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Research Article

Evaluation of front line demonstration on rice (Manaswini)

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SUMMARY : The study was carried out through front line demonstrations during *Kharif* season of 2012 and 2013 in two adopted villages of Angul district in Odisha on farmers field with the active participation of farmers with an objective to evaluate the performances of improved technology of HYV rice Manaswini as compared to the local check (MTU 1001). The HYV Manaswini recorded higher plant height (116.3 cm), effective tillers (13.6), length of panicle (24.9 cm), grains panicle^{-1} (228.5) and test weight (23.4 g) than the local check. The same also recorded grain yield 46.80 q ha^{-1} which was 21.7 per cent higher yield than local check (MTU 1001) with harvest index of 47.3 per cent over the years of study. In spite of increase in yield of improved technology the technological gap, extension gap and technology index existed which was 27.20 q ha^{-1}, 8.35 q ha^{-1} and 36.8 per cent, respectively. The improved technology of HYV Manaswini gave higher gross return of Rs. 65192 ha^{-1} with a benefit cost ratio of 1.48 and additional net return of Rs.8359 ha^{-1} as compared to local check. Hence, the existing high yielding rice variety MTU 1001 can be replaced by HYV Manaswini since it fits to the existing farming situation for higher productivity and income.

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KEY WORDS :
FLD, Rice, Extension gap, Technology gap, Technology index

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BACKGROUND AND OBJECTIVES

Rice is the predominant crop of the state with a total coverage of 4004540 hectare which is about 65 per cent of the total cultivable area of the state. Area under rice crop in Angul district is 79110 hectare with a productivity of 9.89 q ha^{-1} which is 48 per cent less than that of state (Anonymus, 2011). Usually the farmers grow medium duration local and old HYV rice in medium land and get lower yield. In future, there is no scope for further expansion in rice area and to achieve this goal, conventional breeding methods need to be supplemented with the innovative techniques. Achieving self-sufficiency in rice production and maintaining price stability are important political objectives in low-income countries because of the importance of this crop in providing national food security and generating employment and income for low-income people (Ghosh *et al.*, 2009).

Rice is the staple food crop of India and occupies highest area among all the crops grown in the country (Shobha Rani *et al.*, 2010). Currently India produces rice that is sufficient not only to meet the domestic demands, but also was the largest exporter during 2012 (Mahender Kumar *et al.*, 2013). In India, rice is the most important and extensively grown food crop for more than two third of the Indian population. During the period 1950-51to 2001-02, the area has increased by one and half times (31.0 million hectare to 44.6 million hectares), productivity by three times (668 kg/ha to 2086 kg/ ha) and production by four and half times (20.58 million tons to 90 million ton) (Mishra, 2005). But the projected demand for rice is 125 million tons by 2020 at the current rate of population growth.

Cultivation practices comprised under FLD showed increase in yield of rice from 17.34 per cent to 53.52 per cent over local check. Technology

gap was lowest (555 kg/ha) and highest (1900 kg/ha) in summer season. The extension gap in Karjat-3 and Sahyadri hybrid was higher as compared to technology gap. In *Kharif* season technology index was 21.33 per cent in Karjat-5 variety followed by Sahyadri hybrid (17.14%) and Karjat-3 (15.80%) variety of rice. Technology index was highest (22.14%) in Sahyadri hybrid grown in summer season (Mandavkar *et al.*, 2012).

The percentage increase in the rice yield over local check was 21.6 with higher gross return of Rs.17212 /ha, net return of Rs.9567/ha and benefit cost ratio 2.7 as compared to local check (Rs.14034 /ha, Rs.7331/ha and benefit cost ratio 2.5, respectively. By conduction of front line demonstrations on farmer's field there was significant increase in knowledge level of the farmers and majority of farmer's showed high level of satisfaction about demonstrated technologies (Raj *et al.*, 2014).

Keeping in view such problems and after detailed survey, the KVK Angul made an attempt with an objective to substitute existing variety in medium land situation with a newly released promising high yielding variety of rice Manaswini.

Therefore, it was considered important to evaluate growth and yield parameters of high yielding variety of medium land rice Manaswini through front line demonstrations for its suitability in the existing farming situation for higher productivity and income.

