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Comparative Study of Yield and Yield Attributing Characters of Two Mechanically Transplanted Paddy Varieties at Morigaon District of Assam

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Abstract: Rice is considered as a staple food in Assam and occupies about two third of total cropped area in the state. The agro climatic condition of the state is very favourable for rice cultivation and hence most of the farmers earn their livelihood through production of rice on a sustainable basis. Most of the rice cultivation in the state is done by manual transplanting method which involves a number of labourers. In order to overcome the setbacks faced due to shortage of labourers in the main cropping season, the present study was accomplished using a walk behind four row mechanical transplanter for transplanting. A comparative field study was conducted to evaluate the yield attributing characters and yield of two high yielding varieties namely Binadhan 11 and Tripura Chikan at Morigaon district of Assam. Different growth parameters and yield attributing characters like plant height, tillers per hill, panicles per meter square, total numbers of grains per panicle, filled grains per panicle, thousand grain weight, biomass yield, grain yield were recorded. From the study it was found that average plant height of Bina Dhan 11 was 112.4 cm and that of Tripura Chikan was 99.2 cm. Also, average number of tillers per hill was found to be 12 and 9 respectively for Binadhan 11 and Tripura Chikan. Average number of panicles per meter square was also recorded and it was found to be 303 and 268 for Binadhan 11 and Tripura Chikan respectively. Average of total grains per panicle for Binadhan 11 was recorded to be 137 and that of Tripura Chikan was recorded to be 331. Average of filled grains per panicle was found to be 124 and 287 for Binadhan 11 and Tripura Chikan respectively. Average of biomass yield for Binadhan 11 was found to be 12.48 kg and that of Tripura Chikan was found to be 9.94 kg. After attaining a suitable moisture level, average of total grain yield of 2.80 kg was recorded in Binadhan 11 and 2.39 kg was recorded in Tripura Chikan.

Keywords: Rice, mechanical transplanter, yield, yield attributing characters.

I. INTRODUCTION

Rice is the most important cereal cultivated worldwide. In India, it is a widely consumed staple food. More than 60% population of the country is highly dependent on this food crop for their living [1]. Rice occupies about two third of the total cropped area in Assam. The total area under rice in Assam is around 50 lakh hectares with total production of 52 lakh tonnes and average productivity of 2.1 t/ha. Manual transplanting of paddy is mostly followed in this region. However, considering the inconveniences of manual transplanting the present study was undertaken with the usage of mechanical transplanter which reduces labour cost and drudgery of humans & ultimately boosts up economy of the farmers.

II. MATERIALS AND METHODS

The experiment was conducted at Dibika village of Morigaon district of Assam during the Boro season of 2019-20. The Geographic location of the experimental field is N26.22033977 and E92.22559261. The experimental field was a typical low land of clay loam soil. The selected field was divided into two adjacent plots of 0.27 ha each. In one plot Binadhan 11 and on the other Tripura Chikan was cultivated. These varieties were newly introduced in Morigaon district and they are of almost similar duration. These varieties can be grown in both sali and boro season. In this study, both the paddy varieties were transplanted mechanically using walk behind mechanical rice transplanter (Mahindra MP 461). Nitrogen, Phosphorous and Potash were applied at the rate of 60 kg/ha, 20 kg/ha and 40 kg/ha respectively. Mat nurseries for both the varieties were initially prepared on 3rd February, 2020. Binadhan 11 was transplanted on 27th February, 2020 whereas Tripura Chikan was transplanted on 28th February, 2020. The field was irrigated regularly using shallow tube well depending upon the moisture content of the field and flood irrigation method was practiced. During the study, common pests such as yellow stem borer and rice gundhi bug were found to infest the crop and management was done using chlorpyriphos 20 EC at the rate of 2 milliliter per liter of water at tillering stage for yellow stem borer and Cypermethrin 25% at the rate of 0.5 milliliter per liter of water at the time of panicle initiation for rice gundhi bug. Different data like

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plant height, panicle per meter square, total grains per panicle, filled grains per panicle, total biomass weight of 5 m^2 area, total grain weight, 1000 grain weight(test weight) and moisture content at the time of harvest were recorded. Crop cutting was done from 3 random spots of 5 m^2 (2.5m x 2m) area at the time of harvest for both the varieties. Harvesting was done on 10th and 11th July, 2020. Data of both varieties were compared for the study.

III. RESULTS AND DISCUSSION

A. Plant height:

Plant height is one of the important agronomic traits of rice that directly affects the yield of this crop. The dwarf phenotype is beneficial for the lodging problem, but if the plants are too short, it will lead to insufficient growth and ultimately affect the yield potential of rice [2]. Plant height determines or modifies yield contributing characteristics and finally shapes the grain yield [3]. Different varieties of a same crop show variation in plant height which might be due to the differences in their genetic makeup. Plant height between the two varieties increased progressively and differed significantly (Table 1). Binadhan 11 produced higher plant height at all the growth stage than that of Tripura Chikan and showed maximum height at the time of harvest (121.0 cm). On the other hand Tripura Chikan produced the shortest plant height at 50 DAT (30.5 cm).

