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Evaluation of rice variety Manaswini through front line demonstration in Ganjam district of Odisha

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Abstract
The study was carried out through front line demonstrations during *Kharif* season of 2017 in two adopted villages of Ganjam district i.e. Padripalli, Jharapadar 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 grain yield 45.80 q ha-1 which was 21.7 per cent higher yield than local check (MTU 1001) 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.

Keywords: Front line demonstration, rice, extension gap, technology gap, technology index

Introduction
Agriculture is the mainstay of state economic and substance of life of the people. Rice covers about 69 per cent of cultivated area and is the major crop covering about 63 per cent of total area under food grains. It is the staple food of almost entire population of Orissa; therefore, the state economy is directly linked with the improvement in production and productivity of rice in the state. 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) [13]. 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) [4]. 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) [5]. But the projected demand for rice is 125 million tons by 2020 at the current rate of population growth.). India is still amongst the countries with the lowest rice yields, Seventy per cent of the all rice growing districts report yields lower than the national average. Yield gap analysis further reveals that 30 to 40 per cent of the potential yield is yet to be tapped with available high yielding varieties (HYV) with improved practices. This gap is likely due to use of local varieties, high plant population, endemic pests and diseases, low input use, defective cropping systems and a low adoption rate by farmers of high yielding technologies. More than 60 per cent rice area is concentrated in irrigated condition with low productivity (2361 kg/ ha) (Anonymous, 2011) [1].
Keeping in view such problems and after detailed survey, the KVK GANJAM-II 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.

The main aim of the Krishi Vigyan Kendra is to reduce the time lag between generation of technology at the research institution and its transfer to the farmers for increasing productivity and income from the agriculture and allied sectors on sustained basis. KVKs are grass root level organizations meant for application of technology through assessment, refinement and demonstration of proven technologies under different 'micro farming' situations in a district. Front line demonstration (FLD) is an appropriate tool to demonstrate recommended technology among the farmers. The technologies developed at the agricultural universities and research stations through research activities are demonstrated in farmer's field through FLDs. This is one of the most powerful tools of extension because farmers in general are driven by the perception that 'seeing is believing'. The main objective of FLDs is to demonstrate newly released crop production and protection technologies and its management practices at the farmer's field under different agro-climatic regions and farming situations.

Materials and Methods

The study was carried out through front line demonstrations during Kharif season of 2017 in adopted villages of Ganjam district in Odisha *viz*., Padripalli, Jharapadar on farmer's field under medium land situations. The district of Ganjam lies in two agro climatic zones i.e East & South Eastern coastal plain zone and North Eastern Ghat Zone of Odisha extending from 18^{0}13'N to 19^{0}10' North latitude to 82^{0}5' to 83^{0}23' East longitude. The Average Normal Rainfall of this district is 1276.2 mm and more than 75% of the precipitation is received over five months i.e. June- October. Agriculture is the primary occupation of inhabitants of this district. The maximum and minimum temperature of this district is 39^{0}C and 18.9^{0}C respectively ten different farmers each having 0.2 hectare of land cultivated the HYV rice Manaswini with recommended package of practices. They were supplied with seed. Besides farmers practice of one old HYV rice MTU 1001 was selected as local check. The soil of the demonstrations field were deep black cotton soil in texture with a pH ranging between 6.5 to 7.5, low in nitrogen, medium in phosphorus and medium in available potassium. However, the soils were deficient in zinc and sulphur status. In demonstration plots, use of quality seeds of improved varieties, line transplanting and timely weeding, need based pesticide, weedicide as well as balanced fertilization (using micronutrient zinc) were emphasized and comparison has been made with the existing practices. The crops were transplanted during 3rd week of July and harvested during 1st week of November the traditional practices were maintained in case of local checks. The data output were collected from FLD plots as well as control plots and finally the extension gap, technology gap, technology index along with the benefits cast ratio were work out (Samui *et al*., 2000) [9] as given below:

Technology gap = Potential yield - Demonstration yield
Extension gap = Demonstration yield-Farmers yield
Technology Index= Technology gap /potential yield*100
% increase over farmers practices = Improved practices – Farmers practices / farmers practices x 100

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:

Harvest Index: economic yield/ biological yield* 100

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, Ganjam II. 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.

