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Tiryak Kumar Samant
Scientist (Agronomy), Krishi Vigyan Kendra, Angul (OUAT), Angul, Odisha, India

Correspondence
Tiryak Kumar Samant
Scientist (Agronomy), Krishi Vigyan Kendra, Angul (OUAT), Angul, Odisha, India

On farm assessment on growth, yield and economics of high yielding variety scented rice Geetanjali

Tiryak Kumar Samant

Abstract
The study was carried out through on farm testing during *rabi* season of 2011-12 under mid central table land zone of Odisha with an objective to evaluate the performances of high yielding variety scented rice Geetanjali as compared to the farmer's practice (Pimpudibasa). The early matured (135 days) scented rice Geetanjali recorded higher plant height(130.6 cm), effective tillers plant^{-1}(5.3), Length of panicle(23.5 cm), filled grains panicle^{-1}(72.4) with spikelet fertility(84.3%) and 1000 grain weight(22.6 g) than Pimpudibasa. The same also produced grain yield 26.5 q ha^{-1} which is 48.9 % higher yield than Pimpudibasa with harvest index (43.3%) and production efficiency(19.63 kg ha^{-1} day^{-1}). The Geetanjali gave higher gross return Rs. 34885 ha^{-1} with a benefit-cost ratio 2.02, monetary productivity (Rs.258.4 ha^{-1} day^{-1}) and additional net return Rs.13605 ha^{-1} as compared to farmers practice and thus existing variety Pimpudibasa can be replaced by Geetanjali for higher productivity and income.

Keywords: Economics, Effective tillers, Harvest index, Monetary productivity, On farm testing, Spikelet fertility

1. Introduction
Rice is the predominant crop of Odisha with a total coverage of 4.0 million hectare which is about 65 % of the total cultivable area of the state. Area under rice crop in Angul district of the state is 0.08 million hectare with a productivity of 9.89 q ha^{-1} which is 48 % less than that of state [1]. India has a large number of different types and cultivars of aromatic rice, which if properly, exploited, can satisfy taste and aroma preference of people from different regions of the world. Further, it has been reported that indigenous aromatic rice are gradually losing their aroma due to application of inorganic nitrogenous fertilizer, particularly Urea and rise in temperature at the time of flowering or grain filling [2]. Though HYV in green revolution out rightly rejected the low yielding scented varieties, demand for quality rice is now a day's fast increasing and with the improvement of living standard, it is likely to raise further. Similar observation have been found in ten local aromatic rice germ-plasmas from Orissa and Bihar and determined their agro morphological and some physic chemical characteristics [3]. 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 [4]. The new improved technologies will eventually lead to the farmers to discontinue the old varieties and to adopt new variety [5].

Keeping in view such problems and after detailed survey the KVK, Angul made an attempt with an objective to evaluate growth and yield parameters of newly released promising high yielding variety scented rice *cv*. Geetanjali through on farm testing for its suitability in the existing farming situation for substitution old variety (Pimpudibasa) with higher productivity and income.

2. Materials and Methods
2.1 Experimental site, year and climate
The study was carried out through on farm testing during rabi season of 2011-12 at Saradhapur village in Angul district under mid central table land zone of Odisha with an objective to evaluate the performances of scented rice Geetanjali as compared to the farmer's practice (Pimpudibasa). The experimental site lies in 84^0 16′ to 85^0 23′ E longitude and 20^0 31′ to 21^0 41′ N latitude and average elevation of 300 m above sea level. The mean maximum and mean minimum temperature registered in the year was 32.3^0 C and 13.4^0 C respectively. Total 97.7 mm rainfall received during the cropping period and four irrigations were supplied during panicle initiation, flowering and milking stage.

2.2 Initial Soil status
The soil of the experimental site was slightly acidic in reaction (pH-5.6), sandy loam texture with medium organic carbon content (0.52 %), medium in nitrogen (291.0 kg ha^{-1}), low in phosphorus (11.7 kg ha^{-1}) and medium in potassium (187.0 kg ha^{-1}) contents.

2.3 Procedures
The tested high yielding variety "Geetanjali" was released from CRRI in 2005 can be suitably directs sown or transplanted in rain fed and irrigated situation [6]. The treatments Geetanjali (T_1) and Pimpudibasa (T_2) were replicated thirteen times in a randomized block design. The crops were sown during 1st week of December and harvested during 4th week of March. Thirteen different farmers each having 0.08 hectare of land cultivated the HYV rice Geetanjali and Pimpudibasa (control) with recommended package of practices.

2.4 Calculations
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. Available soil nutrients as well as nutrient content were determined following the standard procedures [7]. Final crop yield (grain & 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 [8]. It was calculated by using the Following formula:

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

2.5 Statistical analysis
The data were statistically analyzed applying the techniques of analysis of variance and the significance of different sources of variations were tested by error mean square of Fisher Snedecor's 'F' test at probability level 0.05 [9].

3. Results and Discussion
3.1 Days to maturity and plant height
The HYV scented rice Geetanjali (Figure 1) was early matured (135 days), plant height (130.6 cm) in comparison to local check Pimpudibasa. Similar observation was also observed in scented rice Geetanjali [10].

