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Impact of Frontline Demonstrations on Varietial Evaluation of Wheat (*Triticum aestivum*) Under Cold Arid Condition of Kargil (J & K)

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ABSTRACT

The present study was carried out by Krishi Vigyan Kendra, Kargil, to know the difference between improved package of practices with rust resistant variety (HD 2967) under Front Line Demonstration (FLD) and farmer's practice (FP) of Local wheat (Krokar) under cold arid condition of Kargil district. FLDs were conducted on 20 farmers' fields each year to demonstrate the impact of improved agro-techniques with high yielding rust resistant wheat on production and economic benefits under Cold arid condition of Kargil (Ladakh) Region during *Kharif* seasons of two consecutive years i.e. 2015-16 and 2016-17. The technologies demonstrated in FLDs recorded additional yield over farmers practice. Under FLDs the grain yield of wheat was increased by 7.73 q/ha over FP. Adoption of rust resistant variety HD2967 with improved package of practices in wheat cultivation recorded higher B:C ratio (1.65) as compare to FP (1.35). Yield enhancement and higher net returns observed under FLDs of improved technologies with rust resistant wheat. Thus, the productivity of wheat could be increased with the adoption of rust resistant wheat variety HD 2967with recommended improved package of practices. The present study resulted to convincing the farming community for higher productivity and returns.

1. Introduction

Wheat (*Triticum aestivum*) is the second most important cereal crop in India after rice and it contributing substantially to the national food security by providing more than 50% of the calories to the peoples. Wheat (*Triticum aestivum* L.), a leading cereal grain belongs to the gramineae family, is a staple food of billions of people in the world; used to make flour for leavened, flat and steamed breads, cookies, cakes, pasta, noodles and couscous; for fermentation to make beer and alcohol (Khan and Habibi 2003). Major cultivated species of wheat are *Triticum aestivum*, which is a hexaploid species and is widely cultivated in the world; *Triticum durum*, the only tetraploid form of wheat widely used today, and the second most widely cultivated wheat is *Triticum monococcum*, a diploid species with wild and cultivated variants; *Triticum dicoccum*, a tetraploid species, cultivated in ancient times but no longer has widespread use; and *Triticum spelta*, another hexaploid species is cultivated in limited quantities (Moon 2008). Globally, it was cultivated on an area of 219 m ha with production of 715.9 m tonnes in the year 2013. In India, wheat is being cultivated on an area of 29.6 m ha with 93.5 mt of production and 3.15 t/ha of average productivity (FAO, 2013). The requirement of wheat will be around 109 mt for feeding the 1.25 billion populations by 2020 AD (Singh 2010). India's per capita production is 67 kg against per capita consumption of 73 kg/year. Thus, around 15 mt of wheat production has to be increased by adopting improved production practices. There is no scope for area expansion in near future; additional production could be harvested by increasing the productivity per unit area (Nagarajan 1997).

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There are several constraints of low productivity of wheat in India, out of which poor extension of improved agronomic practices is on the top, unsuitable varieties, faulty nutrient management as well as weed control etc. are responsible for low productivity of wheat in India (Tiwari et al. 2014). Negligence of plant protection measures of crop from insect-pest and wild animals are also responsible for low productivity of wheat. Frontline demonstration is the modern concept with the objective to demonstrate newly released crop production and protection technologies and its management practices at farmer's fields under different farming situations. While demonstrating the technologies in the farmer's fields, the scientists are required to study the various factors contributing higher crop yield, constraints in field production and thereby generate production data and feedback information. Keeping these in view, FLDs of improved production technology on wheat were conducted to enhance the productivity and economic returns and also convincing the farmers for adoption of improved production technologies in wheat crop.

2. Materials and Methods

Front-line demonstration with improved Varieties of wheat HD 2967 were conducted at 20 farmers fields during kharif season of two consecutive years of 2015-16 and 2016-17 indifferent villages i.e. Trespone, G.M.pore, Saliskot, Paskium, Minji, Kurbathang, Kaksar, Chanigund, Shargole and chiktan khangral of District Kargil. The soils of the farmer fields were Sandy-loam in texture and medium to low in NPK. Each demonstration was conducted on an area of 0.01 ha. FLD plot was kept for assigning farmers practices. Prior to conducting FLDs, group meeting and specific skill training was given to the selected farmers regarding package of practices of wheat crop. To popularize the improved wheat production practices, constraints in wheat production were identified though participatory approach. Preferential ranking technique was utilized to identify the constraints faced by the respondent farmers in wheat production. Farmers were also asked to rank the constraints they perceive as limiting factor for wheat cultivation in order of preference. Based on top rank of farmers problems identified, FLDs were planned and conducted at the farmer's fields. The improved technologies selected for FLDs given in Table 1. The other management practices like seed Impact of Frontline Demonstrations on Yield of Wheat HD 2967 treatment, nutrient management etc. were applied for improved as well as farmers practice.

The wheat crop was sown at 22 cm (row-row) a part in line using seed rate of 240 kg/ha in 1st to 10th of April during both the years. The average yield of each FLD and farmer practice has been taken in both the years for interpretation of the results. Total 20 farmers each year were selected to measure satisfaction level for the performance of improved technology. The selected respondents were interviewed personally with the help of a pre-tested and well-structured interview schedule. Client Satisfaction Index was calculated as below. Client satisfaction index = (Individual score obtained/ Maximum score possible) x 100. The data on yield were recorded and analysed to interpret the results. The economic parameters (gross return, net return and B: C ratio) were worked out on the basis of prevailing market prices of inputs and minimum support prices of outputs.

