Performance of climate smart rice varieties in Dibrugarh district of Assam

ABSTRACT

The trail was carried out through on farm testing in two selected villages of Dibrugarh district by Krishi Vigyan Kendra, Dibrugarh, Assam during *kharif* season of 2022 with an objective to evaluate the performance of two climate smart rice varieties *viz.* CR Dhan 801 and CR Dhan 802, submergence and drought tolerance ability with the recommended submergence tolerant rice variety, Ranjit sub 1. It is a fact that Assam is the most flood prone state in India and sometimes drought like situation also occurs in the state. Results revealed that both the varieties *viz.* CR Dhan 801 and CR Dhan 802 performed more or less similar but slightly higher than the submergence tolerant rice variety, Ranjit sub 1 in respect of growth, yield attributing characters, yield and economic point of view. Considering the results, along with rice variety, Ranjit sub 1 the climate smart rice varieties *viz.* CR Dhan 801 and CR Dhan 802 may be cultivated in Dibrugarh district of Assam.

Keywords: Climate smart rice variety, drought, economics, flood prone, growth, on-farm, yield

Introduction

Rice is the main cereal food crop of Assam occupying an area of 23.53 lakh ha with a total production of 43.82 lakh tones. Among different rice (*ahu, sali, boro* and *bao*) grown in Assam, winter (*sali*) rice occupies maximum area of 18.74 lakh ha with a productivity of 18.25 q/ha and considered as the most important crop (Anonymous, 2022). Globally, among the various agricultural commodities, production of rice ranked third after sugarcane and maize (Suthar *et al*., 2016). Assam is one of the most flood prone states in India. According to Government of Assam, water resources in the flood prone area of the state as assessed by the Rastriya Barh Ayog (RBA) is 31.05 lakh ha against the total area of state 78.52 lakh ha i.e. about. 39.58 % of the total land area of Assam and about 9.40% of total flood prone area of the country. Normally, flood occurs during the monsoon season i.e., June to September which is the peak time for cultivation of winter rice in Assam. Besides flood sometimes the state facing drought like situation during this time. Dibrugarh is one of the districtof Assam which is affected by

flood in most of the times and also facing drought to some extent. Mostly long duration local varieties of winter rice are grown in Assam as well as in Dibrugarh district and only 10-15 percent area is devoted to high yielding varieties (HYV), as a result, the productivity of rice becomes low. Besides productivity, the local varieties do not have submergence and drought tolerance ability. However rice is highly sensitive to water stress at the reproductive stage (Venuprasad *et al.*, 2007). Hence the present study was undertaken to evaluate the performance of two pre released climate smart rice varieties having both submergence and drought tolerance ability along with a recommended submergence tolerant rice variety of almost the same duration as check variety during *kharif* season of 2022 on cultivators' field in Dibrugarh district of Assam.

Materials and Methods:

On farm trials were conducted at seven farmers' fields during *kharif* season of 2022 in two different villages viz. Ciringkhat and Kacharipathargaon under Dibrugarh district of Assam. Medium land situations were selected in all the farmers' fields and soil samples of the fields were analyzed before conducting the trials. The range of analyzed soil samples had pH 5.61-6.37, organic carbon 0.57-0.71 per cent, available N 243.1-531.3 kg/ha, available P_2O_5 51.6-53.2 kg/ha and available K_2O 139.4-231.4 kg/ha. The treatments consisted of two climate smart varieties of winter rice viz. CR Dhan 801 and CR Dhan 802 and submergence tolerant winter rice variety, Ranjit sub 1 (check) were tested in randomized block design considering each farmer's field as the replication. The CR Dhan 801 and CR Dhan 802 were developed by ICAR-National Rice Research Institute (NRRI), Cuttack and notified for release in the year 2019 and the variety Ranjit sub 1 (check) was developed and recommended by Assam Agricultural University, Jorhat, Assam and released in the year 2018. The average yield of all the three varieties of winter rice is 47-50 q/ha. The plot size of each of the variety was 1300 m^2 with a total area of 3900 m^2 in each farmer. The sowingtime in the nursery bed of all the three varieties ranges from 19th to 21st June, 2022. Thirty days old nursery raised seedlings of all the three varieties were transplanted in the puddle fields from 19th to 22nd July, 2022 maintaining a spacing of 20cm x 10 cm. Immediately after transplanting in the main field the flood occurs in the district. All the three varieties were under submergence for eleven days starting from 30th July to 9th August, 2022. The recommended dose of fertilizer @60-20-40 kg N, P_2O_5 and K_2O/ha

