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Original Research Article

Yield Enhancement of Wheat (*Triticum Spp.*) Through Front Line Demonstration under Irrigated Condition in Northern Hill Region (Surguja District) of Chhattisgarh, India

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A B S T R A C T

Wheat is the most important cereal crop, and a staple food of the vast majority of the human population. It is a cool-season crop, widely cultivated under varied agro-ecologic conditions and cropping systems throughout the world. There are several HYV of wheat among the farmers to meet out the potential production of crop, but due lack of knowledge and awareness about technology, they harvest very low production. FLD is one of the most important tools for transfer of technology in the farmer's field. The present study was undertaken to find out the yield gap through FLDs on wheat crop. Krishi Vigyan Kendra, Surguja, Chhattisgarh conducted 86 front line demonstration on wheat crop at farmers field of five adopted villages within five blocks during 2014-15 to 2016-17 for transfer of technology. In three year demonstration programme every year demonstration plots with improved package of practices gave higher yield ranges from 37.60 – 41.50 q/ha as compared to farmers practices (26.40–28.40 q/ha) which could be increased by 42%–46% grain yield over farmers practices. Maximum technology gap (2.40) and technology index (6.0) recorded in rabi 2014-15 which was later on decreased in next coming respective years but in case of extension gap, it was maximum (14.04) in the year 2015-16. It shows positive role of KVK in performance of FLDs wheat with improvement in socio-economic status of the farmers.

Keywords

Wheat; Improved varieties; Front Line Demonstration; Transfer of Technology; Yield gap

Introduction

Cereals are generally regarded as the "staff of life". Wheat, rice and maize are the major cereals constituting the staple diet of the majority of the world population. Cereal crops serve as the major source of calories, carbohydrates, and some proteins for the human population in developing countries. During the year 2007, among the cereals, maize recorded the maximum production (786.79 million tons) followed by rice (651.74mt), wheat (607.05mt) and barley (136.21mt). The majority of maize produced is utilized as feed and for biofuel production. The wheat programme has released 399 wheat varieties, comprising bread wheat (335),durum (54),dicoccum (5) and triticale (5), for cultivation under different production conditions in all the wheat growing zones. (Anonymous, 2012). Wheat (*Triticum Spp.)* is the most important cereal crop as well as the most diversified in relation to food preparations. It constitutes

the staple diet of a vast chunk of the human population, providing over 20% of the required calories. It is consumed daily, in some form or other by almost every person. In Surguja district wheat is a major cereal crop of rabi season in rice based cropping system under irrigated condition and maximum farmers grow wheat crop after harvesting of rice in midland condition. There are about 11 thousand hectare area covered by wheat cultivation with an average productivity of 1584 kg/ha. The climatic condition of this district is quite favourable for wheat cultivation due to prolong & cold winter. But lack of knowledge of improved varieties, proper sowing method, use of balance fertilizer, weed control and irrigation management etc., leads to very low productivity of wheat yield. Dawood (1994) reported that grain yield increased with increasing row spacing. However there is still a wide gap between the productions potential and the actual production realized by the farmers. This may be due to partial adoption of recommended package of practices use of improved varieties, proper sowing method, Integrated Nutrient Management, timely weed control and efficent irrigation management etc. by the wheat growers. Technology gap is a major constraint in increasing wheat production Thus, there are tremendous possibilities for ehancing of wheat yield by inclusion of improved techniques in farmers practices (Traditional methods) through front line demonstration. Keeping the above facts in veiw the present study was undertaken to find out the yield gap through FLDs on wheat crop.

