



Economic impact of frontline demonstration on hybrid rice (JRH 05)

Sunil Kumar Jatav^{1*}, Neelam Pradhan²

¹ Scientist, Krishi Vigyan Kendra, Tikamgarh Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh, India

² Department of Agriculture, Tikamgarh, Madhya Pradesh, India

Abstract

The present study was conducted in Balaghat district of Madhya Pradesh. The frontline demonstrations on rice crop conducted by Krishi Vigyan Kendra, Badgaon, Balaghat. The Hybrid rice JRH 05 recorded plant height (95.21 cm), higher effective tillers per plant (22.5), length of panicle (25.8 cm) and grains per panicle (242) and test weight (24.56g) then local check. It is also recorded the higher test weight (24.56g), straw yield (70.30 q per ha) and harvest index (46.66 %) over the years of study. The grain yield showed 61.5 q per ha and percentage is 30.30 % higher yield increase in FLDs over farmers practice. In spite of increase in yield of improved technology the technological gap, extension gap and technology index existed which was 13.2 q per ha, 14.3 q per hectare and 18.86 %; respectively. The improved technology of hybrid rice gave higher net return of Rs. 44722/- per ha with a benefit cost ratio of 2.44 as compared to local check. Therefore, the existing hybrid local check can be replaced by Hybrid rice JRH 05 since it fits to the existing farming situation for higher productivity and higher net return income.

Keywords: Front line demonstration, hybrid rice, yield, technology index

Introduction

Rice is the most important staple food among the cereals, consumed by more than half of the world's population (Biswas and Bhattacharya, 2013) [2]. Rice crop has occupied almost 43.86 million hectares and producing 104.80 million tonnes in India. Area under rice crop in Balaghat district is 265 thousand hectare with a productivity of 8.86 q per ha which is 47% less than that of state (Anonymus 2018). Development of high yielding genotypes requires a thorough knowledge of genetic variation in yield contributing characters. Achieving self-sufficiency in rice production and maintaining price stability are important political objectives in less developed countries, as it caters to the national food security and generating employment and income for low-income people (Ghoshet *al.*, 2009) [4]. Hence growing of hybrid rice in medium land situation would increase the rice productivity of the district, as it has potential to produce 15-20 per cent higher yield than existing varieties (Mahadevapa *et al.*, 1996). Cultivation practices comprised under FLD showed increase in yield of rice from 17.34 % to 53.52% over local check. Through the conduction of frontline demonstrations on farmer's field there was significant increase in agriculture knowledge level of the farmers and majority of farmer's showed high level of satisfaction about demonstrated technologies (Raj *et al.*, 2014) [10]. Keeping in view such problems and after detailed review the KVK, Balaghat made an attempt with an objective to substitute existing variety in medium land situation with a newly released promising hybrid rice cv. Jawahar Rice Hybrid 05 (JRH 05). Therefore, it was considered important to evaluate the impact of frontline demonstration on yield parameters and economics of hybrid rice for its suitability in the existing farming situation for higher productivity and income.

Materials and Methods

The present study was carried out by the Krishi Vigyan Kendra, Balaghat (M.P.) during kharif season from the year 2018-19 and 2019-20 in farmer's field of 2 adopted village's viz., Butte hazari and Anolajiri. Twenty farmers each having 0.2 hectares of land cultivated the hybrid rice Jawahar Rice Hybrid 05 (JRH 05) with recommended package of practices. They were supplied with seed and fertilizers. Further farmers practice of old HYV rice was selected as local check. The soil is loam in texture, low in available nitrogen, intermediate in phosphorus and high in potash with pH of 6.5 to 7.5. The nursery was growing during last week of Jun at farmer's field. The crops were transplanted during 3rd week of July and harvested during 4th week of November. Observations were recorded on different growth and yield parameters. The economic analysis was done by calculating cost of cultivation, gross return, net return and B:C ratio. Final crop yield (grain and straw) were recorded and the gross return were calculated on the basis of prevailing market price of the produce. On behalf of the introduction of the technology, different extension approaches through regular field visit and interpersonal communication were made by the scientists of Krishi Vigyan Kendra, Balaghat. Trainings on farmers and farm women were conducted for the awareness between the farmers and field day were celebrated for the horizontal spread of technology. Also leaflets and pamphlet on improved package of practices on rice cultivation were distributed among the farmers in the villages. Further study on technology gap, extension gap and technology index were calculated by the formula as suggested by Samant, (2015) [11, 12].

