YIELD AND GAP ANALYSIS OF WHEAT PRODUCTIVITY THROUGH FRONTLINE DEMONSTRATIONS ORGANIZED BY AGRICULTURAL RESEARCH STATION, NIPHAD

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ABSTRACT

Front line demonstrations of wheat were conducted on farmers' field in Mahatma Phule Krishi Vidyapeeth, Rahuri jurisdiction of Maharashtra during rabi season of the year 2012-13 to 2016-17. Higher grain yield to the tune of 15.69 per cent was recorded under demonstrations over the farmers' practice. The extension gap, technology gap and technology index were observed to be 5.93 q ha^{-1}, 6.28 q ha^{-1} and 12.63 per cent, respectively. An additional return of Rs. 37059 ha^{-1} was obtained with an additional investment of Rs.5880 ha^{-1} coupled with scientific monitoring of demonstrations and use of other non-monetary factors. Fluctuating MSP or sale price of wheat during different years also influenced the economic returns per unit area. On average basis, the incremental benefit: cost ratio was found as 6.68.

Keywords: *demonstration, economics, gap analysis, grain yields, wheat*

INTRODUCTION

Wheat is the second most important food crop of the country. In India, wheat is grown over 30.72 Million ha area with production and productivity of 97.44 Metric ton and 31.72 q ha^{-1}, respectively (Anonymous, 2016-17). In Maharashtra, wheat is grown on 10.73 lakh ha with production of 16.72 lakh Metric tons and productivity of 15.58q ha^{-1} (Anonymous, 2016-17). Improvement in production technology of wheat crop has played a key role in making the country self sufficient in food production. However, in the past, farmers were not adopting recommended package of practices which resulted into marginal increase in the yield of wheat in Mahatma Phule Krishi Vidyapeeth, Rahuri jurisdiction. Therefore, on the basis of 'seeing is believing' principle, it is very essential to demonstrate the latest technologies at farmers field so that the farmers see the results and adopt the technology in totality. A wide gap exists in wheat production with the use of available techniques and its actual application by the farmers which is reflected through poor yield of wheat crop on farmer's field. There is a tremendous opportunity for increasing the productivity of wheat crop by adopting the improved technologies. There are many technologies generated at agricultural Universities and research stations but the productivity of wheat is still very low due to poor transfer of technology. To demonstrate the scientific cultivation of wheat, front line demonstrations should be laid out at farmer's field. The basic objective of FLDs is to demonstrate the proven technology at all to increase in the productivity of wheat [Nagarajan (2005) and Joshi *et al.* (2007)]. Efforts are being made at various levels to sustain food security through wheat production but as on date the results are not satisfactory and worthy. Keeping the importance of FLDs, the Agriculture Research Station, Niphad had laid out total 81 demonstrations of wheat crop on farmer's field under irrigated situations during *rabi* 2012-13 to 2016-17.

OBJECTIVE

To know the yield and gap analysis of wheat productivity through frontline demonstrations organized by agricultural research station, niphad

METHODOLOGY

Front line demonstrations on wheat were conducted at farmer's field in MPKV, Rahuri jurisdiction (Maharashtra) to assess its performance during the five consecutive *rabi* seasons 2012-13 to 2016-17. In general the soils under study were medium black in texture with pH ranging between 6.8 to 8.0. Deficient micronutrients were given by farmers. Each demonstration was on one hectare area and recommended package was provided to the farmers at the time of seed distribution. The sowing was done during first fortnight of November and harvesting of crop was done during first fortnight of March. The demonstrations on farmer's field

were regularly monitored from sowing to till harvesting by scientists of Agriculture Research Station, Niphad. The grain yield of demonstration crop was recorded and analyzed. Different parameters as suggested by Yadav *et al.* (2004), Dayanand *et al*. (2012) and Verma *et al*. (2014) were used for calculating gap analysis, costs and returns. The analytical tool used for assessing the performance of the FLDs on wheat is as follows:

- Extension gap = Demonstration yield - Farmers' practice yield
- Technology gap = Potential yield - Demonstration yield
- Technology index = (Potential yield - Demonstration yield) x 100/ Potential yield
- Additional return = Demonstration return - Farmers' practice return
- Effective gain = Additional return - Additional cost
- Incremental B: C ratio = Additional return / Additional cost

RESULTS AND DISCUSSION

During the period of study, total 81 FLDs were conducted at farmer's field as per the allotment by ICAR, New Delhi. Out of 81 demonstrations, 49 (60.50 %) were in the yield range of 41-45 q ha^{-1}, 20 (24.69 %) in range of more than 45 q ha^{-1} and remaining 12 (14.81 %) were found in the low yield category i.e. less than 41 q ha^{-1} which might be attributed to variations in biotic and abiotic stresses observed across different time horizone (Table 1).

