SHORT COMMUNICATION

IMPACT OF SYSTEM OF RICE INTENSIFICATION (SRI) THROUGH FRONT LINE DEMONSTRATIONS

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Received-14.07.2017, Revised-16.08.2017

Abstract: Front line demonstrations were conducted at farmer's field in Umaria district during *kharif* seasons of 2009-10 to 2013-14 (five years) at seven different locations under real farming situations prevailing farmer's practices were treated as control for the comparison with recommended SRI practice. Result of front line demonstration showed a greater impact on farmer's economy due to significant increase in crop yield more than two fold over FP. Economics and benefit cost ratio of both FP and RP plots were worked out of RS. 36942/ha was recorded net profit under RP while it was Rs. 16734/ha under FP. Benefit cost ratio was 2.64 under RP, while 1.88 under FP. Demonstrating improved transplanting technique of rice open new horizon of income of farming community of Umaria district as it is profitable in both sense i.e. input saving as well as yield enhancing.

Keywords: Front line demonstration, SRI, Rice, BC ratio, Farmer, Productivity

INTRODUCTION

Rice (*Oryza sativa*) occupies a position of overwhelming importance in Indian agriculture and it constitutes the bulk of the Indian diet. For many people in the India, rice is the main source of energy, and it plays an important role in providing livelihood to the Indian population. It is largely grown in India under diverse conditions of soil, climate, hydrology and topography. Rice farming is the most important source of employment and income for the majority of rural people in this region.
The productivity of rice in the district can be increase by following the appropriate agronomic practices along with high yielding rice varieties/hybrids. Thakur *et al* (2009) suggested that the system of rice intensification (SRI) holds a great promise in increasing the rice productivity. The basic principles of SRI are; planting young seedlings (8-12 days), singly in a square pattern (Stoop et al, 2002), the soil is just kept saturated with water and flooding is not allowed till reproductive stage, after which a thin layer of water (1-2 cm) is kept in the field. Weeds are primarily controlled by mechanical weeding (*Cono weeder*) which also helps in incorporation of weed biomass and maintains proper aeration in soil (Satyanarayana *et al;* 2007).Various planting densities have been evaluated for SRI with the general recommendation being 25 cmx25 cm.
Rice is the staple food crop of the Umaria district of Madhya Pradesh; occupies 45 % of total cropped area of *kharif* season (45000 ha of total 100000 ha cultivated area). The productivity of rice in the district is only 2.26 t/ha, which is much below the national productivity (3.37 t/ha). The reason of low productivity may be attributed to non adoption of improved production technology which includes the agronomic practices and socioeconomic conditions of the tribal people. An effort made by the KVK scientists by introducing the SRI system of paddy production through front line demonstration on farmers field during *kharif* seasons of 2009-10 to 2013-14 (five consecutive years).

MATERIAL AND METHOD

Field demonstrations were conducted in Umaria district of Madhya Pradesh under close supervision of krishi vigyan Kendra. Total 48 front line demonstrations under real farming situations were conducted during *kharif* seasons of 2009-10 to 2013-14 (five consecutive years) at seven different villages namely; Lorha, Chandia, Chhotipali, Dogargawa, Kohka, Patharikhurd and Taali, respectively under krishi vigyan Kendra operational area. The area under each demonstration was 0.4 ha. The soil was sandy clay-loam in texture with moderate water holding capacity, low to medium in organic carbon (0.34-0.61%), low in available nitrogen (113.6-216.3 kg/ha), medium in available phosphorus (12.8-20.4 kg/ha), low to medium in available potassium (218.4-317.1 kg/ha) and soil pH was neutral in reaction (6.8-7.2). The treatment comprised of recommended practice (SRI) *vs* farmers practice. The rice nursery was grown on raised beds of 10mx1.5m with half meter wide irrigation cum drainage channel around the beds. Sprouted seeds of high yielding hybrids/variety sown using 5 kg/ha seed rate. The demonstration fields were well prepared by the suitable implements; fields were puddled twice and leveled properly. 12-14 days old seedlings were transplanted singly (one seedling per hill) with the 25cmx25cm spacing using SRI line marker in muddy field. Balance dose of fertilizers (100:60:40 kg NPK/ha was supplied; 25% through organic sources i.e. FYM and remaining 75% through chemical fertilizers i.e. Urea, DAP and MOP) supplied. The demonstration plots were kept moist throughout the

