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RESEARCH ARTICLE

Impact of frontline demonstrations on popularization of new wheat variety and improvement in productivity of wheat at farmer's fields in Guna district of Madhya Pradesh

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ABSTRACT

The front line demonstration was carried out by Krishi Vigyan Kendra, Aron, Guna, Madhya Pradesh during the Rabi season of 2019-20 and 2020-21 to study the impact on popularization and productivity enhancement of wheat at farmer's fields of Guna District. The results revealed that the demonstration gave higher yields 51.75 q/ha and 53.13 q/ha as compared to farmers practice yield 43.15 q/ha and 49.90 q/ha during 2019-20 and 2020-21, respectively. The demonstration plot produced on an average of 13.20% more yield of wheat as compared to local practices. The extension gap ranging between 323-860 kg/ha during the period of study emphasizes the need to educate the farmer through various means for adoption of recommended improved agricultural package of practice for wheat crop to reverse the trend of wide extension gap. The maximum gross monetary return (Rs. 99619 and Rs. 102266/ha) was recorded in recommended practice while minimum gross monetary return (Rs. 83064 and Rs. 96058/ha) was observed in farmer's practice during 2019-20 and 2020-21, respectively. Moreover, the maximum net monetary returns was recorded in recommended practice (Rs. 67736 and Rs. 70292/ha) and minimum net monetary return registered in farmer's practice (Rs. 51359 and Rs. 64543/ha). Similar trend was found in case of Benefit-Cost ratio as highest B: C ratio was found in recommended practice (3.13 and 3.20) as compared to farmers existing practice (2.62 and 3.05) during both the years of study, respectively.

Keywords: Front line Demonstration, Technology Index, Technology Index, Yield and economics

INTRODUCTION

Wheat [*Triticum aestivum* (L.)] is one of the most important cereal crop because it is the staple food of the people of India. There has been tremendous increase in area, production and productivity of this crop during the phase of green revolution Indian agriculture. It occupies second position both in terms of area and production in the world. It is cultivated over an area of 29.86 million hectares with an annual production of 94.88 million tonnes and productivity of 3.18 Mt / ha, whereas in Madhya Pradesh, it is cultivated in 4.89 thousand hectares of land with an annual production of 12.69 million tonnes and productivity of 2.36 Mt / ha [5]. Wheat provides more protein than any other cereal crops. However, the global challenge for wheat nutrition is to increase grain yield while maintaining its protein. Wheat yield and end use quality depend upon the environment, genotype and their interactions. The many factors like inconsistently and improper use of fertilizers, lack of information on variants, edaphic features, mismanagement of farmers field operations and technologies [1-4] are responsible for low productivity of wheat. Keeping the view in mind the present demonstrations on new high yielding wheat variety were

framed out for create awareness among wheat growers about the improved package of practices during cultivation of wheat [18-21].

MATERIALS AND METHOD

Farmers participatory front line demonstrations were conducted for two consecutive years of Rabi 2019-20 and 2020-21 at farmers field of village Araskheda, Chirola, Goraiya, Govindpur, Bhodani, Khamkheda, Sarkho and Jakhoda of Guna District to demonstrate the performance of new high yielding variety of wheat. The frontline demonstrations were conducted in farmer's fields of 5 and 3 different villages of Guna district on 8 and 8 farmers during the Rabi season of year 2019-20 and 2020- 21, respectively. The farmers training were organized to create awareness to follow the package and practices for wheat crop cultivation as recommended by the Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior (M.P.) and need based inputs were provided to the beneficiaries (Table 2). To conduct the demonstrations a group meeting was organized and specific skill training was imparted to select the farmers. The farmers were advised to follow the full package of practices like soil testing, seed treatment with bio-fertilizer, fertilizer application, weed management, integrated pest management (IPM) practices etc. The traditional practices were followed by the farmers using their own practice of cultivation and existing varieties during both the year of demonstration. The 3.2 and 3.2 hectare area was covered with plot size 0.4 ha under front line demonstration with active participation of selected farmers. Two varieties of wheat namely JW 3382 and HI 8759 were selected for demonstration having high yielding character. In general, the soil of the experimental sites were sandy clay loam in texture, neutral in reaction (pH 7.00-7.50), low to medium in organic carbon (0.45-0.71%) and low in available nitrogen (220.8-246.5 kg N/ha), medium in available phosphorus (12.8-14.8 kg P₂O₅ kg/ha) and medium to high in available potassium (235.5-425.5 kg K₂O/ha). The road side demonstration plots were selected, use quality seeds of selected improved varieties, line sowing in 22.5 cm apart rows, follow timely sowing (15-25th November), herbicide application and irrigation, need based pesticide as well as balanced fertilizer were emphasized and comparison has been made with the existing practices. Visit of farmers and the extension functionaries was organized at

