Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2019; 8(1): 1602-1604
Received: 23-11-2018
Accepted: 29-12-2018

Naresh Kumar Bisen
Associate Professor, Department of Genetics and Plant Breeding, College of Agriculture, Balaghat, Madhya Pradesh, India

Ramkrishna Singh Solanki
Assistant Professor, Department of Mathematics and Statistics, College of Agriculture, Balaghat, Madhya Pradesh, India

NK Singh
Scientist, Krishi Vigyaan Kendra, Seoni, Madhya Pradesh, India

Corresponding Author:
Naresh Kumar Bisen
Associate Professor, Department of Genetics and Plant Breeding, College of Agriculture, Balaghat, Madhya Pradesh, India

Productivity enhancement of wheat (*Triticum aestivum* L.) through front line demonstration in Seoni district of Madhya Pradesh, India

Naresh Kumar Bisen, Ramkrishna Singh Solanki and NK Singh

DOI: https://doi.org/10.22271/phyto.2019.v8.i1z.14933

Abstract
Frontline demonstrations were conducted with scientific package and practices in the farmer's fields located in the Kymore Plateau and Satpura Hill agro climatic zone of Seoni district, Madhya Pradesh to evaluate the performance of wheat variety JW-3336 under during the *Rabi* season of two consecutive years 2015-16 and 2016-17. The data on yield and economics of demonstrated plots when compared with the farmers cultivating practices revealed that JW-3336 performed superior. JW-3336 with improved production technologies showed increased mean grain yield by 19.57% over existing farmers practices with only Rs. 1675/ha extra expenditure on inputs. In addition to this, the mean extension gap (7.76 q/ha) and mean IBCR (6.03) recorded were sufficiently high to motivate farmers to adopt JW-3336 with the improved wheat production technology.

Keywords: Front line demonstration, wheat, technology gap, extension gap, yield

Introduction
Wheat is the world's third most widely consumed crop after rice and maize. It accounts directly for 21% of energy intake by the world's population [1] and more than 50% of the energy intake in the Indian population. In India, wheat production increased from 11 million tonnes to 94 million tonnes from 1961 to 2016 [2] due to selective breeding for high yielding semi-dwarf varieties. Wheat is the second most important winter cereal in India after rice contributing substantially to the national food security by providing more than 50% of the calories. In historical perspective, India has made spectacular advancement in productivity and sustainability of wheat and wheat based cropping system. The scenario of the past ten years has clearly indicated that the wheat production in the country has soared ahead despite area remaining the same. The major producing states of wheat are Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Rajasthan and Bihar due to assured irrigation facility and favourable soil and climate condition. But there is large gap in production due to several living and inanimate factors. Beside the several constraints of low productivity, poor extension of improved agronomic practices is one top [3]. The improper adoption of scientific package of practices leads to low production than the potential production.

Wheat is one of the important cereals crop grown in *Rabi* season all over Madhya Pradesh. Area, production and productivity of wheat crop during 2015-16 in Seoni district was 115000 ha, 277000 tonnes and 2410 kg per ha, respectively [4]. The productivity of wheat per unit area could be increased by adopting recommended scientific and sustainable management production practices using suitable high yielding varieties. The main objective of Front Line Demonstration (FLD) is to demonstrate newly released crop production and protection technologies and its management practices at farmers' field under different agro-climatic regions of the country under different farming situations. While demonstrating the technologies in the farmers' field the scientists are required to study the factors contributing higher crop production, field constraints of production and thereby generate production data and feedback information. Taking into account the above considerations FLDs were carried out in a systematic manner on farmer's field to show the worth of a new variety and convincing farmers to adopt improved production management practices of wheat for enhancing productivity of wheat. The low productivity of this crop is due to poor adoption of improved technologies of wheat by the farmers. Hence, the Krishi Vigyan Kendra, Seoni has organized FLDs with improved varieties along with recommended package of practices. The main purpose of these demonstrations was to enhance the productivity levels of wheat which

in turn will increase the income levels of farmers and to transfer the latest production technologies to farmers. Realizing the importance of wheat FLD in transfer of technology, agro-economical and technical constraints limiting wheat yield in Seoni district, assessment of recommended technology and farmer's practices of wheat production, the extent of adoption of improved technologies of wheat by the farmers, and the productivity and economics of frontline demonstrations on farmer's field were carried out.