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vegetative growth by applying light and frequent irrigations, when required. During flowering to milking stage about 2-3 cm standing water was maintained continuously. Pyrazosulfuron @ 25 g a.i./ha as pre emergence was applied at 3-4 days after transplanting (DAT). *Cono weeder* operated at 30, 40 and 50 DAT for the mechanical weed control and increases the soil aeration during 2009-10 to 2013-14 (five consecutive years).

Farmer's practice constituted the application of high seed rate (50 kg/ha), planting of old seedling (30-45 DAS), closer planting, not adopting the line sowing, imbalance and insufficient supply of nutrients (50:30:0 kg NPK/ha), submerged the paddy field throughout the crop season, one hand weeding between 30-40 days after transplanting (DAT) etc. Harvesting and threshing operation done manually; 5mx3m plot harvested in 3 locations in each demonstration and average grain weight taken at 14% moisture. Similar procedure adopted on FP plots under each demonstration then grain weight converted into quintal per hectare (q/ha).

Before conduct the demonstration training to farmers of respective villages was imparted with respect to envisaged technological interventions. All other steps like site selection, farmers selection, layout of demonstration, farmers participation etc were followed as suggested by Choudhary (1999).Visits of farmers and extension functionaries were organized at demonstration plots to disseminate the technology at large scale. Yield data was collected from farmers practice and demonstration plots; cost of cultivation, net income and benefit cost ratio were computed and analyzed during 2009-10 to 2013-14 (five consecutive years).

RESULT AND DISCUSSION

The yield performance and economic indicators are presented in Table-1 and Table-2. The data revealed that under demonstration plot, the performance of rice yield was found to be double than that under FP during 2009-10 to 2013-14 (five consecutive years). The yield of rice under demonstration recorded was 62.9, 49.25, 57.0, 53.2, and 43.4 q/ha during 2009-10, 2010-11, 2011-12, 2012-13 and 2013-14; respectively. The yield enhancement due to technological intervention was to the tune of 40% to 108% over FP. The cumulative effect of the technological intervention over five years of demonstrations, revealed on average yield of 53.19 q/ha, 74% higher over FP. The year to year fluctuations in yield and cost of cultivation can be explained on the basis of variations in prevailing varieties/hybrids, social, economical and prevailing microclimatic condition of that particular village. Similar trends on straw yield and harvest index were found. Mukhargee (2003) has also reported that depending on identification and use of farming situation, specific intervention may have greater implications in enhancing systems productivity. Yield enhancement in different crops in front line demonstration has amply been documented by Haque (2000), Sharma (2003), Gurumukhi and Mishra (2003) and Kumar *et al* (2011).

Economic indicators i.e. gross expenditure, gross returns, net returns and B:C ratio of front line demonstration are presented in Table-2. The data clearly revealed that the net return from the recommended practice were substantially higher than FP plot during all the years of demonstration. Average net returns from recommended practice were observed to be Rs. 36942/ha in comparison to FP plot i.e. Rs 16734/ha. On an average Rs. 20208/ha as additional income is attributed to the technological intervention provided in demonstration plots i.e. SRI system.

Economic analysis of the yield performance revealed that benefit cost ratio of demonstration plots were observed significantly higher than FP plots. The benefit cost ratio of demonstration and FP plots were 2.62, 2.63, 2.96, 2.82, 2.07 and 1.93, 1.89, 2.21, 1.70, 1.70 during 2009-10, 2010-11, 2011-12, 2012-13 and 2013-14; respectively. Hence favorable benefit cost ratios proved the economic viability of the intervention made under demonstration and convinced the farmers on the utility of intervention. The data clearly revealed that the maximum increase in yield observed was during 2009-10, while maximum benefit cost ratio of 2.96 was observed during 2011-12. The variation in benefit cost ratio during all the years of demonstration may mainly on account of yield performance and input output cost in that particular years.

