



# PRODUCTIVITY AND ECONOMIC ANALYSIS OF FRONT LINE DEMONSTRATIONS ON WHEAT IN DAUSA DISTRICT, RAJASTHAN, INDIA

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## Abstract

Yield of front line demonstration trials and potential yield of the respective variety and year were compared to estimate the yield gap, which were further categorized into technology and extension gaps. Technology gaps (1327 kg/ha) was highest in case of PBW 502 in 2010-11 and lowest (615 kg/ha) of Raj 3777 in the year 2007-08. Average technology gap were 1018 kg/ha. Extension gap was highest in variety Raj 3777 (689) in year 2008-09 and lowest (476) in variety Raj 4037 in year 2009-10. The average extension gap was 573 kg/ha. Technology index was highest 22.11 per cent in the year 2010-11 and lowest 12.30 per cent in 2007-08. The average technology index was found 18.35 per cent. The highest wheat yield of FLD were found 4884 kg/ha and lowest yield were found 3838 kg/ha. Average yield of front line demonstration were found 4481 kg/ha and in local check/ farmers practice, it was 3908 kg/ha. The study indicated that average per cent increase in yield was 14.73 (573 kg/ha). Average per cent increase of gross return were found 14.48 per cent and average net return were found 29.30 per cent, which shows front line demonstrations can be increasing the living standard of farming community of Dausa district. Across the years front line demonstrations were found higher productivity ranging from 11.51 to 19.47 per cent and higher B : C ratio from 2.46 to 2.94. Front line demonstrations shows in respect of per cent increase of yield and B:C ratio is sufficient for increasing production of wheat and increasing living standard of farmers community of Dausa district. The study reveals that overall per cent increase in net returns was 29.30 (Rs. 10127/ha). It assumes that if farmers of Dausa district adopt the demonstrated technology in current wheat area (90000 ha) can earn additional benefit in terms of net return over farmers practice Rs. 91.14 crores per year improving their socioeconomic status of the farmers.

**Key words :** Front line demonstration, wheat, impact, economics, B: C ratio.

## Introduction

District Dausa falls in Agroclimatic zone IIIa, namely "Semi Arid Eastern Plains" covering Dausa, Ajmer, Tonk and Jaipur districts. The headquarter of the zone is situated at Rajasthan Agricultural Research Institute, Durgapura, Jaipur. The technologies generated by scientist of Rajasthan Agricultural Research Institute, Durgapura were tested and disseminated through front line demonstrations to farmers of Dausa district. Wheat is the most important cereal crop grown in *Rabi* season in Dausa district of Rajasthan, India. Wheat crop occupy the first rank in cereal crops grown in Dausa district. It account for 90000 hectare area and 360000 metric ton production with 4000 kg/ha productivity (Anonymous, 2013-14). The hike in production in recent years has been possible due to improvement in productivity and strategies

adopted by the government by launching various schemes. In view of this, a project on front line demonstration was started in order to demonstrate the production potential and latest advancement in package of practices among the farmers with the view to reduce the time lag between technology generated and its adoption. This also enable field functionaries to elucidate the production constraints and limitation in the adoption of technology for onward transmission to scientists to reorient their research accordingly, in order to improve the productivity all the latest and unfolded technologies were carried out in front line demonstrations plots under the direct supervision of the scientist by supplying the critical inputs.

Keeping in view the importance of front line demonstration in Dausa district of Rajasthan in productivity enhancement and increase the monetary returns, the present study was carried out.

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## Materials and Methods

The present study was conducted at the farmers fields of Dausa district of Rajasthan during the *Rabi* season of consecutive seven from 2007-08 to 2013-14. A total of 246 demonstrations and 100.6 ha area having similar number of traditional practices or local check was carried out in sandy loam soil under irrigated conditions. The wheat crop was sown in November and harvested in first fortnight of March across the years. The variety Raj 3777, Raj 4037 and PBW 502 was used in demonstrations. The front line demonstrations were conducted in different villages of Dausa district. In front line demonstrations especial emphasis was given to proper seed rate (100 kg/ha), balance use of fertilizers (90 kg/ha N and 20 kg/ha P<sub>2</sub>O<sub>5</sub>), high yielding variety (Raj 3777, Raj 4037 and PBW 502), seed treatment with pesticides, and proper & need based plant protection measures. In traditional or local check plots farmers were using higher seed rate (150 kg/ha), imbalance use of fertilizers, improper seed treatment and plant protection measures. The cross section data on output of wheat crop and input used per hectare have been collected from the front line demonstration trials. In addition to this in traditional or control plot followed by farmers have also been collected and used for further calculation like cost of cultivation, gross returns, net returns, additional cost, additional returns, B : C ratio. The benefit cost ratio (B:C) was calculated dividing the net monetary return by the total cost of cultivation.