Material and Methods

The constraints in production were identified through participatory approach such as farmer's meetings, training programmes and field diagnostic visits during crop growth period. Low yield of wheat was conceived due to lack of suitable variety of wheat, higher seed rate without treatment, imbalance use of chemical fertilizers, no or less plant protection measures, infestation of weeds and improper crop geometry. Based on the farmer's problems, The Krishi Vigyan Kendra, Seoni conducted FLD's on wheat during two consecutive seasons of *Rabi* 2015-16 and 2016-17 on wheat variety JW-3336 developed by Jawaharlal Nehru Agriculture University, Jabalpur at one Block of Seoni District of Madhya Pradesh (Table 1). The variety JW-3336 matures in 118 days, bold grain, good appearance and high protein content with yield potential of 53 q/ha. It has resistant to rust and suitable for irrigated condition of Madhya Pradesh. The area under each demonstration was 0.4 ha.

Table 1: Front line demonstration and carrying out site.

Year	Variety	Check	No. of FLD	Area (ha)	Village	Block
2015-16 *Rabi*	JW-3336	LOK-1	5	02(0.4ha/FLD)	Erma	Kurai
2016-17 *Rabi*	JW-3336	LOK-1	5	02(0.4ha/FLD)	Alesur	Kurai

To manage the identified problems, JW-3336 variety seeds were provided to the farmers as critical inputs and scientific recommended technologies (Table 2) were followed as intervention during the course of front line demonstration programme. In case of local check (control plots), existing farmers' practices were followed by the farmers. Well before conducting the demonstrations, a training programme was organized for the selected farmers of the respective villages each year to impart the technological knowledge of wheat production techniques. All other steps like site selection, layout of demonstrations, farmers' participation etc. were followed as suggested by [5].

Table 2: Technological intervention and farmer's practices under FLD.

Particulars	Technological intervention	Existing practices
Variety	JW-3336	LOK-1
Seed rate (kg/ha)	100	125-140
Seed treatment	Carbendazim + Mancozeb (2g/kg seed)	No seed treatment
Time of sowing	First Fort night of November	End of October
Method of sowing	Use of seed drill machine	Broadcasting
Fertilizer (NPK)	120:40:60	120:80:20
Weed management	Pendimethalin 30% EC at 0-3 days after sowing, Clodinafop Propargyl 15% WP or Fenoxaprop-P-Ethyl (25-30 DAS)	No use of Weedicides
Plant Protection	Endosulfan 35 EC or Chloropyriphos 50% EC, Imidacloprid 17.8% SL	Unwise use of insecticides and pesticides

The demonstrations on farmers' fields were regularly monitored by Krishi Vigyan Kendra, Seoni scientist's right from sowing to harvesting. The grain yield of demonstrations as well as farmers' practice (local check) were recorded and analysed according to different parameters suggested by [5]. The details of these parameters are as follows:

Extension gap = Demonstration yield–Farmer's yield
Technology gap = Potential yield - Demonstration yield

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

Additional Cost = Demonstration cost of cultivation - Farmer's cost of cultivation

Additional Return = Demonstration return - Farmer's return
Effective Gain = Additional return - Additional cost

$$\text{Increment B: C ratio} = \frac{\text{Additional return}}{\text{Additional cost}}$$

Result and Discussion

Grain yield

The increase in grain yield under demonstration was 17.72-21.43% than farmer's local practices. On the basis of two years, 19.57 percent yield advantage was recorded under demonstrations carried out with improved cultivation technology as compared to farmer's traditional way of wheat cultivation.

Table 3: Gap in grain yield production under FLDs

Season-Year	Potential Yield (q/ha)	Demonstration Yield (q/ha)	Farmer`s practice Yield (q/ha)	Increase over Farmer`s practices (%)	Extension Gap (q/ha)	Technology Gap (q/ha)	Technology Index (%)
2015-16 *Rabi*	53.00	49.30	40.60	21.43	8.70	3.70	6.98
2016-17 *Rabi*	53.00	45.25	38.44	17.72	6.81	7.75	14.62
Average	53.00	47.28	39.52	19.57	7.76	5.73	10.80

Gap analysis: An extension gap of 6.81-8.70 q/ha was found between demonstrated technology and farmer's practices during different two-years and on average basis the extension gap was 7.76 q/ha (Table 3). The extension gap was lowest