The result of front line demonstration convincingly brought out that the yield of rice could be increased almost double with the intervention on varietal replacement i.e. JRH-4, JRH-8, MTU-1081 and Sahbhagi in rice and SRI system of production in the Umaria district. To safeguard and sustain the food security in India, it is quite important to increase the productivity of rice under limited resources, especially water. Favorable benefit cost ratio is self explanatory of economic viability of the demonstration and convinced the farmers for adoption of SRI system of rice production. The technology suitable for enhancing the productivity of rice and calls for conduct of such demonstration under the transfer of technology programme by KVKs.

Technology gap, Extension gap and Technology index

The extension gap ranging between 12.35 to 32.7 q/ha during the period of study emphasized the need to educate the farmers through various means for the adoption of improved agricultural production to reverse the trend of wide extension gap (Table-2). The trend of technology gap ranging between 2.80 to 20.75 q/ha reflected the farmer's cooperation in carrying out such demonstration with encouraging results in all the years. The technology gap observed may be attributed to the dissimilarity in weather conditions. The technology index showed the feasibility of the evolved technology at the farmer's field. The lower the value of technology index, the more is the feasibility of the technology. As such, the reduction in technology index from 4.67% during 2011-12 to 29.64% during 2010-11 exhibited the feasibility of the demonstrated technology in this region.

Table 1. Productivity, Yield parameters, Grain yield, Straw yield and Harvest index of rice as affected by recommended practices (SRI) as well as farmer's practices:

Year	Variety	Area (ha)	No. of farmers	No. of effective tillers/hill		Grain yield (q/ha)			% increase over FP	Straw yield (q/ha)		Harvest index (%)	
				RP	FP	Potential	RP	FP		RP	FP	RP	FP
2009-10	JRH-4	6.4	16	18.25	9.28	70.0	62.9	30.2	108	80.5	48.6	44	38
2010-11	JRH-8	2.4	06	14.16	8.60	70.0	49.25	25.40	94	65.5	40.0	43	39
2011-12	MTU-1081	3.2	08	18.75	11.25	60.0	57.20	41.0	40	74.8	62.0	43	40
2012-13	JRH-8	3.2	08	17.3	8.9	70.0	53.20	28.42	87	71.0	45.0	43	39
2013-14	Sahbhagi	4.0	10	15.3	10.2	50.0	43.40	31.05	40	60	51.0	42	38
Total/Mean	---	**19.2**	**48**	**16.75**	**9.64**	**64**	**53.19**	**31.21**	**74**	**70.36**	**49.32**	**43**	**39**

Table 2. Economics of Front Line Demonstration of rice as affected by recommended practices (SRI) as well as farmer's practices:

Year	Variety	Gross expenditure (Rs/ha)		Gross returns (Rs/ha)		Net returns (Rs/ha)		Additional net return (Rs/ha)	B:C ratio		Technology gap (q/ha)	Extension gap (q/ha)	Technology index (%)
		RP	FP	RP	FP	RP	FP		RP	FP			
2009-10	JRH-4	21599	14080	56610	27180	35011	13100	21911	2.62	1.93	7.10	32.7	10.14
2010-11	JRH-8	19599	14080	51712	26670	32113	12590	19523	2.63	1.89	20.75	23.85	29.64
2011-12	MTU-1081	20562	19547	61000	43275	40438	23728	16710	2.96	2.21	2.80	16.20	4.67
2012-13	JRH-8	25500	22800	72100	38796	46600	15996	30604	2.82	1.70	16.80	24.78	24.00
2013-14	Sahbhagi	28400	25900	58950	44158	30550	18258	12292	2.07	1.70	6.60	12.35	13.2
Total/ Mean	--	**23132**	**19281**	**60074**	**36016**	**36942**	**16734**	**20208**	**2.64**	**1.88**	**10.81**	**21.97**	**16.33**

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