IMPACT OF FRONT-LINEDEMONSTRATION ON DIRECT SEEDED RICE TECHNOLOGY UNDER RICE-WHEAT CROPPING SYSTEM

ABSTRACT

Krishi Vigyan Kendra Satna laid out Front Line Demonstration in the year Kharif 2020 and 2021 direct seeded rice technology on farmer's field. Direct-seeded rice (DSR) has outperformed farmers' practices. DSR performance was higher at 43.03 q/ha and 44.14 q/ha in 2020 and 2021, respectively, than at 35.83 and 35.92 q/ha in farmer's practices. The average rise in performance was 21.49%. In spite of increase in yield of rice, technology gap and extension gap existed.The DSR technology gave higher gross monetary return (80380&85632Rs./ha), net monetary return (66930& 66685 Rs./ha) with higher benefit cost ratio (2.25&2.41) as compared to farmer's practices. Thevariation in per cent had increase the yield due to the use of long duration local rice varieties by following the practicingof broadcasting sowing method, poor crop management practices, lack ofknowledge and poor socio-economic condition. With respect to sustainable farming practices, the study found that FLD programs were effective at changing attitudes, skills and knowledge about DSR adoption.

Keywords: FLD; DSR;Broadcasting, Rice; yield gap; economics.

INTRODUCTION

Rice is the foremost cereals and consumed as major food at world level. Worldwide, it was grown on an area of 165.21 m ha with production of 509.32 m tones and 46.00 q/ha of average productivity [1]. In India, rice is being grown on an area of 45.07 m ha with 122.27mt of production and 27.13 q/ha of average productivity [2]. In Madhya Pradesh it is grown on 3.40 m ha area with production 12.31mt and productivity of 36.17q/ha [3]. Rice–wheat is one of the most widely adoptedcropping system in the world.Cultivating of degenerated local seed and long duration rice variety by broad casting sowing method besides that imbalance fertilizers use which results in lower productivityin rainfed area of Satna district.Agricultural universities across the country have developed a number of new and improved technologies that help increase crop yields and reduce cropping costs, especially on-farm mechanization.To close the gap between the potential return and the return on farmers' practices, extension activities such as front-line demonstrations, training and information on new technologies play a key role. Krishi Vigyan Kendras (KVKs) in the country has supported many extension activities and has reduced this yield gap which helps small and marginal farmers maintain their economic status.

This DSR technology has proven effective in saving water and improving rice yield around the world and currently contributes 23% of rice production under direct seeding (Rao et al., 2007) [4].The DSR increase the net profit by reducing the cost of production.Direct seeded rice-drill increases productivity by 8-10% over broadcasting method (Iqbal et al., 2022) [5]. Short duration variety suitable for rain fed condition, direct seeded rice, weed & nutrient management. Therefore, the present study is undertaken to create awareness on Direct Seed Rice sowing method through front line demonstration.

MATERIALS AND METHODS

Frontline demonstrations on ricewere conducted during Kharif 2020 and 2021 at farmer's fields of Satna district to found theimpact of frontline demonstration on direct sowing rice under rice-wheat cropping system. 13 FLDs were conducted with randomly selected farmer's fields inNaugawan and Shahpur villages ofMajhgawan block of satna. Geographically, Satna is located in the Satpura and Kaymore Plateau range at an elevation of 313 metres above mean sea level and between 24^o 51' 15" and 24^o 57' 30" N latitude and 80^o 43' 30" and 80^o 54' 15" E longitude.The place has a subtropical climate characterized by a hot and dry summer and a chilly winter. The farmer's fields had sandy loam soil with a shallow depth, very low readily available nitrogen, low phosphorus and but more readily available potassium. The soil reaction was close to neutral. The conventional rice-wheat cropping system has been observed on the ground since the last 15 years.Each front linedemonstration was of 0.4 ha area and Improved short duration ricevariety seed (MTU 1010), seed treatment fungicide, herbicide, pesticide and fertilizer were managed by farmers as per the recommendation of package of practices as indicated by Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur. The rice seed was sown with tractor operated seed cum fertilizer drill in demonstration field and broadcasting sowingin farmer's practices field for analysisof yield and economic feasibility. Selected farmers received training in the usage of seed cum fertilizer seed drill for sowing, numerous field visits were made to gather the necessary data during the crop growth period, and a field day was conducted before harvest day to raise awareness of the selected technology among the villagers. Farmers were informed to record all quantities of inputs used in demonstration plots as well as farmer's practice plots and used for economic analysis. The necessary steps for the selection of demonstration site and farmers, lay out of demonstration, etc were followed as suggested by Chaudhary (1999) [6]. The farmer's practices were maintained in local check. The data were collected from both demonstration practices as well as farmer's practices. To estimate the technology gap, the extension gap and the technology index, the following formula was used as indicated below were used as suggested by Samui et al. (2000) [7], Sagar and Chandra (2004) [8] and Dayanand and Mehta (2012) [9].