Technology gap = Potential yield - Demonstration yield

Extension gap = Demonstration yield - Farmers yield

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

Harvest index was calculated by the formula as suggested by Gardner *et al.*, (1985) [3]. It was calculated by using the following formula:

$$\text{Harvest index (\%)} = \frac{\text{Economic yield}}{\text{Biological yield}} \times 100$$

The data were tabular involving simple statistical tools like mean was done by standard formula to analyze the data and draw conclusions and suggestions.

Details of technology

The hybrid rice “Jawahar Rice Hybrid 05” (JRH 05) was released from Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh in the year 2007 as a suitable variety for irrigated medium land ecosystem. It is a shortduration (100-105 days), early maturing variety having yield potential of 70-75 q per hectore. It is Drought tolerant, Grain long slender. It is Suitable for double cropping under rainfed situation. It has field tolerance to blast and bacterial. Keeping all these in view the variety JRH 05 has been recommended for cultivation in MP, Chhattishgarh and Jharkhand.

Technology transferred

Table 1: Productivity, technology gap, extension gap and technology index in HYV paddy JRH 05 under front line demonstration

Year	Area (ha)	No. of Farmers	Potential yield	Yield (q/ha.)		% of local check	Technology Gap(q/ha.)	Extension Gap (q/ha.)	Technology index (%)
				Improved Technology	local Check				
2018-19	2.0	10	70.0	56.8	43.3	31.18	13.2	13.5	18.86
2019-20	2.0	10	70.0	61.5	47.2	30.30	8.5	14.3	12.14
Total/	4.0	20	70.0	59.15	45.3	30.74	10.9	13.9	15.50

Yield Parameter

The plant height (95.21 cm), higher effective tillers per plant (22.5), panicle (25.8 cm) and higher grains per panicle (242) were recorded in Hybrid JRH 05 as compared to local check variety which was attributed to their varietal difference. The differential response of tillering in the genotype could be yield attributed to its genetic potentiality. This result is found Samant, (2015) [11, 12]. The hybrid rice JRH 05 recorded the higher test weight(24.56g), straw yield (70.30 q per ha) and harvest index (46.66 %) as compared to local check. These results are in conformity with Samant, (2015) [11, 12].

Technology gap

The demonstrations in both the year recorded the technology gap of 13.2 q per haduring 2018-19 which was 8.5 q per hathat during 2019-20 and average 10.9 q per hectore (Table 1). Mandavkar *et al.* (2012) [7] observed that may be attributed to the differential soil fertility status and variable climatic conditions.

Extension gap: Higher extension gap (14.3 q ha⁻¹) was found during 2018-19 and lower (13.5 q ha⁻¹) was in 2019-20 (Table 1). The need to educate the farmers through various means like village level training, on campus training, method demonstration, front line demonstration, etc. Farmer’s use of latest production technologies with high yielding variety will subsequently change this alarming

The technology was transferred through Krishi Vigyan Kendra for varietal introduction, different extension techniques. Interested farmers were provided with breeder label seeds of JRH 05 by KVK, Balaghat. The variety JRH 05 could successfully out yield all other local and HYV varieties and recorded higher yield in Balaghat conditions. During kharif 2018-19, the area under JRH 05 expanded horizontally to 90 hectares from a mere 4 hectares during early year of introduction and accepted by 120 farmers in 60 villages.