Materials and Methods

Front line demonstration was conducted in farmers field in different adopted villages of five blocks (Udaipur, Ambikapur, Batauli, Lundra and Lakhanpur) of Surguja district during 2014-2015 to 2016-2017. During these three years of study, 34.40 ha area was covered under front line demonstraton in at 86 farmers field. The area under each demonstration was 0.40 ha (1 acre). Before conducting demonstration basic survey of village was taken by PRA method and skill training was imparted to the selected farmers regarding different aspects of wheat cultivation. The demonstration was conducted under intensive monitoring of KVK scientists by field visit to ensure timely sowing, application of balanced nutrients, herbicide, plant protection measures and timely irrigation. The data were collected through personal interview schedule consisting of set of questionnaire, which were asked from the selected farmers by the investigator in face to face situation to give their response about each improved production technology of wheat. To compare the production and profitability of crop the yield data of FLDs and control plots were collected from each farmers and averaged out in each year at all locations during the study. The collected information was grouped and tabular analysis was done for calculating the technological gap and extension gap in yield by using the suitable statistical tools. In demonstration plots, use of improved varieties, seed treatment, line sowing, balanced fertilizer, proper weed as well as irrigation management were emphasized on the farmers field in different adopted villages were selected. The Farmers practices were indicated in case of local checks. The data on output were collected from both FLD plots as well as control plots and finally the extension gap, technology gap and technology index were worked out. The differences between the demonstration package and existing farmers practices are mentioned in (Table 1). The soils under study were sandy loam in texture with a $_{p}H$ range in between 5.5 to 6.2. The available nitrogen, phosphorous and potassium varied

between 100-250, 26-60, 250-300 Kg/ha, respectively. However, the soils were deficient in micro nutrients particularly zinc. In demonstration plots, use of quality seeds of improved varieties, timely weed control, need based pesticides as well as balanced fertilization, irrigation were emphasized and comparison has been made with the existing practices (Table 1). The necessary step for the selection of site and farmers, lay out of demonstration, etc. were followed as suggest by Chaudhary (1999). The tradition practices were maintained in case of local check. The data output were collected from both FLD plots as well as control plot and finally the extension gap, technological gap, technological index along with the benefit-cost ratio were calculated. (Samui *et al.*, 2000) as given below.

Technology gap = Potential yield - Demonstration yield

Extension gap = Demonstration yield - Farmers yield

$$\text{Technology index} = \frac{\text{Potential yield - Demonstration yield}}{\text{Potential yield}}$$

Results and Discussion

The data from the Table 2 indicated that the demonstration plots with improved package of practices gave higher yield ranges from 37.60 – 41.50 q/ha with an average of 39.55 q/haas compared to farmers practices (26.40 – 28.40 q/hawith an average of 27.40 q/ha) which could be increased by 42 – 46 % with an average of 43.30% grain yield over farmers practices. Overall, the yield of demonstration plots exceeded that of farmers plot in all the years. Similarly, Kirar *et al.,* (2005) Tomer *et al.,* (2003), Tiwari and Saxena (2001) and Tiwari *et al.,* (2003) also reported that increase in productivity and income gain under FLD's over traditional practices. The data revealed that the technoloy gap existing between the potential and demonstrable yields ranging between 2.40-0.50 q/hawith an average of 1.66q/ha. The technology gap observed may be attributed to the dissimilarity in soil fertility status and climatic condition. The Study also indicates that an extension gap exists between the improved and farmers practice with an avereage of 13.74 q/ha. Technology index varied from 6.0 to 1.19 % with and average of 4.06% which gave evidence that there was scope for further improvement in the productivity of wheat in irrigated condition. The technology index showed the feasibility of the envolved technology at the farmers fields. (Table -3)

The major differences in extent of adoption of technology interventions of FLDs before and after KVK activities

The data presented in Table- 4 indicated that before the activities of KVK in the adopted village the extent of adoption of wheat technology interventions were recorded very low due to lack of knowledge and unavailability of inputs on time. It was found that before the activities of KVK only 45.34 per cent farmers were using the HYVs in their fields while only 40.69 per cent farmers adopted proper seed rate and line sowing, 30.23 per cent used seed treatment, 32.55 per cent used balance dose of NPK and only 13.95 per cent used herbicide for spray, While after the adoption of KVK and conduction FLDs and trainings in adopted villages the extent of adoption of new technology interventions among wheat growers were increased upto 79.06 per cent in case of HYVs followed by 65.11 per cent increased in using proper seed rate and line sowing, 48.83 per cent seed treatment, 53.48 per cent use balance dose of NPK, 26.74 per cent use of herbicide.

