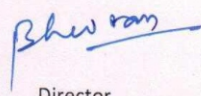
*Rs. 8782/- lapsed in CSNA as on 31.03.2026. So, the closing balance as on 31.03.2026 is Rs.0/.


23/08/26
Nodal Officer
CFLDs on Biofortified
Varieties

ASHISH SANTOSH MURA
Scientist (AE)
Indian Council of Agricultural Research
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23/8/26
Finance & Accounts Officer
(FAO)

प्रमोद शर्मा / PERMOD SHARMA
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Finance & Accounts Officer
भारतीय कृषि अनुसंधान परिषद
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Director

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DETAILS OF DEMONSTRATED BIOFORTIFIED VARIETIES

S. Variety No.	Developing Institute	Year of release	Characteristics
1. DBW 187	ICAR-IIWBR, Karnal	NWPZ- Irrigated, Early Sown- High Fertility (2021), Irrigated Timely Sown (2020), NEPZ (2019), CZ (2021)	It (Karan Vandana) is high-yielding and high in iron (43.1 ppm). The variety shows good heat tolerance, performs relatively well under late sowing, and is resistant to major yellow and brown rust diseases as well as wheat blast. It has good grain quality, with 12.0% protein content and good chapati, bread, and biscuit-making quality.
2. JAUW-672	SKUAST-Jammu	2022	It is best suited for early, timely sowing in production environments with restricted irrigation. High resistance to yellow rust, safeguarding crop health against prominent fungal pressures in variable climates.
3. Shalimar Wheat-3	SKUAST-Kashmir	2023	Enables timely rice transplantation; strengthens food security and farmer livelihoods; resistant to yellow rust.
4. PBW Zinc 2	PAU, Ludhiana	2023	It has a higher grain zinc concentration of 48.5 mg/kg (ppm). This is good for human health. Its average plant height is 100 cm and is resistant to yellow and brown rust. Its ears are medium dense with red glumes. It matures in about 154 days.
5. PBW Zinc 1	PAU, Ludhiana	2023	It possesses higher grain zinc concentration (40 ppm), which is good for human health. Its average plant height is 103 cm and is resistant to brown rust and moderately resistant to yellow rust. It matures in about 151 days.
6. DBW 371	ICAR-IIWBR, Karnal	2023	DBW 371 (Karan Vrinda) is a climate-resilient, biofortified wheat variety recommended for early sowing under irrigated conditions in the North-Western Plains Zone. It has an average yield of 75.9 q/ha and a yield potential of 87.1 q/ha. The variety takes about 102 days to heading and 150 days to maturity, has an average plant height of 100 cm, and a 1000-grain weight of 46 g. It has good grain quality, with a chapati quality score of 7.7, hectolitre weight of 81.0 kg, protein content of 12.2%, iron content of 44.9 ppm, and zinc content of 39.9 ppm.
7. DBW 327	ICAR-IIWBR, Karnal	2021	DBW 327 is a biofortified wheat variety recommended for early-sown, irrigated conditions of the North-Western Plains Zone. It recorded an average yield of 79.4 q/ha, which was 35.3% higher than HD 2967 and 13.6% higher than HD 3086, with a maximum production potential of 87.7 q/ha. The variety has good yield stability across the zone and tolerance to high temperature and drought. It is resistant to the major types of yellow and brown rust and to Karnal

S. Variety No.	Developing Institute	Year of release	Characteristics
			bunt. DBW 327 is nutritionally superior, containing 39.4 ppm iron and 40.6 ppm zinc, with good chapati, grain and bread-making quality. Its average days to heading, maturity, plant height and 1000-grain weight were 98 days, 155 days, 98 cm and 48 g, respectively.
8. DBW 303	ICAR-IIWBR, Karnal	NWPZ (2021), CZ (2023)	DBW 303 (Karan Vaishnavi) is an early-sown, irrigated wheat variety developed by ICAR-Indian Institute of Wheat & Barley Research, Karnal, and recommended for the North-Western Plains Zone. It recorded an average grain yield of 81.2 q/ha, which was 30.3% higher than HD 2967 and 11.7% higher than HD 3086, with a maximum recorded production potential of 97.4 q/ha. The variety has good resistance to yellow, brown and black rust, and high resistance to Karnal bunt and wheat blast. Grain quality is also good, with 12.1% protein, chapati score of 7.9, wet and dry gluten of 34.9% and 11.3%, biscuit spread factor of 6.7 cm, and bread quality score of 6.4/10. The average days to heading and maturity are 101 and 156 days, respectively, with an average plant height of 101 cm and 1000-grain weight of 42 g.