Results and Discussion

Grain yield

Results of twenty front line demonstrations conducted during kharif 2018-19 and 2019-20 in four hectares in farmer’s field of two villages showed that the improved practice of hybrid JRH 05 recorded grain yield 61.5 q per haand percentage is 30.30% higher yield than local check variety (Table 1). This might be due to the production of higher number of effective tillers plant ⁻¹ and higher number of grains panicle⁻¹ which was in conformity with Maitiet *al.* (2003) [6] and Samant, (2015) [11, 12]. Thus the FLD might have a positive impact on farming community in the district over local check. Mondalet *al.* (2005) [8] observed that higher yield and compared to farmer yield in rice crop.

trend of galloping extension gap. The new improved technologies will eventually lead to the farmers to discontinue. Similar results were reported by Sharma *et al.* (2011) [13] and Samant, *et al.*, (2015) [11, 12].

Technology index: The Technology index was reduced from 18.86 to 12.14 per cent during 2018-19 to 2019-20 (Table 1) which shows the higher feasibility of the demonstrated technology of hybrid JRH 05. This finding is in corroborated with the findings of Raj *et al.* (2014) [10].

Economics: Economic returns as a function of grain yield and MSP sale price varied during both years. The hybrid rice JRH 05 recorded the Maximum net returns (Rs 67783/-ha) during the year 2019-20 was obtained due to higher grain yield and MSP sale rates as declared by Government of India. The higher additional returns and effective gain obtained under demonstrations could be due to improved technology, nonmonetary factors, timely operations of crop cultivation and scientific monitoring. The highest benefit: cost ratio (B:CR) was 2.55 during the year 2019-20 might be due to higher MSP sale rate declared by Government of India. It depends on grain yield and MSP. Overall average BCR was found to be 2.44 among the demonstrated plots. The results confirm the findings of frontline demonstrations on rice crops by Nirmalaet *al.* (2012) [9] and Samant, *et al.*, (2015) [11, 12].

Reason of low yield of rice at farmer's field: Delay sowing due to irregular onset of monsoon, lack of awareness, lack of latest production techniques and non-availability of quality seed of suitable variety cause yield reduction in paddy. Injudicious application of fertilizers cause no soil testing in field and hand weeding by the farmers also cause the lower yield in rice.

Limitations with marginal and small farmers: Small holding: Small and marginal farmers are resource poor having less risk bearing capacity, lack of new techniques cause no educated and do not dare to invest in the costly input which is an obstacle in adoption of proven technology.

Farm implements and tools: Traditional techniques implements and tools of poor working efficiency are still in practice due to small holding. The lack of modern mechanized implements and tools for small holding are hindrance to the adoption of improved technology.

Farmers Feedback: The hybrid rice JRH 05 produced higher yield with more tillering capacity. It is more suitable for Balaghat environment conditions. It is more resistance to disease and pest incidence. also it was found to be suitable for rice- gram/wheat cropping system

Table 2: Cost of cultivation, gross return, net return and B:C ratio as affected by front line demonstration

Year	Cost of cultivation (Rs/ha)		Gross Return (Rs/ha)		Net Return (Rs/ha)		Benefit-Cost Ratio (G Return / G Cost)	
	FP	RP	FP	RP	FP	RP	FP	RP
2018-19	35420	42560	75775	99400	40355	56840	2.14	2.34
2019-20	36580	43840	85668	111623	49088	67783	2.34	2.55
Mean	36000	43200	80722	105511	44722	62311	2.24	2.44

* Market price of paddy seed Rs.1750 and Rs.1815 q per ha. for the year 2018-19 and 2019-20, respectively

Conclusion

Thus, the cultivation of rice with improved technologies has been found more productive and grain yield might be average increased up to 30.74 per cent. Technology and extension gap extended which can be bridges by popularity package of practices with emphasis of improved variety. Replacement of high yielding variety with newly released hybrid will increase the production and net income. The existing local variety can be replaced with hybrid JRH 05 because of higher productivity and income. Hybrid rice JRH 05 was found to be suitable for Balaghat environment condition since it fits well to the existing farming situation and also it had been appreciated and adopted by the farmers.

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