Grain yield

The increase in grain yield under demonstration over the farmer's local practices was in the range of 12.10 to 18.61 per cent. On the average basis 15.69 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 4.42 to 7.01q ha^{-1} was found between FLD demonstration and farmers practice during the different time line and on average basis the extension gap was observed to be 5.93 q ha^{-1} (Table 2). The extension gap was lowest (4.42 q ha^{-1}) in year 2013-14 and was highest (7.01q ha^{-1}) in year 2012-13. Such gap might be attributed to adoption of improved technology in demonstrations which resulted in higher grain yield than that in the farmer's practice. Wide technology gap were observed during these years and this was lowest (1.79 q ha^{-1}) during 2012-13 and was highest (9.08 q ha^{-1}) during 2013-14. On average basis, the technology gap of all the 81 demonstrations was found to be 6.28 q ha^{-1}.

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

No. of demonstrations conducted during 2012-13 to 2016-17		No. of demonstrations in range different yield (q ha^{-1})		
Allotted	Conducted	<41	41-45	>45
81	81	12 (14.81 %)	49 (60.50 %)	20 (24.69 %)

*Figures in parentheses indicates the percentage to total

Table 2 : Grain yield and gap analysis of front line demonstrations of wheat on farmers' field

Year	No. of demons-trations	Potential yield (q ha^{-1})	Demon-stration yield (q ha^{-1})	Farmers practice yield (q ha^{-1})	Increase over farmers practice (%)	Extension gap (q ha^{-1})	Technology gap (q ha^{-1})	Technology index (%)
2012-13	20	50	48.21	41.20	17.01	7.01	1.79	3.58
2013-14	10	50	40.92	36.50	12.10	4.42	9.08	18.16
2014-15	16	50	42.58	36.65	16.18	5.93	7.42	14.84
2015-16	25	50	44.15	38.54	14.55	5.61	5.85	11.70
2016-17	10	50	42.70	36.00	18.61	6.70	7.30	14.60
Overall average	**16**	**50**	**43.71**	**37.77**	**15.69**	**5.93**	**6.28**	**12.63**

Table 3 : Economic analysis of front line demonstrations of wheat on farmers' field

Year	Cost of cash input (₹ ha^{-1})		Additional cost in demon-stration	Sale price (MSP) of grain (₹/q^{-1})	Total returns (₹/ha)*		Additional return in demon-stration (₹ ha^{-1})	Effective gain (₹ ha^{-1})	Incre-mental B:C ration (IBCR)
	Demon-stration	Farmers practice			Demon-stration	Farmers practice			
2012-13	26864	16340	10524	2075	166360	95328	71032	60508	6.74
2013-14	23275	18550	4725	2317	113414	86560	26854	22129	5.68
2014-15	36241	30230	6011	2250	118245	87309	30936	24925	5.14
2015-16	33022	26524	6498	2236	123189	82605	40584	34086	6.19
2016-17	35320	33680	1640	1631	93556	77668	15888	14248	9.68
Overall average	**30944**	**25065**	**5880**	**2102**	**122953**	**85894**	**37059**	**31179**	**6.68**

*indicates returns from grain and straw

Economic analysis

Different variables like seed, fertilizers, herbicides and pesticides were considered as cash inputs for the FLD demonstrations as well as for farmers practice. During demonstrations, it is observed that an additional investment of ₹ 5880 ha^{-1}was made under FLD demonstrations. Economic returns was observed to be a function of grain yield and Minimum Support Price (MSP) or sale price which varied along different years. Maximum additionalreturns of ₹ 71032 ha^{-1} during the year 2012-13 was obtained due to higher grain yield. The higher additional returns under demonstrations could be due to improved technology, non-monetary factors, timely operations of crop cultivation and scientific monitoring. The lowest and highest incremental benefit: cost ratio (IBCR) were 5.14 and 6.74 in 2014-15 and 2012-13, respectively (Table 3) which depends on grain yield and MSP or sale price.

The results are in conformity with the findings of Yadav *et al.* (2004), Lathwal, O.P. (2010), Dayanand *et al.* (2012), Meena, *et al.* (2012) and Verma *et al.* (2014). The front line demonstration on wheat revealed 15.69 per cent increase in yield over local check. This increase was with an extra expenditure of ₹ 5880 ha^{-1} which is very less and even small and marginal farmers could also afford. Thus, it is not the cost that deters the farmers from adoption of latest technology but ignorance is the primary reason. It is quite appropriate to call such yield gap as extension gap. The extension gap was found to be 5.93 q ha^{-1}. The IBCR (6.68) is sufficiently high to motivate the farmers to adopt the technology.

CONCLUSION

Therefore, FLD program was effective in changing attitude, skill and knowledge of farmers towards improved / recommended practices of wheat cultivation. This also led to improvement in the relationship between farmers and scientists and built confidence between them. The FLD demonstration farmers acted as primary source of information about the improved practices of wheat cultivation. They also acted as source of good quality pure seeds in their locality and surrounding area for the next crop. The concept of Front line demonstration may be applied to all farmer categories including progressive farmers for speedy and wider dissemination of the recommended practices to other members of the farming community. This will help in the removal of the cross-sectional barriers among farming community.

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