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Assessment of high yielding rice varieties for their growth and yield performance in Sepahijala district of Tripura

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Abstract
In Tripura rice is grown in 2.75 lakh ha of area with a production and productivity of 8.21 lakh tones and 2.9 t ha^{-1}. High yielding rice variety is gown in most of the area of Sepahijala district but the varieties grown by the farmers either very old or susceptible to various pests and diseases due to that the production from those varieties are less as compared to the new high yielding varieties. Assessment of high yielding rice varieties for assessment of their growth and yield performance was conducted at five different farmers' fields during the year 2019-20 under on farm testing. In the experiment individual farmers are taken as replications and high yielding rice varieties are taken as treatments. From the experiment the results revealed that Gomati recorded the highest values for growth, yield and cost economics traits. Though the growth characters like plant height (140 cm), 50% flowering (74.20 days) and total duration of varieties (138.60 days) in case of Sahalom but the highest yield recorded under variety Gomati (5.36 t ha^{-1}) followed by Tripura Chickon (4.62 t ha^{-1}) and Sahalom (3.98 t ha^{-1}), where variety Gomati also resulted significantly highest test weight (23.04 g) and number of panicle (m^{-2}) (517). In the case of benefit cost ratio, Gomati recorded the highest ratio of 1.71 with the net profit of Rs 41495.32 followed by Tripura Chickon (1.48) whereas local check (Sahalom) observed the lowest B:C ratio (1.27) and net profit of Rs. 15,938.92. Gomati is performed well and increased yield of 35% with good market preference over the farmer's practices. Due to highest yield of Gomati was found to be the most suitable high yielding rice variety under Sepahijala district conditions.

Keywords: plant height, high yielding variety, yield, B:C ratio

Introduction
Rice is the staple food for more than half of the world's population and cultivation of rice is the main occupation of those engaged in agriculture. Approximately 90% of the world rice grown and consumed in Asia, where as 50% of the world's population depends on rice for food and dietary requirement [1]. Rice is the major *kharif* crops of Tripura as well as the Sepahijala district covering 78% of cultivable area of the state. Paddy area has almost remained stable at 0.27 mha and production fluctuated between 0.74 to 0.93 mt during the last decade and the productivity ranged from 2.9 to 3.7 t ha^{-1}. Therefore, food security and doubling farmers income of the state strictly depends on rice production as rice is the only cereal crop grown by the farmers in the state due to food habits and agro-climatic situations during *kharif* season. It is very important that rice production continue to sustain the ever-growing population and doubling farmer's income. Increase in agricultural production with limited resources could be possible by shifting more area under less input intensive crops and achieving higher crop yield per unit area [2]. The adoption of recommended improved varieties and production technologies are thus of utmost importance. Significant increase in yield of rice has been achieved with adoption of recommended technologies. Adoption of improved rice varieties has resulted in increase in production of rice [3, 4]. So, self sufficiency in food grains production can be attained only through enhanced productivity of rice in the coming days. Therefore, the present study was conducted to assess the high yielding rice varieties for their growth and yield parameters.

Materials and Methods
The present experiment was conducted under KVK Sepahijala from *Kharif* 2019-2020 for consecutive at five farmers' fields with three high yielding rice varieties (Gomati, Tripura Chickan, Sahalom). The design followed in the experiment was Randomized block design with 5 replications and three treatments, where the individual farmer's fields are considered as

replication and the varieties are as treatments. The rice varieties Gomati and Tripura Chickan were collected from the ICAR-NEH, Tripura Centre, Lembucherra and the rice variety Sahalom collected from farmer's field. The field was thoroughly ploughed, by giving 3 ploughings with power tiller. The seedlings were raised in separate field by following standard protocol upto 2 weeks and the 2 weeks old seedlings were transplanted at a spacing of 20 cm x 10 cm. Each variety sown in an area of 0.2 ha in each farmer's field and the recommended cultivation practices were followed with recommended dose of 5 t FYM and NPK 60:40:40 kg/ha. Basal application of 1/3rd nitrogen and entire dose of phosphorus and Potash and remaining 2/3rd dose of nitrogen was applied in equal two doses at tillering and panicle initiation stages. The recommended cultivation practices were followed as per the state recommended crop production guidelines [5]. Soil application of *Pseudomonas fluorescens* @ 2.5 kg/ha at the time of last ploughing and incorporated. The observation on plant height (cm) was taken at the time of maturity, days to 50 per cent flowering (days), duration of the variety (days) number of panicles per square meter, test weight (g), yield per ha (t/ha), gross income (Rs.), net income (Rs.), B:C ratio and market preference were recorded. The average mean data of two years are analyzed and presented in the table with appropriate statistical method [6].

Results and Discussions

Plant height is an important growth character for rice crop. From table 1 it was found that among three high yielding rice varieties; rice variety Sahalom showed significantly highest plant height 140 cm as compared to varieties Gomati 130 cm and Tripura Chickon 110.20 cm. Some recent studies showed much progress on exploring the mechanism for regulation of yield potential, plant height in rice is an important factor, the gene responsible for the trait are already been identified [7, 8]. Likewise total duration of a variety is important factor which determine 50% flowering or heading of the varieties. From the tables it was observed that rice variety Sahalom required maximum of 74.20 days for 50% flowering followed by Gomati 64.60 days and Tripura Chickon 50.20 days which ultimately affect the total duration of the varieties. The 50% flowering duration and total duration of the rice varieties depends on the day's length [9]. Among the three rice varieties Gomati showed significant highest yield of 5.36 t ha^{-1} as compared to Sahalom 3.98 t ha^{-1} and Tripura Chickon 4.62 t ha^{-1}. With the increase in duration rice varieties Gomati and Tripura Showed icrease in yield it might be due to the more photosynthates gets enough time to travel from source to sinks, again which inturn increases the yield attributes increasing grain yield [10] but in case of rice variety Sahalom it was decreases might be due increase in pests and diseases attack on the crop. The other reason for increasing the yield among the varieties might be due to the higher test weight and number of panicles per meter square due to their genetic divergence [11].