RESOURCES AND METHODS

The study was carried out through front line demonstrations during *Kharif* season of 2012 and 2013 in two adopted villages of Angul district in Odisha *viz.*, Saradhapur and Sandhapal on farmers field under medium land situations. Twenty different farmers each having 0.2 hectare of land cultivated the HYV rice Manaswini with recommended package of practices. They were supplied with seed and fertilizers. Besides farmers practice of one old HYV rice MTU 1001 was selected as local check. The soil of the study area was slightly acidic in reaction (pH-5.2 - 5.8), loam in texture with medium organic carbon content (0.45-0.60 %), medium in nitrogen (284-312 kg ha^{-1}), low in phosphorus (9.2-11.4 kg ha^{-1}) and medium in potassium (145-186.0 kg ha^{-1}) content. The crops were transplanted during 3rd week of July and harvested during 1st week of November. Observations on different growth and yield parameters were taken and 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. Harvest index is the relationship between economic yield and biological yield (Gardner *et al.*,1985).

It was calculated by using the following formula:

$$\text{Harvest index (\%)} = \frac{\text{Economic yield}}{\text{Biological yield}} \text{x100}$$

For the introduction of the technology, different extension approaches through regular field visit and interpersonal communication were made by the scientists of Krishi Vigyan Kendra, Angul. Trainings on farmers and farm women were conducted for the awareness among the farmers and field days 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 Samui *et al*. (2000).

Technology gap = Potential yield - Demonstration yield
Extension gap = Demonstration yield-Farmers yield

$$\text{Technology index (\%)} = \frac{\text{Technology gap}}{\text{Potential yield}} \text{x100}$$

Tabular analysis involving simple statistical tools like mean was done by standard formula to analyze the data and draw conclusions and implications.

Details of technology:

The high yielding variety "Manaswini"(OR-1912-24) was released from OUAT in 2008 as a suitable variety for medium land ecosystem. It is a medium duration variety having yield potential of 74.00 q ha^{-1} and matures in 130 days. It is photo insensitive, withstand late sowing, long slender grains, white straw, coloured hull. It is resistance to brown spot, gall midge, leaf folder, stem borer; moderately resistance to fungus, blast, sheath blight, WBPH and BPH. Keeping all these in view the variety "Manaswini" has been recommended for cultivation in Odisha.

Technology transferred:

For varietal introduction, different extension approaches were made. Interested farmers were supplied with truthful label seeds of Manaswini by KVK, Angul. The variety Manaswini could successfully out yield all other local and old varieties and recorded eye catching higher yield in medium lands. During *Kharif* 2013, the area under Manaswini expanded horizontally to 80 hectares from a mere 2 hectares during first year (2012) of introduction and adopted by 170 farmers in 20 villages. Due to efforts of KVK, scientists field visit, interpersonal communication and individual efforts of the farmers, the variety Manaswini could spread to a more than 50 hectares of the district (Dwibedi *et al*., 2009).

OBSERVATIONS AND ANALYSIS

The experimental findings obtained from the present study have been discussed in following heads:

Yield:

Results of 20 front line demonstrations conducted during 2012 and 2013 in 4 hectares in farmers field of two villages indicated that the improved practice of HYV Manaswini (Table 1) recorded grain yield 46.80 kg ha^{-1} which was 21.7 per cent higher yield than local check (MTU 1001). This might be due to the production of higher number of effective tillers plant^{-1} and higher number of grains panicle^{-1}. Thus, the FLD might have a positive impact on farming community in the district over local check. Similar results were also reported by Mondal *et al*. (2005) in rice crops.

Technology gap:

The demonstrations in both the year recorded the technology gap of 28.80 q ha^{-1} during 2012 which was 12.5 per cent higher than that during 2013 (Table 1). This may be attributed to the differential soil fertility status and variable climatic conditions (Mandavkar *et al*., 2012; Sharma and Sharma, 2004).

Extension gap:

Higher extension gap (9.90 q ha^{-1}) was found during 2013 and lower (6.80 q ha^{-1}) was in 2012 (Table 1). More and more use of latest production technologies with high yielding variety will subsequently change this alarming trend of galloping extension gap. The new improved technologies will eventually lead to the farmers to discontinue the old varieties and to adopt new variety. Similar results were reported by Sharma *et al.* (2011); Sharma and Sharma (2004).

Technology index

The Technology gap was reduced from 38.9 to 34.6 per cent during 2012 to 2013 (Table 1) which shows the higher feasibility of the demonstrated technology of HYV Manaswini. This finding is in corroborated with the findings of Raj *et al*. (2014); Suryawanshi and Prakash (1993) and Singh *et al.* (2007).

Plant height, effective tillers plant^{-1}, length of panicle and grains panicle^{-1}:

The taller plant height (116.3 cm), higher effective tillers per plant (13.6), longer panicle (24.9 cm) and higher grains per panicle (228.5) were recorded in HYV Manaswini (Fig. 1) as compared to local check (MTU 1001) which was attributed to their varietal difference. The differential response of tillering in the genotype could be attributed to its genetic potentiality. These results are in agreement with those of Sarker *et al.* (2013).