Table.1 Package of practice under demonstration and existing farmers practices under FLD

Particulars	Demonstration package	Farmers practice
Farming situation	Irrigated upland & midland	Irrigated upland & midland
Variety	GW-322, GW-366, MP-1203	WH-147
Time of sowing	Between 15 to 30 November	Second fortnight of December
Method of sowing	Line Sowing	Broadcasting
Seed rate	100 kg/ha	150 kg/ha
Seed treatment	Carbendazim+Mencozeb @ 2gm/ kg of seed	Nil
Fertilizer Dose	NPK @ 100:60:40 kg/ha	NPK @ 69:57:0 kg/ha
Weed control	Clodinofop propargylc + metsulfuran methyl @ 400 gm/ha at 25 DAS	Nil
Irrigation	At critical stages	Frequent Irrigation

Table.2 Yield performance of wheat

Year	Variety	Area (ha)	No of famers	Yield (q/ha)		% increase in yield
				Demo.	Local Check	
2014-2015	GW-322	11.00	28	37.60	26.40	42
2015-2016	MP1203	11.00	28	39.90	27.96	42
2016-2017	GW-366	12.40	30	41.50	28.40	46
Total/**Mean**		34.40	86	**39.66**	**27.58**	**43.3**

Table.3 Yield gap analysis and technology transfer in wheat under irrigated condition

Year	Variety	Potential yield (q/ha)	Demo. Yield (q/ha)	Farmers Yield (q/ha)	Technology gap (q/ha)	Extension Gap (q/ha))	Technology Index (%)
2014-2015	GW-322	40.00	37.60	26.40	2.40	13.60	6.0
2015-2016	MP-1203	42.00	39.90	27.96	2.10	14.04	5.0
2016-2017	GW-366	42.00	41.50	28.40	0.50	13.60	1.19
Total/Mean		**41.33**	**39.66**	**27.58**	**1.66**	**13.74**	**4.06**

Table.4 Adoption level of technology intervention of front line demonstrations

(n=86)

S No	Problems	Technology intervention	Adoption level				Increased adoption (%)
			Before KVK		After KVK		
			f	%	f	%	
01	Lack of knowledge about HYVs	Improved HYVs GW-322, MP-1203, GW-366	39	45.34	68	79.06	33.72
02	Lack of knowledge of proper seed rate & sowing method	Optimum Seed rate with line sowing	35	40.69	56	65.11	24.42
03	Lack of knowledge of seed treatment	Seed treatment with Fungicide	26	30.23	42	48.83	29.74
04	Lack of knowledge about balance use of fertilizer	Balanced use of fertilizer	28	32.55	46	53.48	32.01
05	Lack of knowledge about proper weed management	Timely weed control with Clodinofop propargyl + metsulfuran methyl @ 400 gm/ha at 25 DAS	12	13.95	23	26.74	13.68

It may be due to regular follow up and face to face contact with farmers maintained by KVK Scientists. Similar findings were reported by Asiwal *et al.*, (2014). From the above findings it can be concluded that use of improved practices of wheat cultivation can reduce the technology gap to a considerable extent thus leading to increased productivity of wheat in Northern hill region of Chhattisgarh (Surguja district). Moreover, extension agencies in the district need to provide proper technical support to the farmers through different educational and extension methods to reduce the extension gap for better wheat production in the district. Finally, front line demonstration is a effective tools of technology transfer in crop production because it encourage to farmers for accept and adopt the improved cultivation techniques due to increased in grain yield and decreased in production cost. Technology index which shows the feasibility of the technology demonstrated has depicted good performance of the intervention

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