was applied as half of N and whole dose of P_2O_5 and K_2O at the time of final puddling. The remaining part of N was applied half at tillering stage i.e., 20-30 days after transplanting and other half at panicle initiation stage. All the three varieties were ready for harvest within 144-147 days. The average rainfall received during the crop growing period ranged from 1293.2 to 1346.7 mm distributed in 58 to 63 rainy days.

Results and Discussions

The study revealed that among all the three rice varieties, CR Dhan 801 and CR Dhan 802, attained almost similar plant height with maturity duration of 144-145 days(Table 1). The check variety, Ranjit sub 1, produced slightly more plant height (120.1 cm) and matured 2-3 days later than the two test varieties. All the three rice varieties produced more or less same number of effective tillers per hill. The yield attributing characters *viz.* panicle length, number of grains/panicle and 1000 grain weight were recorded significantly higher with the CR Dhan 802 followed by CR Dhan 801 and Ranjit sub 1. Different varieties having different tiller number might be due to the varieties unique genetic potentiality (Rai *et al.* 2020). Similarly, the highest grain yield (49.6 q/ha) was recorded with the CR Dhan 802 which was at par with the variety CR Dhan 801 but significantly higher than Ranjit sub 1.The increase in yield of CR Dhan 802 over CR Dhan 801 and Ranjit sub 1 (check) was 1.43 and 5.08 per cent, respectively. Higher yield attributing characters like panicle length and number of grains/panicle were responsible for higher grain yield of CR Dhan 802. The results corroborate the findings of Malik *et al.* 2020 and Mangaraj *et al.* 2021. An analysis on economics revealed that CR Dhan 802 recorded the highest net return with a benefit- cost ratio of 2.18 followed by CR Dhan 801 and Ranjit sub 1. Economics of cultivation of all the varieties were computed as per the selling price of the produce and cost of cultivation based on the prevailing market situations. The monetory productivity (Rs/ha/day) was found to be highest with the variety CR Dhan 802 over the other two varieties.

Conclusion

Based on the study, it can be concluded that along with submergence tolerant rice variety, Ranjit sub 1, the climate smart rice varieties, CR Dhan 801 and CR Dhan 802 may be cultivated considering the yield and economic benefits for the farmers of Dibrugarh district of Assam.

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Table 1. Growth, yield attributes, grain yield and economics of submergence and drought tolerant winter rice varieties

Varieties	Plant height (cm)	Duration (days)	Number of effective tillers/hill	Panicle length (cm)	No. of grains/ panicle	1000 grain weight (g)	Grain yield (q/ha)	Net return (Rs./ha)	Benefit-Cost ratio	Monetary productivity (Rs./ha/day)
CR Dhan 801	118.3	144	12	27.1	158.72	25.34	48.9	53256.00	2.14	369.80
CR Dhan 802	119.7	145	13	28.5	161.00	25.70	49.6	54684.00	2.18	377.10
Ranjit sub 1 (Check)	120.1	147	11	25.5	155.21	24.46	47.2	49788.00	2.07	338.70
SEm±	0.576	-	0.702	1.021	2.215	0.442	0.870	-	-	-
$CD_{(P=0.05)}$	NS	-	NS	3.16	6.74	1.35	2.62	-	-	-

NS-Non significant