demonstration plots to disseminate the message at large scale and finally a field day was organized maturity stage of the crop. The beneficiaries under the programme were facilitated by KVK scientists in performing field operations by direct contact as well as through electronic media. The farmers practices were maintained traditionally in case of local checks. The data were collected from both the year of demonstrations from FLD plots as well as control plots and finally the extension gap, technology gap, technology index along with the benefit cost ratio were worked out (Samui *et al.*, 2000) as given below.

Technology gap= Potential yield - Demonstration yield

Extension gap= Demonstration yield - Farmer's yield

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

RESULTS AND DISCUSSION

The results of front line demonstrations conducted during Rabi season of 2019- 20 and 2020-21 in different villages of Guna district of Madhya Pradesh indicated that the cultivation practices adopted under front line demonstration *viz.* use of improved high yielding variety, line sowing, balanced application of fertilizers and control of pest through insecticide at economic threshold level (Table 1) obtained maximum number of tillers per plant (5.0 and 5.18) and grains per ear (40.17 and 42.90) as compared to farmer's practice data of tillers per plant (4.02 and 4.14) and grains per ear (36.80 and 38.92) during both the years of study, respectively (Table 4). Yield parameters enhanced by the improved package of practices over existing farmers practice are shown in Table 3. The results revealed that the demonstrated plots gave higher yield of wheat crop than the farmer's practice. The demonstration gave higher yields 51.75 q/ha and 53.13 q/ha as compared to farmers practice yield 43.15 q/ha and 49.90 q/ha during 2019-20 and 2020-21, respectively. On the basis of two year data, the average maximum yield (52.44 q/ha) was recorded in recommended practice while minimum yield (46.53 q/ha) observed in

farmer’s practice during the course of study. The demonstration plot produced on an average of 13.20% more yield of wheat as compared to local practices. The data revealed that the yield of wheat fluctuated over the years in demonstration plot due to varietal characters and farmers practice due to climatic factors and management practices. Similarly, yield enhancement in different crops in front line demonstrations were documented by Kumar *et al.*, (2010); Dhaka *et al.*, (2010) and Dhaka *et al.*, (2015).

The increase in percent of yield was ranged from 6.46% to 19.93% during both years of study. The results clearly indicated the positive effects of FLDs over the existing practices toward enhancing the productivity of wheat in Guna district with its positive effect on yield attributes (Table 4). The extension gap showed an increasing trend. The extension gap ranging between 323-860 kg/ha during the period of study emphasizes the need to educate the farmer through various means for adoption of recommended improved agricultural package of practice for wheat crop to reverse the trend of wide extension gap. The yield of the front line demonstrations and potential yield of the crop was compared to estimate the yield gaps which were further categorized into technology gap and technology index. The trend of technology gap (ranging between 388-800 kg/ha) reflects the farmer’s cooperation in carrying out such demonstrations with encouraging results in subsequent years. Data revealed that the performance of the technology demonstrated was found to be better than the farmers practice under same environmental conditions. The farmers were motivated by seeing the results in terms of productivity and they are now ready to adopt the wheat varieties i.e. GW 3382 and HI 8759 with improved package and practices. The technology index showed the feasibility of evolved technology at the farmer’s fields. The lower value of technology index showed that there is more feasibility of technology. As such fluctuation in technology index (ranging between 6.80%-13.39%) during the study period in certain region may be attributed to the dissimilarity in soil fertility status, weather conditions, availability of water and variation of insect pest attack in the crop.

