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Nutrient Management in Wheat through Front Line Demonstrations in Hingoli District

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ABSTRACT

The FLD's of wheat were conducted during the *rabi* season at twelve farmers' field to demonstrate production potential and economic benefit of recommended technologies consisting of recommended nutrient management (100:50:50:20 NPKS kg/ha + *Azotobacter* + PSB @ 25 g/kg seed) over existing farmers practices of (local check 64:46:30:00 NPKS kg ha^{-1}) at Hingoli district of Maharashtra during *rabi* season 2011-2012 and 2014-2015. Each front line demonstration was laid out on 0.40 ha area with farmers practices were considered as existing farmer practice for comparison. Recommended nutrient management technologies recorded mean yield of 25.12q/ha which was 21.33 per cent higher than that obtained with farmer's practice. The average technology gap and index were found to be 4.38 q/ha and 16.25 per cent. Improved soil fertility status at the time of harvest in demonstration plot as compared to farmer practice (local check) will save the fertilizer doses due to its judicious use of fertilizers.

Key words: Front Line Demonstration, wheat, Lok-1, BC ratio

INTRODUCTION

Wheat is the second most important winter cereal in India after rice contributing substantially to the national food security. The wheat programme in India has released 399 wheat varieties, comprising bread wheat (335), durum (54), dicoccum, (5) and triticale (5) for cultivation under different production in all the wheat growing zones (Anonymous, 2012). The growing situations vary from harsh conditions in peninsular and central regions to the favourable conditions of northern India. Wheat grown in rain fed and dry land area is faced with water scarcity, temperature extremes and minimal use of nutrients that limit the yield potential and also results in irregular production. The productivity of wheat per unit area could be increased by adopting recommended scientific and sustainable management production practices using suitable high yielding varieties. Front line demonstrations (FLD) were carried out in a systematic manner at farmers' field to convince farmers to adopt improved production management practices for enhancing wheat productivity.

MATERIALS AND METHODS

Participatory rural appraisal (PRA), group discussion and transect talk were followed to explore the detail information of study area. Twelve FLD's were conducted during *rabi* season of 2011-2012 and 2014-2015 in two villages namely Sukali vir and Bhategaon, respectively. The area under each demonstration was 0.4 ha. The soil was medium black to black cotton soil with low to medium organic carbon (0.20 to 60 %), low to medium in available phosphorus (8.20 to 17.00 kg/ ha); very high in available potassium (up to 500 kg/ ha) and soil pH was slightly alkali in nature. The treatment comprise of recommended practice (100:50:50:20 NPKS kg /ha + *Azotobactor* + PSB @ 25 g/kg seed). Fifty per cent dose of nitrogen, full P and K was applied as basal at time of sowing, remaining quantity of nitrogen applied 30 day after of sowing. The seeds were treated with *Azotobactor* and Phospho-solubilizing bacteria bio-fertilizer each 25 g/kg seed. Farmer's practice include imbalance fertilizer application (64:46:30:00 NPKS kg/ha) without seed treatment. All the participating

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Table 1: Production, technology gap, extension gap and technology index of wheat as affected by recommended practice as well as farmers practice under irrigated condition

Year	Area (ha)	No. of farmers	Grain yield (q/ha)				Per cent increase over FP	Technology gap (q/ha)	Extension gap (q/ha)	Technology index
			Potential	Recommended Practice			FP			
				Highest	Lowest	average	average			
2011-12	4.8	12	30	26	20	23.58	19.00	24.10	6.42	4.58	21.4
2014-15	4.8	12	30	28.50	24.30	25.67	22.49	18.56	4.18	4.18	11.1
Total/ mean	4.8	12	30	27.25	22.15	25.12	20.74	21.33	5.3	4.38	16.25

Table 2: Economics and fertility status of front line demonstrations of wheat as affected by recommended practices as well as farmers practices under irrigated conditions

Year	No. of Farmers	Gross expenditure (Rs./ha)		Gross returns (Rs./ha)		Net returns (Rs./ha)		Additional net return (Rs./ha)	B:C Ratio		Fertility status					
		RP	FP	RP	FP	RP	FP		RP	FP	OC (%)		P (kg/ha)		K (kg/ha)	
											RP	FP	RP	FP	RP	FP
2011-12	12	20,860	20,950	27,096	22,800	6,236	1,850	4,386	1.29	1.12	0.35	0.33	16	10.50	536	463
2014-15	12	27,750	28,150	45,333	38,236	17,583	10,086	7,497	1.63	1.36	0.43	0.37	13.50	15.70	433	461
Total/ mean	12	24,305	24,550	36,214	30,518	11,909	5,968	5,941	1.46	1.24	0.39	0.35	14.75	13.10	484.5	462

farmers were trained on all aspects of wheat production management before implementing the FLDs at their field. To study the impact of frontline demonstration, data from FLDs and local practices were collected and analyzed. The extension gap, technology gap and technology index along with benefit cost ratio were calculated using the formula as suggested by Samui *et al* (2000).

Technology Gap = Potential yield – Demonstration Yield

Extension Gap = Demonstration Yield – Farmers Yield

$$\text{Technology Index} = \frac{\text{Potential Yield} - \text{Demonstration Yield}}{\text{Potential Yield}} \times 100$$

RESULTS AND DISCUSSION

Seed yield

Wheat productivity was 25.12 q/ha under recommended practice (100:50:50:20 NPKS kg/ha + *Azotobacter* + PSB @ 25 g/kg seed) on farmers field as against a yield 20.74 q/ha under existing farmers practice (64:46:30:00 NPKS kg/ha) with an increase of 21.33 per cent following recommended practices (Table 1). Similar results have been reported by Joshi *et al* (2015).

Economics

The inputs and outputs prices of commodities prevailed during both the year of demonstrations were taken for calculating cost of cultivation, net returns and benefit cost ration show in table 2. The investment on production by adopting recommended practices was Rs. 24,305/- ha against the traditional farmers practices (Rs. 24,550/- ha). The additional net income ranged from Rs. 4,386 to Rs. 7,497/- ha with mean value 5,941/- ha over farmers practice. The average benefit cost ratio of recommended practices was 1.46 and that of farmers practice was 1.24, this may be due to higher yields obtained under recommended practices compared to farmers practice. Similar results have been reported earlier on wheat by Tiwari *et al,* (2003).

Extension and technology gap

The extension gap ranged between 4.58-4.18 q/ha emphasized the need to educate the farmers through various mean for adoption of improved agricultural production to reverse the trend of wide extension gap (table 1). The trend of technology gap ranged between 4.18-6.42 q/ha reflected the farmer's cooperation in carrying out such demonstration with encouraging results in both the years. The technology index of 21.4 to 11.1 per cent showed the feasibility of the evolved technology at the farmer's field. The reduction in technology index exhibited the feasibility of the demonstrated technology in this region.

Soil Fertility Status

The soil fertility status was increased during both the year of demonstrations soil sample were taken at the time harvesting for soil analyzing data are presented in table 2. The data revealed that increase the mean organic carbon 0.39 per cent in demonstration plot as compared to 0.35 per cent by farmer's practice. Similar is the case with available phosphorus and potassium. This also save the fertilizer as well as soil fertility status could be maintained due to judicious use of fertilizers.

CONCLUSION

FLD is playing one of the important roles in motivation the farmers for adoption of based on soil test nutrient management in wheat production. Favorable benefit cost ratio is self explanatory of economic viability of the demonstration and convinced the farmer balance fertilizer use in wheat production. The technology suitable for enhancing the productivity of wheat, calls for conduct of such demonstrations under the transfer of technology programme by KVKs.

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