Table 1. Details of package of practices followed in FLDs vs FP

S. No	Input	FLDs	FP
1.	Wheat cultivar.	HD 2967	Local (Krokar)
2.	Seed Rate.	240 kg/ha	400kg/ha
3.	Chemical Fertilizer (NPK).	100: 80: 60	140: 100: 40
4.	FYM.	10t/ha	8t/ha
5.	Weed management.	Two hand weeding, first at 35 days after sowing and second 55 days after sowing	One weeding at 35 DAS.

Table 2. Ranks for different constraints given by farmers.

Constraints	Percentage	Rank
Improved and rust resistant Varieties of wheat	79.3	1
Low technical knowledge	74.6	2
Rust infestation	71.3	3
Low soil fertility	67.8	4
Use of higher seed rate	66.7	5
Weed infestation	55.5	6

3. Results and Discussion

3.1 Constraints in wheat production

Problems faced by the farmers in wheat cultivation were documented during the study. Perusal of the data from Table 2 indicated that non-availability of improved varieties of Wheat resistant to rust (79.3%) was given the top most rank followed by low technical knowledge (74.6%), yellow rust infestation (71.3%), low soil fertility (67.8%) use of higher seed rate (66.7%), weed infestation (55.5%) were the major constraints to wheat cultivation. Dhruw et al. (2012) and Meena et al. (2014) have also reported similar constraints.

3.2 Wheat yield

The data on wheat yield (Table 3) indicated that the FLDs given a good impact on the farming community of different villages of district Kargil, as they were motivated by the new agricultural technologies adopted in the demonstrations. Average wheat yield under front line demonstrations was observed as 24.8 q/ha which was higher by 7.73q/ha over the prevailing farmers practice (17.7 q/ha/ha). The results are in close conformity with the research results of Sharma et al. (2016).

3.3 Economic analysis

The higher cost of cultivation Rs 38,620 involved in FLDs as compared to Rs. 36,810 under Farmers practice (Table 4). The FLDs plots fetched higher mean gross returns (Rs. 67,770/ha) and net returns (Rs. 29150/ha) with higher B:C ratio (1.7) as compared to (gross returns Rs. 51,840), (net returns Rs. 15030) and (benefit: cost ratio 1.4) with farmers practice. Hiremath and Nagaraju (2009), Sreelakshmi et al. (2012) and Joshi et al. (2014) also reported higher net returns and B:C ratio in the FLDs on improved technologies compared to the farmers practices

3.4 Additional cost of cultivation and returns

Further, data (Table 4) revealed that the average additional cost of cultivation (Rs. 1800/ha) under integrated crop management with rust resistant variety and has yielded additional net returns of Rs. 15,930 / ha. The results suggest that higher profitability and economic viability of wheat demonstrations under local agro-ecological situation.

3.5 Farmer's satisfaction

Client satisfaction index (CSI) presented in Table 5 observed that majority of the respondent farmers expressed high (60%) and medium (26.7%) level of satisfaction regarding the performance of FLDs, whereas, very few (13.3 %) of respondents expressed lower level of satisfaction. Majority of responding farmers under higher and medium level of satisfaction with respect to performance of demonstrated technology indicate stronger conviction, physical and mental involvement in the frontline demonstrations which in turn would lead to higher adoption. The results are corroborated with the results of Kumaran and Vijayaragavan (2005) and Dhaka et al. (2010).

Table 3. Yield performance of wheat under FLDs. variety HD2967 vs FP variety Local Krokar

Year	No. of Demo	Area (ha)	Yield q/ha FLD	Yield q/ha FP	Yield increase over FP q/ha
2015-16	20	1	24.5	19.9	7.6
2016-17	20	1	25.1	19.2	7.9
Mean	20	1	24.8	17.07	7.73

Table 4. Economics, additional cost and returns in wheat under FLDs variety HD2967 vs FP variety Local Krokar.

Year	Cost of cultivation (Rs./ha)		Gross returns (Rs./ha)		Net returns (Rs./ha)		Additional cost of cultivation (Rs./ha) in	Additional Returns (Rs./ha) in	B: C Ratio	
	FLD	FP	FLD	FP	FLD	FP	FLD	FLD	FLD	FP
2015-16	38270	36570	61250	49750	22980	13180	1700	11500	1.6	1.3
2016-17	38620	36810	67770	51840	29150	15030	1800	15930	1.7	1.4
Mean	38445	36780	64510	50795	26065	14105	1750	13715	1.65	1.35

Conclusion

Thus, it may be concluded that the yield and returns in wheat crop increased substantially with the improved production technologies. However, the yield level under FLDs was better than the farmer practice and performance of these varieties could be further improved by adopting recommended production technologies. So, there is need to disseminate the improved technologies among the farmers with effective extension methods like training and field demonstrations. The farmers should be encouraged to adopt the recommended agro techniques with rust resistant variety for getting maximum returns in specific locations.

Table 5. Extent of farmer's satisfaction over performance of FLDs.

Satisfaction level	Number	Percent
High	36	60
Medium	16	26.7
low	8	13.3

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