Technology gap = Potential yield - Demonstration yield
Extension gap = Demonstration yield-Farmers yield
% increase over farmers practices = Improved practices – Farmers practices / farmers practices x 100

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, and 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, Ganjam-II. The variety Manaswini could successfully out yield all other local and old varieties and recorded eye catching higher yield in medium land.

Results and Discussion

The major differences were observed between demonstration package and farmer's practices are regarding recommended varieties, seed treatment, method of sowing, fertilizer dose, Method of fertilizer application, weed management and plant protection measures. Table 1 shows that under the demonstrated plot only recommended varieties, seed treating culture, herbicide and plant protection chemicals were given to farmer by the KVK and other practices were timely performed by the farmer itself under supervision of KVK scientist.
The experimental findings obtained from the present study have been discussed in following heads:

Table 1: Comparison between demonstration package and existing practices under rice FLD

Sl. no	Particulars	Demonstartion practice	Farmer's practice
1	Farming situation	Rainfed	Rainfed
2	Variety	Manaswini	MTU 1001
3	Time of sowing	15-30 June	25-30 June
4	Method of sowing	Line transplanting(20x15cm)	Without line

5	Seed treatment	Bavistin 3g/kg of seed	No seed treatment
6	Fertilizer dose	80:40:40Kg N:P:K/ha	100:50:00Kg N:P:K/ha
7	Plant protection	Need base measures adopted	Not adopted
8	Weed management	Butachlor 1.0 kg a.i./ha + 1 hand weeding at 25 DAT	2 H.W. at 20 and 40 DAT

Plant height, effective tillers plant-1, length of panicle and grains panicle-1, Test weight, harvest index:

The taller plant height (112.3 cm), higher effective tillers per plant (14.6), longer panicle (23.2cm) and higher grains per panicle (226.8) 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) [10].

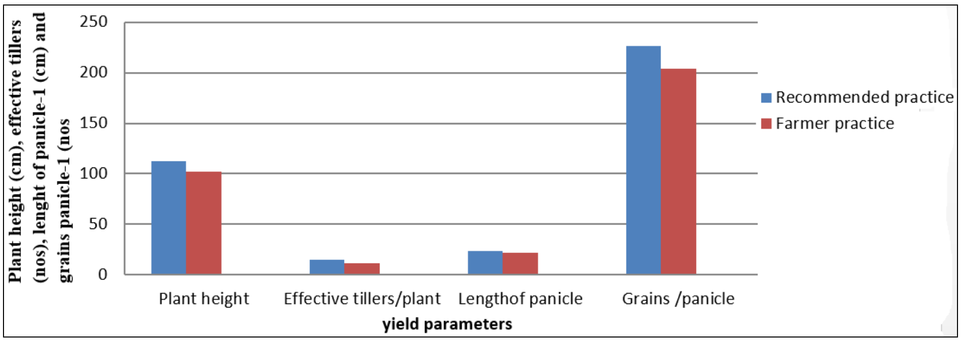

Fig 1: Plant height, EBT plant-1, lenght of panicle and grains panicle-1 under front line demonstration

Test weight, straw yield and harvest index

The HYV Manaswini recorded the higher test weight (of thousand grains) (22.5 g), straw yield (51.2 q ha-1) and harvest index (47.2%) as compared to local check (Fig. 2). These results are in conformity with Tripathi *et al.* (2013) [14].

