



Research Article

YIELD AND GAP ANALYSIS OF WHEAT PRODUCTIVITY THROUGH FRONTLINE DEMONSTRATIONS IN LALITPUR DISTRICT OF BUNDELKHAND REGION OF U.P.

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Abstract- Wheat (*Triticum aestivum*) is one of the major Rabi cereal in Bundelkhand region of U.P. Major constraint for lower productivity in the district is low adoption of improved technologies. Front line demonstrations are the better means for increasing productivity of wheat crop in the district over the existing one. KVK, Lalitpur conducted 93 demonstrations in 34.4 hectare area on wheat varieties PBW 375, PBW 502, HUW 234 and PBW 550 on farmers' fields to demonstrate the production potential and advantages of improved techniques namely balanced seed rate, line sowing, integrated nutrient management and timely weed management for five consecutive Rabi seasons i.e., 2008-09, 2011-12, 2012-13, 2013-14 and 2014-15 in 15 villages spreading over 4 blocks. On an average over years about 32.7 percent yield increase was observed in demonstrations over farmer's varieties. The mean yield of 35.1 q/ha was recorded under demonstrations over the farmers' practices of 26.4 q/ha. The extension gap, technology gap and technology index were observed to be 8.68 q per ha, 13.5 q per ha and 27.8%, respectively. The improved technologies resulted higher mean net income of Rs.29894/ha with a benefit cost ratio of 2.91 as compared to local practice (20146/ha, 2.47).

Keywords- Demonstration, economics, gap analysis, grain yields, wheat

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Introduction

Wheat is the second most important staple food crop of the country. In India wheat is grown over 30.96 lakh ha area with production and productivity of 88.93 lakh ton and 28.72 q/ha, respectively [1]. Improvement in productivity of wheat crop due to development of dwarf and management responsive varieties had played a key role in making the country self-sufficient in food production. However, in the past decade there has been marginal increase in the productivity of wheat [2,3]. The average area, production and productivity of wheat in U.P. is 9.8 lakh ha, 25.22 lakh ton and 25.61 q/ha respectively. Maximum efforts have been made at different levels to sustain food security through wheat production but till date the results are not satisfactory. In Lalitpur district of Bundelkhand region of U.P. wheat is the major Rabi crop grown in over 1.58 lakh ha area and 23.20 q/ha productivity [Table-3] [4]. The productivity level of Wheat crop in the Lalitpur district is low because the farmers were not aware regarding improved production technologies. Therefore, KVK, Lalitpur demonstrated latest technologies at farmer's field on account of which farmers can adopt the newer technologies [5]. A wide gap exists in available techniques of wheat production and its real application on the farmer's field which resulted poor yield at their end. Thus, there is a tremendous opportunity for increasing the productivity of wheat crop by adopting the improved technologies. There is an urgent need to narrow down the gaps between the technological adoption at rural door steps by using rapid and easily acceptable dissemination of technologies. Wheat front line demonstrations with improved production technologies were conducted at farmer's field in different years from 2008-09 to 2014-15 to demonstrate the improved production technologies at farmer's field by KVK, Lalitpur with following specific objectives. To demonstrate the performance of recommended high yielding wheat variety of wheat with

complete package of practices and to analyse the economics of FLDs on wheat.

Materials and Methods

Front line demonstrations on wheat were conducted at farmer's field in district Lalitpur of Bundelkhand region of Uttar Pradesh to assess its performance during the five consecutive Rabi seasons i.e., 2008-09, 2011-12, 2012-13, 2013-14 and 2014-15. Soils of the demonstration sites were Light to Heavy Black soils, low in organic carbon (0.2-0.3%) low to medium in phosphorus (20-45 kg/ha.) and medium to high in potash (320-350 kg/ha.) The demonstrations were laid out on irrigated fields with Black gram -Wheat, Maize -Wheat and Green Gram-Wheat crop rotations which are most prevalent in the district. Each demonstration was of one-acre area and recommended package was provided to the farmers along with on and off campus trainings. The sowing was done during mid-November to last week of November and harvesting of crop was done during first fortnight of April. The demonstrations on farmer's fields were regularly monitored from sowing till harvesting by scientists of Krishi Vigyan Kendra, Lalitpur. In demonstration plots, critical input in the form of quality seed of high yielding variety was provided by KVK. The grain yield of demonstration crop was recorded & analyzed. The technology gap, extension gap, technology index during the study was calculated as suggested by Samui, et al., (2000) [6].

Technology gap = Potential Yield - Demonstration yield

Extension gap = Demonstration Yield - Farmers yield

$$\text{Technology index (\%)} = \frac{\text{Technology gap}}{\text{Potential Yield}} \times 100$$

Results and Discussion

During the period of study, a total no. of 93 FLDs were conducted at farmer's field as per the target assigned by ICAR, New Delhi. Out of 93 demonstrations, 02 (2.2 per cent) were in the yield range of less than 3000 kg/ha, 55 (59.1 per cent) in range of 3000-3500 kg/ha and remaining 36 (38.7 per cent) were found in the high yield category i.e., 3500 to 4000 kg/ha which might be attributed to variations in biotic and abiotic stresses observed across different time horizon [Table-1].

Grain yield

The increase in grain yield under demonstration over the farmer's local practices was in the range of 26.5 to 45 per cent. On the average basis 32.7 per cent yield advantage was recorded under FLD demonstrations as compared to farmers practices (FP) of wheat cultivation [Table-2].