(6.81 q/ha) during *Rabi* 2016-17 and was highest (8.70 q/ha) during *Rabi* 2015-16. Such gap might be attributed to adoption of improved technology in demonstrations which resulted in higher grain yield than the traditional farmer's practices. Wide technology gap was observed during different years and this was lowest (3.70 q/ha) during *Rabi* 2015-16 and was highest (7.75 q/ha) during *Rabi* 2016-17. On two years' average basis the technology gap of total 10 demonstrations was found as 5.73 q/ha. The difference in technology gap during different years could be due to more feasibility of recommended technologies during different years. Similarly, the technology index for all the demonstrations during different years were in accordance with technology gap. Higher technology index reflected the inadequate proven technology for transferring to farmers and insufficient extension services for transfer of technology. Technology index shows the feasibility of the variety at the farmer's field. The lower the value of technology index more is the feasibility. Table 3 revealed that the average technology index value was 10.80. The findings of the present study are in line with the findings of [6].

Economic analysis

Different variables like seed, fertilizers, weedicides and pesticides were considered as cash inputs for the demonstrations as well as farmer's practice and on an average an additional investment of Rs. 1675 per ha was made under demonstrations. Economic returns as a function of grain yield and MSP sale price varied during different years. Maximum net returns (Rs. 52000 per ha) during the year *Rabi* 2015-16 was obtained due to higher grain yield. These results are in line with the findings [6]. The higher additional returns and effective gain obtained 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 ratios (IBCR) were 5.60 & 6.46 in *Rabi* 2016-17 and *Rabi* 2015-16 respectively (Table 4) depends on produced grain yield and MSP sale rates. Overall average IBCR was found as 6.03.

Table 4: Economic impact under FLDs.

Season-Year variety	Cost of cultivation (Rs/ha)		Additional cost in Demo. (Rs./ha)	Sale price (MSP) of (Rs./q)	Net Return (Rs/ha)		Additional return in Demo. (Rs./ha)	Effective Gain (Rs./ha)	IBCR
	Demo.	FP			Demo.	FP			
2015-16 *Rabi*	21950	20200	1750	1500	52000	40700	11300	9550	6.46
2016-17 *Rabi*	22100	20500	1600	1550	48038	39082	8956	7356	5.60
Average	22025	20350	1675	1525	50019	39891	10128	8453	6.03

Conclusion

Front line demonstration program was effective in changing attitude, skill and knowledge of improved / recommended practices of wheat cultivation including adoption. This also improved the relationship between farmers and scientists and built confidence between them. During demonstration the farmers also acted as primary source of information on the improved practices of wheat cultivation and also acted as new source of good quality pure seeds in their locality and surrounding area for the next crop. The JW-3336 variety of wheat and production technologies followed in demonstrations, on an average increased the grain yield by 19.57% over existing farmer's practice. The average increment in yield cost only Rs. 1675/ha. This amount is so negligible that even small and marginal farmers can afford it. The mean extension gap (7.76 q/ha) and IBCR (6.03) are sufficiently high to motivate the farmers for adoption of JW-3336. Favourable benefit cost ratio itself explanatory of economic viability of the demonstration and convinced the farmers for adoption of intervention imparted. 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 barrier of the farming population. The yield gap in wheat can be overcome, through the wide publicity of the improved practices wheat cultivation by use of various extensions methodologies including Front Line Demonstrations as one of the most important method to show the result of improved practices.

References

1. Shiferaw B, Smale M, Braun HJ, Duveiller E, Reynolds M, Muricho G. Crops that feed the world 10. Past successes and future challenges to the role played by wheat in global food security. Food Security. 2013;5:291-317.
2. DACFW. Department of Agriculture, Cooperation & Farmers Welfare [Internet]. Available from: http://eands.dacnet.nic.in/Advance_Estimate/3rdAdv150216Eng.pdf. Accessed [Insert date accessed].
3. Singh SB. Impact of frontline demonstrations on yield of Wheat (*Triticum aestivum*) under rain fed Condition in Uttarakhand. International Journal of Science and Technology. 2017;6(1):779-786.
4. Directorate of Economics and Statistics: Department of Agriculture and Farmers Welfare Ministry of Agriculture and Farmers Welfare, Govt. of India.
5. Sharma V, Kumar V, Sharma SC, Singh S. Productivity enhancement and popularization of improved production technologies in *wheat* through frontline demonstrations. Journal of Applied and Natural Science. 2016;8(1):423-428.
6. Meena ML, Singh D. Increasing wheat yield through frontline demonstration in Pali district of Rajasthan. Wheat and Barley Research. 2017;10(1):52-58.