Extension gap = Di (Demonstration plot yield) – Fi (Farmer's practice plot yield)

Technology Gap = Pi (Potential yield)- Di (Demonstrated yield)

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

Table 1. Details of front line demonstration and farmer's practice in Rice

S.No.	Particulars	Frontline demonstration	Farmer practice	Gap
1.	Crop variety	Short duration variety (MTU 1010)	Long duration variety (Local)	Full gap
2.	Seed rate (kg/ha)	50	80	High er seed rate
3.	Seed treatment	Carboxin+ thiram @ 2 g/kg seed	No followed	Full gap
4.	Sowing method	Direct Seeded Rice Method	Broadcasting method	Full gap
5.	Fertilizer dose N:P:K:Zn (kg/ha)	80:40:20:20	60:30:0:0	Partial Gap

6.	Weed control	Bisbyribac-sodium @ 25 g/ha a.i. at 20 DAS	No followed	Full gap
7.	Plant protection measures	Need based plant protection measure	Not followed	Full gap

RESULT AND DISCUSSION

Grain Yield

Harvesting of crop in all plots were carried out under the supervision of Krishi vigyankendra specialist.Performance of yield from direct seeded rice and farmer's practices have been compared in table 2. The grain yield of the demonstrated plots was recorded higher 43.03 and 44.14 q/ha, with an average of 43.59 q/ha compared to the farmer's practices 35.83 and 35.92 q/ha with an average of 35.88 q/ha in years Kharif 2020 and 2021.It is also noted that, 20.09% and 22.88% increase in crop yield in the DSR method compared with traditional practices during Kharif 2020 and 2021 respectively.Reducing nitrogen application in the direct seeding method minimizes the impact of pests and diseases that help improve crop yields in demonstration fields.The directly seeded rice drill increases productivity by 8.51% compared to the broadcasting method.These findings are similar to those of Iqbal et al., (2021) [5].The productivity of rice could be increased in comparison to the yield obtained by farmers using local long duration varieties, unbalanced fertilizer doses, untimely sowing and no pest management.The foregoing findings are consistent with those ofSingh et al, (2015) [10].

Table 2 Effect of direct seeded rice and farmer practices on grain yield and gap analysis

Year	Yield (q/ha)		Increase (%)	Extension gap (q/ha)	Technology gap (q/ha)	Technology index (%)
	DSR	FP				
2020	43.03	35.83	20.09	7.20	6.97	13.94
2021	44.14	35.92	22.88	8.22	5.86	11.72
Average	43.59	35.88	21.49	7.71	6.42	12.83

Extension Gap

An extension gapbetween direct seeded rice and farmerspractices was calculated and depicted in table 2.The extension gap 7.20, 8.22 q/ha was observed respectively. On an average of extension gap of two years front-line demonstration programme was 7.71 q/ha.This is because of the adoption of improved technology practices such as appropriate seed rates, use of seed treatmentweed management, recommended dose of fertilizer, pest managementetc.followed in the demonstrated plots which might resulted in higher grain yield than the traditional farmer's practices.Based on the extension gap, farmers were encouraged to adopt the improved production technology to reduce the extension gap and improve their grain yield.

Technology Gap

The technology gap is the difference between potential yield and yield of demonstration plots which was recorded as6.97 and 5.86 q/ha during the kharif 2020 and 2021 respectively. The average technology gap was found 6.42 q/ha. The difference in technology gap during two years could be due to more feasibility of recommended technologies like sowing time, seed rate, seed treatment, nutrient management and plant protection measures. The difference in the two-year technology gap may be due to higher feasibility of recommended technologies such as sowing method (DSR), seed rate, seed treatment, weed control, recommended dose of fertilizer and plant protection measures.

Technology index:

The technology index shows the feasibility of the technology demonstrated in the farmer's field. The technology index varied from 13.94 and 11.72 per cent. In an average technology the index foundthat 12.83 per cent during the two the years of front-line demonstration programme,this shows the effectiveness of efficient technology interventions.This will accelerate the adoption of a proven technical response to increase rice yield performance.

Economic returns

The input and output prices for commodities prevailing in the demonstration study were used to calculate the net monetary returns and benefit: cost ratio (Table 3). Rice growing using the direct seeded method gave a higher net monetary yield Rs. 47372 per ha as compared to farmers' practices.The benefit: cost ratio of ricegrowingby following direct seeded rice sowing method were 2.33 as compared to 1.98 under farmer's practice. This may be due to higher yield achieved underdirect seeded rice compared to farmer's practice. This finding is corroborated by the conclusions of.Iqbal et al., (2021) [5].

Table 3. Effect of direct seeded rice and farmer's practices on GMR, NMR and B:C ratio

Year	Cost of cultivation (Rs/ha)		Gross returns (Rs/ha)		Net return (Rs/ha)		B:C ratio	
	DSR	FP	DSR	FP	DSR	FP	DSR	FP
2020	35721	34612	80380	66930	44659	32318	2.25	1.93
2021	35546	34521	85632	69685	50086	35164	2.41	2.02
Average	35634	34567	83006	68308	47372	33741	2.33	1.98

CONCLUSION

Farmers of Satna district under rainfed condition generally grow local seed by broad casting method besides that imbalance use of fertilizers showed low yield. To get better of this problemin the direct seeded rice (DSR) drill method was introduced for rainfed area.The average crop yield of riceusing DSR method was 43.59 q/ha andin farmer's practices it was 35.88 q/hacompared with a potential yield of 50 q/ha. By utilising 30% less crop inputs, such as seed and fertilizer, adoption of the DSR approach in rice production increased by up to 21.49 percent while reducing the occurrence of weeds, pests and diseases.Increase in grainyield under DSR extended the B:C ratio up to Rs. 2.33 higher than farmer's practices profit. The study suggests that adopting the DSR approach in rice farming minimizes inputs, weeds, pests and disease incidence.

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