Yield gap, extension gap and technology index were calculated as follows :

Technology gap = Potential yield – Demonstration yield

Extension gap = Demonstration yield – Farmers/ Traditional yield.

Technology index =  $\frac{Pi - Di}{Pi} \times 100$

Where, Pi = Potential yield of the crop.

Di = Demonstration yield of the crop.

## Results and Discussion

### Yield gaps

Yield of front line demonstration trials and potential yield of the respective variety and year were compared to estimate the yield gap, which was further categorized in to technology and extension gaps. Technology gaps (1327 kg/ha) was highest in case of PBW 502 in 2010-11 and lowest (615 kg/ha) of Raj 3777 in the year 2007-08. Average technology gap were 1018 kg/ha. Though, the front line demonstration trials were laid down under the supervision of KVK scientists at the farmers' fields'.

There exists gap between the potential yield and trial yield. This may be due to the soil fertility and weather condition especially rainfall intensity, interval etc. Hence, location specific recommendations are necessary to bridge the gap. Higher technology gap (647 kg/ha) were also recorded by Meena *et al.* (2012) and Katare *et al.* (2011).

The extension gap for all the year in front line demonstrations on wheat were lower as compared to technology gap except in the year 2007-08. This emphasized the effort made by the scientist to educate the farmers in adoption of improved technology to narrow the extension gaps. Among the front line demonstration on wheat in different years, extension gap was highest in variety Raj 3777 (689) in year 2008-09 and lowest (476) in variety Raj 4037 in year 2009-10. The average extension gap was 573 kg/ha. These findings are in line with the findings obtained by Kaushik (1993) and Meena *et al.* (2012) *i.e.* 406 kg/ha. All demonstrations were found lower extension gap as compared to technology gap except in the year 2007-08. Similar findings were also reported by Sharma and Sharma (2004).

### Technology index

Technology index shows the feasibility of the evaluated technology on the farmers fields'. The lower the value of the technology index more feasibility of technology. Technology index was highest by the tune of 22.11 per cent in the year 2010-11 and lowest 12.30 per cent in 2007-08. The average technology index was found 18.35 per cent. Similarly, technology index were also reported by Meena *et al.* (2012) *i.e.* 26.98 per cent and Katare *et al.* (2011) *i.e.* 24.21 per cent. This indicates that in FLDs a wide gap exists between the technology evaluated at research station and farmers fields'. Hence, according to the criterion Raj 3777 variety in year 2007-08 is best followed by in the Raj 4037 variety in year 2013-14.

### Comparison of yield and economics

The highest wheat yield of front line demonstration were found 5200 kg/ha in 2013-14 followed by 5100 kg/ha and 5000 kg/ha in 2010-11 and 2011-12, respectively. And lowest yield were found 3050 kg/ha followed by 3700 kg/ha and 3750 kg/ha in year 2010-11, 2009-10 and 2007-08, respectively. Average yield of front line demonstration were found maximum by the tune of 4767 kg/ha in year 2011-12 with the variety PBW 502, followed by 4673 kg/ha and 4671 kg/ha in year 2010-11 with the variety PBW 502 and in year 2013-14 with the Raj 4037 variety, respectively. The Maximum percentage increase over control or traditional practice recorded 19.47 per

**Table 1 :** Comparative statement of yield and other parameters of front line demonstrations on wheat in different villages of Dausa district of Rajasthan

Year	Village	Variety	No. of Demo	Area (ha)	Highest yield of demo (kg/ha)	Lowest yield of demo (kg/ha)	Average yield of demo (kg/ha)	Average yield of Local Check (kg/ha)	% increase	Technology gap (kg/ha)	Extension gap (kg/ha)	Technology index
2007-08	Different villages	Raj 3777	25	10	4875	3750	4385	3763	16.53	615	622	12.30
2008-09	Different villages	Raj 3777	23	9.2	4500	4050	4228	3539	19.47	772	689	15.44
2009-10	Different villages	Raj 4037	49	20	4800	3700	4321	3845	12.37	1179	476	21.43
2010-11	Different villages	PBW 502	24	10	5100	3050	4673	4102	13.69	1327	571	22.11
2011-12	Different villages	Raj 4037	15	6.8	4800	4200	4407	3840	14.76	1093	567	19.87
2011-12	Different villages	PBW 502	12	4.8	5000	3700	4767	4275	11.51	1233	492	20.55
2012-13	Different villages	Raj 4037	48	19.8	4800	4000	4398	3867	13.73	1102	531	20.03
2013-14	Different villages	Raj 4037	50	20	5200	4250	4671	4034	15.79	829	637	15.07
Total	-	-	246	100.6	-	-	-	-	-	-	-	-
Average	-	-	-	-	4884	3838	4481	3908	14.73	1018	573	18.35