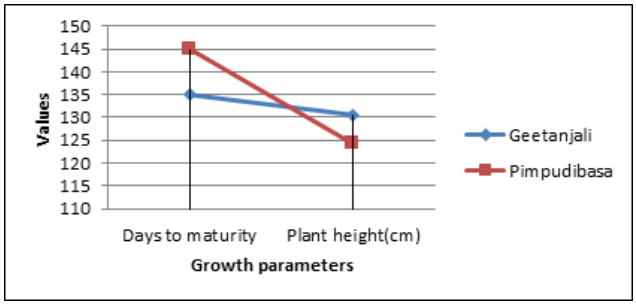

Fig 1: Effect of different treatments on days to maturity and plant height

3.2. Tillers plant^{-1}, no of effective tillers plant^{-1}, effectively of tillers and 1000 grain Weight:
Analysis of data(Table 1) indicated that higher tillers plant^{-1} (7.5), Effective tillers plant^{-1} (5.3), 1000 grain weight (22.6 g) were recorded in Geetanjali where as lower effectively of tillers (66.1 %) was observed in local check Pimpudibasa attributing to their genetic variability, varietal difference and environmental adaptability. The differential response of tillering in the genotype could be attributed to its genetic potentiality. The mortality of tillers might be due to the fact that the amount of resource available to the plant is not sufficient to produce enough photosynthetics to maintain all the tillers produced [11].

Table 1: Effect of different treatments on growth and yield parameters

Treatments	No of tillers plant^{-1}	No of effective tillers plant^{-1}	Effectivity of tiller (%)	Length of Panicle (cm)	No of panicles m^{-2}	No of Filled grains panicle^{-1}	Unfilled spikelet Panicle^{-1}	Spikelet fertility (%)	Test weight (1000 grain) (g)
Geetanjali	7.5	5.3	70.6	23.5	236.2	72.4	13.5	84.3	22.6
Pimpudibasa	5.6	3.7	66.1	20.8	172.5	63.2	22.6	73.7	21.8
SEm ±	0.097	0.065	-	0.421	5.135	1.21	0.761	-	0.04
CD at 5%	0.283	0.189	-	1.230	14.99	3.531	2.220	-	0.116

3.3 Length of panicle, panicles m^{-2}, grains panicle^{-1}, unfilled spikelets panicle^{-1}and spikelet Fertility
The longer panicle (23.5 cm) and higher panicles m^{-2}(236.2) were produced in Geetanjali. The same treatments also recorded higher no of filled grains panicle^{-1} (72.4) and spikelet fertility (84.3 %) owing to reduced no of unfilled spikelet (13.5) than the local check(Table 1). Similar finding findings also recorded for Gobindabhog rice under inorganic nutrient management [12].

3.4 Grain yield, Straw yield, Production efficiency, harvest Index and monetary productivity
An economic analysis of the data (Table 2) revealed that Geetanjali produced higher grain yield 26.5 q ha^{-1} which is 48.9 % higher yield than Pimpudibasa. This may be attributed to higher panicle production, larger panicles and high tillering capacity in some cases [6] The trend of straw yields of two varieties was similar with grain yields. Geetanjali recorded the higher straw yield (35.2 q ha^{-1}) with harvest index(43.3 %) and production efficiency(19.63 kg ha^{-1} day^{-1}) in comparison to Pimpudibasa [13]. Monetary productivity was also higher (Rs.258.4 ha^{-1} day^{-1}) in Geetanjali as comparison to farmers practice owing to its higher grain yield [14]. Similar type of results have been found in scented rice Geetanjali by [15].

Table 2: Effect of different treatments on yield and economics

Treatments	Grain yield (q ha^{-1})	Straw yield (q ha^{-1})	Harvest index (%)	Production efficiency (kg ha^{-1} day^{-1})	Cost of cultivation (Rs ha^{-1})	Gross return (Rs ha^{-1})	Net return (Rs ha^{-1})	B:C ratio	Monetary productivity (Rs ha^{-1} day^{-1})
Geetanjali	26.5	35.2	43.3	19.63	17250	34885	17635	2.02	258.4
Pimpdibasa	17.8	24.6	42.0	12.28	15000	19030	4030	1.27	131.2
SEm ±	0.243	0.389	0.357	0.198	165.99	411.65	364.38	0.016	3.26
CD at 5%	0.708	1.135	1.043	0.579	484.43	1201.36	1063.38	0.047	9.516

*Sale price of HYV scented rice seed Rs.1250/q; local scented rice seedRs.1000/q and paddy straw Rs.50/q

3.5. Economics
An analysis on economics (Table 2) revealed that the Geetanjali recorded higher gross return Rs. 34885ha^{-1} with a benefit-cost ratio 2.02 and additional net return Rs.13605 ha^{-1} as compared to farmers practice. The advantages of growing newly introduced variety over the traditional with higher return, the variation in net return and benefit-cost ratio may be attributed to the variation in the price of agri inputs and produce [16, 17].

4. Conclusions
Thus, the cultivation of scented rice Geetanjali was found to be more productive and can replace the local check since it fits to the existing farming situation for higher productivity and income.

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