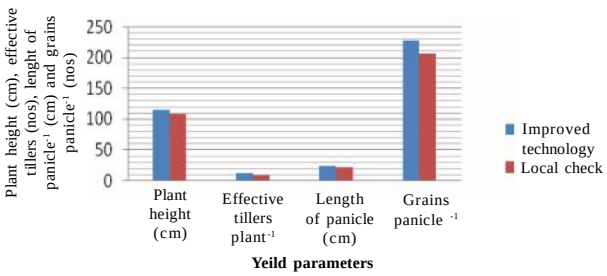

Fig. 1: Plant height, EBT plant^{-1}, lenght of panicle and grains panicle^{-1} under front line demonstration

Test weight, straw yield and harvest index:

The HYV Manaswini recorded the higher test weight (of thousand grains) (23.4 g), straw yield (52.13 q ha^{-1}) and harvest index (47.3%) as compared to local check (Fig. 2). These results are in conformity with Tripathi *et al.* (2013).

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

Years	Area (ha)	No of farmers	Yield (q ha^{-1})			% of local check	Technology gap (q ha^{-1})	Extension gap (q ha^{-1})	Technology index (%)
			Potential	Improved technology	Local check				
2012	2.0	10	74.00	45.20	38.40	17.7	28.80	6.80	38.9
2013	2.0	10	74.00	48.40	38.50	25.7	25.60	9.90	34.6
Mean	4.0	20	74.00	46.80	38.45	21.7	27.20	8.35	36.8

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

Years	Cost of cultivation (Rs. ha^{-1})		Gross return (Rs. ha^{-1})		Net return (Rs. ha^{-1})		B:C ratio	
	Improved technology	Local check	Improved technology	Local check	Improved technology	Local check	Improved technology	Local check
2012	44250	41200	61560	52420	17310	11220	1.39	1.27
2013	43950	40700	68824	54945	24874	14245	1.57	1.35
Mean	44100	40950	65192	53683	21092	12733	1.48	1.31

*Sale price of paddy seed Rs.1250 q^{-1} and Rs.1310 q^{-1} for the year 2012 and 2013, respectively and paddy straw Rs.100 q^{-1}for both the year

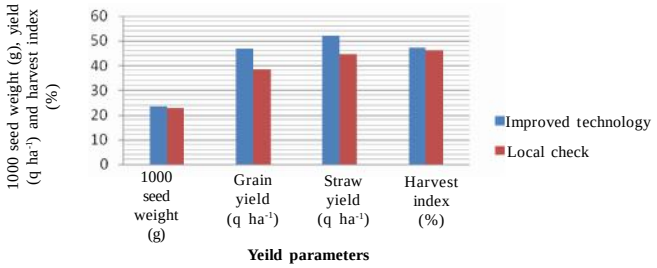

Fig. 2: 1000 seed weight, grain yield, straw yield and harvest index under front line demonstration

Economics:

The HYV Manaswini recorded the higher gross return of Rs. 65192 ha^{-1} and additional net return of Rs. 8359 ha^{-1} over local check (Table 2). Higher B:C ratio (1.48) was found in improved technology of Manaswini due to higher net return as compared to local check (MTU 1001). These finding are similar with the findings of Balai *et al*. (2013).

Reason of low yield of rice at farmer's field:

Delay sowing due to irregular onset of monsoon and non-availability of quality seed of suitable variety cause yield reduction in rice. Injudicious application of fertilizers and hand weeding by the farmers also cause the lower yield in rice.

Constraints with marginal and small farmers:

Small holding:

Small and marginal farmers are resource poor having less risk bearing ability and do not dare to invest in the costly input which is a obstacle in adoption of proven technology.

Farm implements and tools:

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

Farmers feedback:

The HYV Manaswini produced higher yield with more tillering capacity and resistance to disease and pest incidence. Also its straw is found to be suitable for mushroom cultivation.

Conclusion:

Thus, the cultivation of rice with improved technologies has been found more productive and grain yield might be increased up to 21.7 per cent. Technology and extension gap extended which can be bridges by popularity package of practices with emphasis of improved variety. Replacement of old variety with newly released variety of rice will increase the production and net income. The existing HYV of rice MTU 1001 can be replaced with HYV Manaswini because of higher productivity and income. HYV Manaswini was found to be suitable since it fits well to the existing farming situation and also it had been appreciated by the farmers.

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