Potential yield of Raj 3777 = 50 kg/ha, Potential yield of Raj 4037 = 55 kg/ha, Potential yield of PBW 502 = 60 kg/ha

cent in 2008-09 with the variety of Raj 3777, followed by 16.53 per cent in year 2007-08 with the same variety. Studies shows that average percentage increase was found 14.73 per cent, which show that front line demonstrations found better than farmers practices or control (Suryawansi and Prakash, 1993; Sagar and Chandra, 2004 and Meena *et al.*, 2012) for increasing the productivity of farmers' community (table 1).

On the basis of table 2 for economics of various front line demonstrations on wheat in different years, the highest per cent increase in gross return were found 18.20 per cent in year 2008-09 with the variety of Raj 3777 followed by 16.32 per cent and 14.82 per cent in year 2007-08 with the same variety and in year 2013-14 with the variety Raj 4037. Average per cent increase of gross return was found 14.48 per cent, which is substantial for the farming community of Dausa district. The highest increase in net return were found 41.94 per cent in year 2008-09 with the variety of Raj 3777 followed by 36.84 per cent and 27.97 per cent in year 2007-08 with the same variety and in year 2010-11 with the variety PBW 502, respectively. Average % increase in net return was found 29.30 per cent, which shows front line demonstrations can be increasing the living standard of farming community of Dausa district.

Among all front line demonstrations the highest B:C ratio were found 2.94 in year 2010-11 with the variety PBW 502 followed by 2.93 in the year 2011-12 with the same variety and 2.83 in year 2009-10 with the variety Raj 4037, respectively. Similar findings were also reported by Meena *et al.* (2012).

Overall results shows that variety Raj 3777 is found better in per cent increase, gross returns and net return but PBW 502 were found better in respect of B:C ratio. Across the years front line demonstrations were found higher productivity ranging from 35.39 to 42.75 per cent and higher B:C ratio from 2.46 to 2.94. Front line demonstrations shows in respect of per cent increase of yield and B:C ratio is sufficient for increasing production of wheat and increasing living standard of farmers' community of Dausa district. Presently 14.73 per cent increase reveals that if farmers adopt the demonstrated technologies, they will fetched Rs. 10127/ha as net return in addition to they are getting now in traditional practices will improving their livelihood. Presently, the area of wheat in Dausa district is 90000 ha, by adopting the demonstrated technology farmers of Dausa district can get additional Rs. 91.14 crores rupees in terms of net returns per year.

Table 2 : Economics of the front line demonstrations on wheat in different villages of Dausa district of Rajasthan.

Year	Village	Variety	No. of Demo	Area (ha)	Cost of cultivation (Rs/ha)		Gross return (Rs/ha)		% increase in gross return	Net return (Rs./ha)		% increase in net return	Additional cost (Rs/ha)	Additional return (Rs/ha)	B:C ratio	
					Demo	Local	Demo	Local		Demo	Local				Demo	Local
2007-08	Different villages	Raj 3777	25	10	21750	23100	55878	48039	16.32	34128	24939	36.84	-1350	9989	2.56	2.07
2008-09	Different villages	Raj 3777	23	9.2	23729	24996	58503	49494	18.20	34774	24498	41.94	-1267	10276	2.46	1.98
2009-10	Different villages	Raj 4037	49	20	25570	26750	72368	64408	12.36	46798	37658	24.27	-1180	7960	2.83	2.40
2010-11	Different villages	PBW 502	24	10	23820	25700	70144	61899	13.32	46324	36199	27.97	-1880	8245	2.94	2.41
2011-12	Different villages	Raj 4037	15	6.8	27270	28024	73387	64199	14.31	46117	36175	27.48	-754	9188	2.69	2.29
2011-12	Different villages	PBW 502	12	4.8	27270	28024	79793	71125	12.18	52523	43101	21.86	-754	8668	2.93	2.54
2012-13	Different villages	Raj 4037	48	19.8	30844	31271	82425	72111	14.30	51581	40840	26.30	-427	10314	2.67	2.31
2013-14	Different villages	Raj 4037	50	20	36044	36721	92041	80539	14.82	55997	43818	27.79	-677	11502	2.55	2.19
Total	-	-	246	100.6	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	27037	28073	73067	63976	14.48	-	-	29.30	-1036	9517	2.70	2.27

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