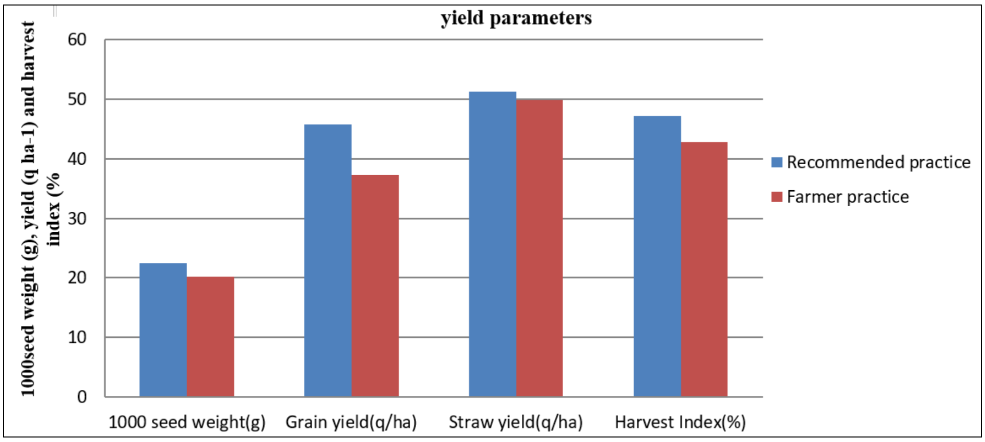

Fig 2: 1000 seed weight, grain yield, straw yield and harvest index under front line demonstration

Yield

The data of Table 2 clearly indicate that the improved practice of HYV Manaswini recorded grain yield 45.80 kg ha-1 which was 22.8 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) [8] in rice crops. The results clearly indicate the positive effects of FLDs over the existing practices toward enhancing the yield of rice.

Technology gap

The technology gap, which is the difference between potential yield and demonstration yield, was 28.2 q/ha.. The present trends reflect the farmer cooperation in carrying out such demonstration with encouraging result in subsequent years. The technology gap increased may be attributing to the dissimilarity soil fertility status and weather conditions (Mitra *et al.*, 2010 and Sharma and Sharma, 2004) [12].

Extension gap

The extension gap showed an irregular trend (Table 2).This extension gap was 8.5q/ha during period of study emphasizes the need to educate the farmer through various means for adoption of improved agriculture production to reverse the trend of wide extension gap. 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)

Technology Index

The technology index showed the feasibility of the evolved technology at the farmer’s fields. The lower the value of technology index more is the feasibility of the technology. As such, fluctuation in technology index was 38.1. Per cent during period of study (Table 2). These findings corroborate with the finding of Mokidue *et al.* (2011) [7].

Table 2: Yield, technology gap, extension gap and technology index in HYV paddy Manaswini under front line demonstration

Crop	Yield(q/ha)		% increase of local check	Technology gap(q/ha)	Extension gap(q/ha)	Technology Index (%)
Rice	Farmer practice	Recommended practice				
	37.3	45.8	22.8	28.2	8.5	38.1

Economics
The comparative profitability of rice cultivation with adoption of improved technology and farmers practices has been presented in Table 3. The adoption of improved technology under FLDs recorded higher average gross returns (70990 Rs. /ha), net returns (28540 Rs. /ha) and B: C ratio (1.67) compared to farmers practice. This fluctuating income trend was obtained due to variable price of rice and improper marketing system. These results are in conformity with the findings of Katare *et al*. (2011) [3].

Table 3: Cost of cultivation, gross return, net return and B: C ratio as affected by front line demonstration

Crop	Yield(q/ha)		Cost of cultivation		Gross return		Net return		Benefit cost ratio	
Rice	Farmer practice	Recommended practice	Farmer practice	Recommended practice	Farmer practice	Recommended practice	Farmer practice	Recommended practice	Farmer practice	Recommended practice
	37.3	45.8	39817	42450	57815	70990	17998	28540	1.45	1.67

Sale price of rice is Rs 1550/- for the year 2017-18

Reason of low yield of rice at farmer's field
Optimum planting time is not followed due to delay in land preparation in monsoon season and non availability of quality seed. Lack of popularization of rice planter for planting and use of inadequate and imbalance dose of fertilizers especially the nitrogenous and phosphatic fertilizers by farmers does not make possible to fetch potential yield. Mechanical weed control is costly and chemical control is quit uncommon in this region

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.

Farmer's 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 22.8 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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