Gap analysis

An extension gap ranging from 6.7 to 11.8 q per hectare was found between FLD demonstration and farmers practices during the different time line and on average basis the extension gap was observed to be 8.68 q per hectare [Table-2]. The extension gap was lowest (6.7 q/ha) in year 2012-13 and was highest (11.8 q/ha) in year 2013-14. This gap may be due to the adoption of improved cultural practices in demonstrations which resulted into higher grain yield than the farmer's practices. Wide technology gap was observed during these years and this was lowest (11 q/ha) during 2012-13 and was highest (17 q/ha) during 2008-09. On average basis the technology gap of all the 93 demonstrations was found to be 13.5 q per hectare. The technology index was lowest 23.4 percent during 2013-14 and highest 34 percent during 2008-09. The average technology index over years was 27.8 percent. More extension gap reveals that there is need to motivate the farmers through various means for adoption of improved production technologies to lowering down this wide extension gap. Use of latest technologies in terms of new released varieties will lead to minimize the extension gap. The technology gap during different years could be minimized by adopting new high yielding varieties and practices by the farmers and replacement of old practices. Similarly, the technology index for all the demonstrations during different years were in

accordance with technology gap. Higher technology index reflected the inadequate efforts for transfer of technology.

Table-1 Details of demonstrations under different yield ranges in wheat

No. of Demonstrations conducted during 2008-09 to 2014-15		No. of demonstrations in range Different yield (kg/ha)		
Allotted	Conducted	< 3000	3000 to 3500	3500 to 4000
93	93	02 (2.2)	55 (59.1)	36 (38.7)

*Figures in parentheses indicates the percentage to total

Table-3 District wise area and productivity of Wheat in Bundelkhand region of U.P.

District	Area (ha)	Productivity (kg/ha.)
Jhansi	164886	26.02
Lalitpur	158682	23.2
Jalaun	144599	31.73
Chitrakoot	50458	20.15
Hamirpur	100534	28.18
Banda	152883	19.6
Mahoba	66613	14.9

Source: National Rainfed Area Authority, Niti Ayog, Government of India (2015)

Economic analysis

The inputs and outputs prices of commodities prevailed during the study of demonstrations were taken for calculating gross return, cost of cultivation, net return and benefit: cost ratio (Table 2 b). The cultivation of wheat under improved technologies gave higher net return of Rs. 23916 /ha, 32565, 27513, 34500, and Rs.30978/ ha, respectively as compared to farmers practices from year 2008-09 to 2014-15. The benefit cost ratio of wheat under improved technologies was 3.05, 3.53, 2.76, 2.80 and 2.41 as compared to 2.64, 3.14, 2.40, 2.19 and 1.98 under farmers practices from 2008-09 to 2014-15. This may be due to higher yields obtained under improved technologies compared to local check (farmers practice). The results are in conformity with the findings [2,3,5].

Table-2a Grain yield and gap analysis of front line demonstrations of wheat on farmers' yield

Year	Variety	Area	No. of FLDs	Potential Yield (q/ha)	Yield (q/ha)		% increase over Existing practice	Extension gap (q/ha)	Technology gap (q/ha)	Technology Index (%)
					FLD	FP				
2008-09	PBW- 375	12	20	50	33.0	25.5	29.0	7.5	17.0	34.0
2011-12	PBW 502	5	13	50	35.4	27.4	29.0	8.0	14.6	29.2
2012-13	PBW 502 & HUW 234	6.4	18	43	32.0	25.3	26.5	6.7	11.0	25.6
2013-14	PBW 550	5.6	15	50	38.3	26.5	45.0	11.8	11.7	23.4
2014-15	PBW 550	5.4	27	50	36.6	27.2	34.0	9.4	13.4	26.8
Overall Average	-	6.9	18.6	48.6	35.1	26.4	32.7	8.68	13.5	27.8

Table-2b Economic analysis of front line demonstrations of wheat on farmers' field

Technology demonstrate	Variety	Economics of demonstration (Rs./ha)				Economics of Local (Rs./ha)			
		GC	GR	NR	BCR	GC	GR	NR	BCR
2008-09	PBW- 375	11670	35586	23916	3.05	10450	27540	17090	2.64
2011-12	PBW 502	12860	45425	32565	3.53	11230	35209	23979	3.14
2012-13	PBW 502, HUW 234	15620	43133	27513	2.76	14205	34155	19950	2.40
2013-14	PBW 550	19120	53620	34500	2.80	16950	37100	20150	2.19
2014-15	PBW 550	22020	52998	30978	2.41	19880	39440	19560	1.98
Overall average	-	16258	46152	29894	2.91	14543	34689	20146	2.47

Conclusion

There has been good response among the farmers regarding adoption of the technologies in the demonstrations. The results of the frontline demonstrations of wheat showed the yield increase from minimum 26.5 percent to maximum 45 with technological interventions in Lalitpur district of Bundelkhand region of U.P. The results with low yield of wheat at farmer's field might be due use of saved seed for

sowing, high seed rate, use of inadequate and imbalance dose of fertilizers and no weed control by farmers. The major constraints for obtaining poor yield even in potential varieties of wheat in these areas are poor soil conditions, unavailability of proper irrigation facility during critical periods, high seed rate resulting poor tillering, no proper weed control. Thus, technological and extension gap extended which can be minimized by popularizing package of practices with emphasis on

use of high yielding variety, use of proper seed rate, balance nutrition and timely weed control.

Application of research: The FLD demonstrations on wheat used for fast and acceptable means of dissemination of improved variety as well as cultural practices. It also acts as good quality seed material for further seasons to the nearby farmers of the locality.

Research Category: Demonstration, economics, gap analysis, grain yields, wheat

Abbreviations:

FLD: Front Line Demonstration

FP: Farmer's Practice

GC: Gross Cost

NR: Net Return

BCR: Benefit Cost ratio

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