Table 1: Assessment of high yielding rice variety for growth and yield

Treatments	Plant Height (cm)	50% Flowering (days)	Duration of the varieties (days)	Number of panicle (m^{-2})	Test Weight (g)	Yield (t/ha)
T1– Gomati	130.00	64.60	127.80	517.00	23.04	5.36
T2–Tripura Chickon	110.20	50.20	110.60	453.00	21.28	4.62
T3– Sahalom	140.00	74.20	138.60	441.80	22.36	3.98
CV (%)	5.50	3.21	3.47	3.85	3.35	7.26
Sem±	3.12	0.91	1.95	8.10	0.33	0.15
CD (*p*=0.05)	10.16	2.95	6.37	26.41	1.09	0.49

The gross cost of cultivation was similar for all three improved rice varieties (Rs 58163.58) (Table 2). Among the high yielding rice varieties, market preference was higher for Tripura Chickon as well as Gomati. Gomati recorded the highest net profit of Rs. 41495.32 ha^{-1} with the benefit to cost ratio of 1.71 followed by Tripura Chickon (Rs. 27768.52 ha^{-1}; 1.48) while the Sahalom registered the lowest net profit of Rs. 15938.92 ha^{-1} and B:C ratio of 1.27. It was found that farmers were convinced with the performance of Gomati variety fetches higher income, higher yield and recorded the low incidence of diseases and pests when compared with local check (Sahalom) rice variety. Gomati is performed well and increased yield of 35% with good market preference over the farmers' practices (Sahalom).

Table 2: Cost economics for different high yielding rice varieties

Treatments	Gross Return (Rs)	Gross Cost (Rs)	Net Return (Rs)	B:C Ratio
T1– Gomati	99658.80	58163.48	41495.32	1.71
T2–Tripura Chickon	85932.00		27768.52	1.48
T3– Sahalom	74102.40		15938.92	1.27

In case of the number of panicle (m^{-2}) with Yield of varieties (t ha^{-1}), the regression equation (Y =0.016x-2.859) of number of panicle (m^{-2}) on Yield of varieties (t ha^{-1}) showed the relationship between the number of panicle (m^{-2}) as X and yield of varieties as Y, respectively, where the equation gave a good fit to the data and the co-efficient of determination (R2=0.88) fitted regression line had a significant regression co-efficient. It may be concluded that if number of panicles (m^{-2}) increases the yield of the varieties will also increase, it means number of panicle (m^{-2}) has positive correlation with the yield of the varieties.

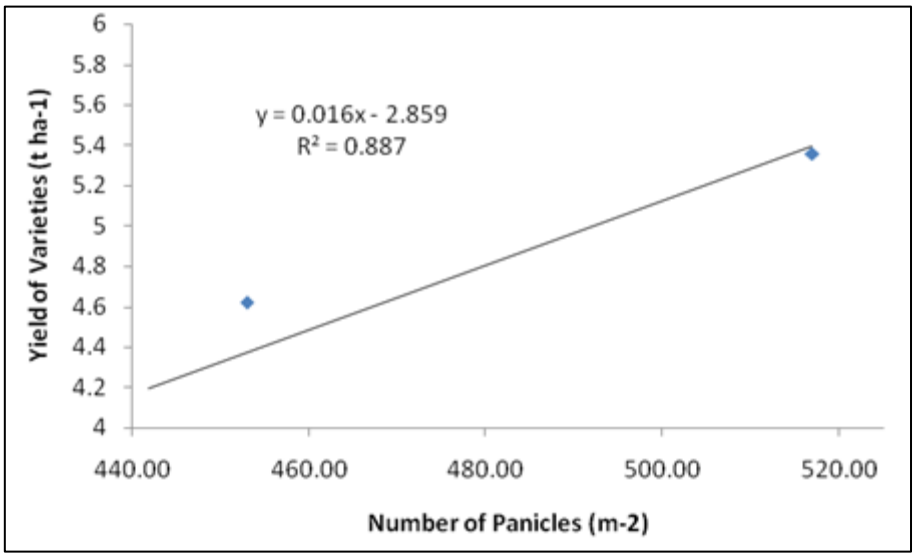

Fig 1: Regression equation between number of panicles (m^{-2}) and yield of varieties (t ha^{-1})

Conclusion

The present study concluded that rice varieties Gomati at Sepahijala district was more beneficial due to their yield contributing traits namely number of number panicles (m^{-2}), test weight (g), and yield per hectare which were recorded higher as compared to farmer's choice of variety (Sahalom). Gomati fetches higher profit (Rs. 41495.32 ha^{-1}) with benefit to cost ratio of 1.71, higher yield (5.36 t ha^{-1}) and when compared with local check (Sahalom). Gomati performed well and increased yield of 35% with good market preference over the farmers' practices. Hence, Farmers realized that rice variety Gomati is better choice in terms of yield and market under Sepahijala district. These high yielding rice hybrids will be promoted as frontline Demonstrations and mass demonstration during ensuing season at Sepahijala district.

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Declarations

Authors do not have any conflict of interest regarding the experiment.

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