(North Western Plains Zone - NWPZ, North Eastern Plains Zone - NEPZ, Central Zone - CZ)

Sources

- 1) Punjab Agricultural University (PAU), Ludhiana. 2025. Package of Practices for Crops of Punjab: Rabi 2025-26. Vol. 42, No. 2, August 2025. ISSN 2278-3709.
- 2) DBW 187 (Karan Vandana): A New Wheat Variety for the North-Western Plains Zone. Extension Folder No. 82/2021. ICAR-Indian Institute of Wheat & Barley Research, Karnal, India.
- 3) DBW 187 (Karan Vandana): An Improved Wheat Variety for the North-Eastern Plains Zone. Extension Folder No. 75/2018. ICAR-Indian Institute of Wheat & Barley Research, Karnal, India.
- 4) DBW 303 (Karan Vaishnavi): A new wheat variety for the North-Western Plains Zone under irrigated conditions for early sowing. Extension Folder No. 83/2021. ICAR-Indian Institute of Wheat & Barley Research, Karnal, India.
- 5) DBW 327 (Karan Shivani): A Biofortified Wheat Variety for Irrigated Conditions of the North-Western Plains Zone. Extension Folder No. 85/2022, ICAR-Indian Institute of Wheat & Barley Research, Karnal, India.
- 6) Climate Resilient New Biofortified Wheat Varieties for North Western Plains Zone. ICAR-Indian Institute of Wheat & Barley Research, Karnal, India. Extension Folder No. 94/2023.

LIST OF CONTRIBUTORS

S.No.	KVK	Contributors
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1.	Amritsar	Bikramjit Singh, Raminder Kaur Hundal
2.	Bathinda	Gurdeep Singh, Gurmeet Singh Dhillon
3.	Faridkot	Rakesh Kumar, Pawitar Singh
4.	Ferozepur	Gurmail Singh Sandhu, Simranjit Kaur
5.	Fatehgarh Sahib	Hardeep Singh Sabhikhi, Arvind Preet Kaur
6.	Gurdaspur	Sarabjit Singh Aulakh, Anil Khokhar
7.	Hoshiarpur	Maninder Singh Bons, Gurpratap Singh
8.	Jalandhar	Sanjeev Kumar Katariya, Prabhjit Kaur
9.	Kapurthala	Harinder Singh, Mandeep Singh
10.	Ludhiana	Vipan Kumar Rampal, Amanpreet Singh
11.	Mansa	Ajit Pal Singh Dhaliwal, Ranvir Singh
12.	Moga	Kamaldeep Singh Matharu, Manpreet Jaidka
13.	Muktsar	Karamjit Sharma, Sukhjinder Singh
14.	Nawanshahr	Pardeep Kumar, Baljit Singh
15.	Pathankot	Ravinder Singh Chinna, Vinay Singh
16.	Patiala	Hardeep Singh Sabhikhi, Gurpreet Singh Sidhu
17.	Ropar	Satbir Singh, Jagmanjot Singh
18.	Sangrur	Mandeep Singh, Rukinder Preet Singh Dhaliwal
19.	Barnala	Prahalad Singh Tanwar, Suryendra Singh
20.	Mohali	Balbir Singh Khadda, Harmeet Kaur
21.	Fazilka	Arvind Kumar Ahlawat, Prakash Chand Gurjar
HIMACHAL PRADESH		
22.	Bilaspur	Seema Shah, Gourav
23.	Sirmour	Vishal Dogra, Shiwali Dhiman
24.	Una	Sanjay Kumar Sharma
25.	Shimla	Usha Sharma, Shikha Bhagta
UTTARAKHAND		
26.	Champawat	R. K. Sharma, Avikal Kumar
27.	Dehradun	A.K. Sharma, Sanjay Kumar
28.	Haridwar	Purushottam Kumar, Vinod Kumar
29.	US Nagar	S K Sharma, Ajay Prabhakar
JAMMU & KASHMIR		
30.	Jammu	Puneet Choudhary, Muneeshwar Sharma
31.	Kathua	Vishal Mahajan, Vishal Sharma
32.	Reasi	Banarsi Lal, Sanjay Kaushal
33.	Samba	Sanjay Khajuria, Saurav Gupta
34.	Bandipora-I	Tariq Sultan, Tahir Saleem



हर कदम, हर डगर
किसानों का हमसफ़र
भारतीय कृषि अनुसंधान परिषद

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PROJECT ON
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VARIETY- PBW 1 ZN



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