The maximum gross monetary return (Rs. 99619 and Rs. 102266/ha) was recorded in

recommended practice while minimum gross monetary return (Rs. 83064 and Rs. 96058/ha) was observed in farmer’s practice during 2019-20 and 2020-21, respectively. Moreover, the maximum net monetary returns was recorded in recommended practice (Rs. 67736 and Rs. 70292/ha) and minimum net monetary return registered in farmer’s practice (Rs. 51359 and Rs. 64543/ha). Similar trend was found in case of Benefit-Cost ratio as highest B: C ratio was found in recommended practice (3.13 and 3.20) as compared to farmers existing practice (2.62 and 3.05) during both the years of study, respectively. Similar results were found by Saikia *et al.*, (2018). Data clearly showed higher benefit cost ratio of recommended practices than control plot in both the years of study. Hence, favorable benefit cost ratios proved the economic viability of the interventions and convinced the farmers on the utility of interventions [6-12].

CONCLUSION

It is concluded from the above findings of FLDs on Wheat variety GW 3382 and HI 8759, that the technology gap can be reduced to a considerable extent by adopting scientific methods of wheat cultivation to increase productivity of wheat crop in the district. It was observed that potential yield can be achieved by imparting scientific knowledge to the farmers, providing the need based inputs and their proper utilization. Horizontal expansion of improved technologies may be achieved by implementation of various extension activities like training programme, field days, exposure visit etc. organized in FLD programmes at the farmer’s fields. Moreover, Krishi Vigyan Kendra in the district need to play the lead role in providing proper technical support to the farmers through different educational and extension activities to reduce the extension gap for quality production and higher productivity in the district [13-18].

Table 1. Comparison of Demonstration Practices and farmers practices for wheat crop

Particulars	Demonstration Practices	Farmers Practice
Farming Situation	Irrigated	Irrigated
Variety	JW 3382 and HI 8759	Lok1
Time of Sowing	15- 25 November	15- 25 November

Seed rate	100 kg/ha	150 kg/ha
Fertilizer as per STV	NPK 120:60:30	NPK 120:50:00
Seed Treatment	Carboxin + Thiram @ 2g per kg seed with PSB + <i>Azotobacter</i> @ 5g per kg seed	No practice adopted
Weed Management	Clodinafop + metsulfuron applied as Post emergence at 30-35 DAS	No practice adopted
Plant protection	As per requirement	As per requirement
Irrigation	4 irrigations at CRI, tillering, flowering and grain filling stage	4-5 irrigations, but stage of crop is not fixed

Table 2. Details of input given to farmer for Demonstration

Year	No of Demonstration	Technology Demonstrated	Input provided to farmer
2019-20	8	Improved high yielding variety JW 3382	40 kg improved seed of demonstrated variety, fungicide and biofertilizer
2020-21	8	Improved high yielding variety HI 8759	40 kg improved seed of demonstrated variety, fungicide and biofertilizer

Table 3. Productivity, Technology gap, extension gap and technology index under FLD and Farmers Practice of wheat

Year	Sample Area (ha)	Yield (kg/ha)			% increase over FP	Technology gap (Kg/ha)	Extension Gap (kg/ha)	Technology Index (%)
		Potential	FLD	FP				
2019-20	3.2	59.75	51.75	43.15	19.93	800	860	13.39
2020-21	3.2	57.00	53.13	49.90	6.46	388	323	6.80
Average	-	-	52.44	46.53	13.20	594.00	591.50	10.10

Table 4. Yield attributes of wheat crop

S. No.	Year	Yield attributing characters					
		No. of tillers/ plant		No. of grains/ ear		Test weight (1000 grain weight)	
1	2019-20	5.00	4.02	40.17	36.80	40.48	40.12
2	2020-21	5.18	4.14	42.90	38.92	41.28	40.18
	Average	5.09	4.08	41.54	37.86	40.88	40.15

Table 5. Economics of demonstrations

S. No.	Village covered	No of farmer	Area (ha)	Cost of Cultivation (Rs/ha)		Gross Monetary Return (Rs/ha)		Net Return (Rs/ha)		B:c ratio	
				Demo	FP	Demo	FP	Demo	FP	Demo	FP
1	5	8	3.2	31883	31705	99619	83064	67736	51359	3.13	2.62
2	3	8	3.2	31974	31515	102266	96058	70292	64543	3.20	3.05

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