Table 1: Plant Height for Binadhan 11 And Tripura Chikan At Different Days After Transplanting

	Plant height (cm)											
	Binadhan 11						Tripura Chikan					
	Plant 1	**Plant 2**	**Plant 3**	**Plant 4**	**Plant 5**	**Avg.**	**Plant 1**	**Plant 2**	**Plant 3**	**Plant 4**	**Plant 5**	**Avg.**
50 DAT	41.0	37.5	43.0	35.3	40.4	39.4	32.2	33.1	30.5	35.3	38.2	33.8
60 DAT	51.3	46.2	52.5	46.0	51.0	49.4	41.5	43.0	39.6	44.5	48.3	43.4
70 DAT	65.2	60.3	64.0	57.3	62.3	61.9	53.2	55.5	51.0	56.4	59.7	55.2
Harvest	**117.0**	**112.0**	**121.0**	**95.0**	**117.0**	**112.4**	**97.0**	**98.0**	**94.0**	**101.0**	**106.0**	**99.2**

DAT: Days after transplanting; Avg.: Average and cm: Centimeter

B. Numbers of tillers per hill:

Number of tillers per hill for the both varieties increased exponentially upto the harvest (Table 2). Binadhan 11 produced highest numbers of tillers per hill at the time of harvest and Tripura Chikan produced lowest numbers of tillers per hill at 50 days after transplanting (Table 2). Due to variation in the genetic makeup of the both varieties, they produced different tillers per hill. Similar results were also obtained by [4] and [5]

Table 2: Number of Tillers Per Hill of Binadhan 11 and Tripura Chikan at Different Days After Transplanting

	Number of tillers per hill											
	Binadhan 11						Tripura Chikan					
	Plant 1	**Plant 2**	**Plant 3**	**Plant 4**	**Plant 5**	**Avg.**	**Plant 1**	**Plant 2**	**Plant 3**	**Plant 4**	**Plant 5**	**Avg.**
50 DAT	6	6	5	6	5	6	4	5	6	5	4	5
60 DAT	7	8	5	6	6	6	4	5	7	6	5	5
70 DAT	7	8	7	7	6	7	5	6	7	6	5	6
Harvest	**11**	**13**	**11**	**12**	**12**	**12**	**09**	**10**	**11**	**09**	**08**	**9**

C. Panicles per meter square:

For more accuracy in the yield attributing character, panicles per meter square were recorded rather than calculating tillers per hill and hills per meter square. Highest number of panicles were recorded for Binadhan 11 (310) at the time of harvest whereas Tripura Chikan showed the lowest (262) (Table 3). The reason for the difference in the number of panicles is due to the variation in the genetic makeup of the two varieties.

Table 3: Panicles Per Meter Square for Binadhan 11 and Tripura Chikan at Different Days After Transplanting

	Panicles per meter square							
	Binadhan 11				Tripura Chikan			
	Spot 1	**Spot 2**	**Spot 3**	**Avg.**	**Spot 1**	**Spot 2**	**Spot 3**	**Avg.**
Harvest	303	310	295	303	262	267	275	268

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D. Total and filled grains per panicle:

Total grains per panicle was recorded highest for Tripura Chikan (343) and lowest for Binadhan 11 (130). The results revealed that filled grains per panicle were also highest for Tripura Chikan (327) and the lowest was for Binadhan 11 (118) (Table 4). The graphical representation of comparison of total grains and filled grains per panicle for both the varieties has been showed in Figure 1 and 2 respectively.

Table 4: Number of total grains per panicle and filled grains per panicle of binadhan 11 and tripura chikan at the time of harvest

	Binadhan 11		Tripura Chikan	
	Total grains	**Filled grains**	**Total grains**	**Filled grains**
Panicle 1	146	130	300	165
Panicle 2	130	120	331	297
Panicle 3	135	118	341	326
Panicle 4	141	128	339	320
Panicle 5	135	123	343	327
Average	**137**	**124**	**331**	**287**

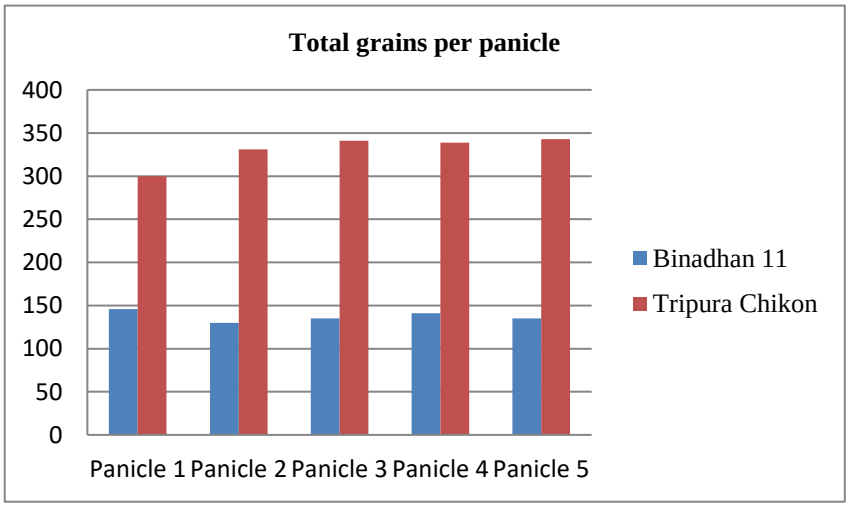

Fig 1: Comparative study of total grains per panicle for Binadhan 11 and Tripura chikan

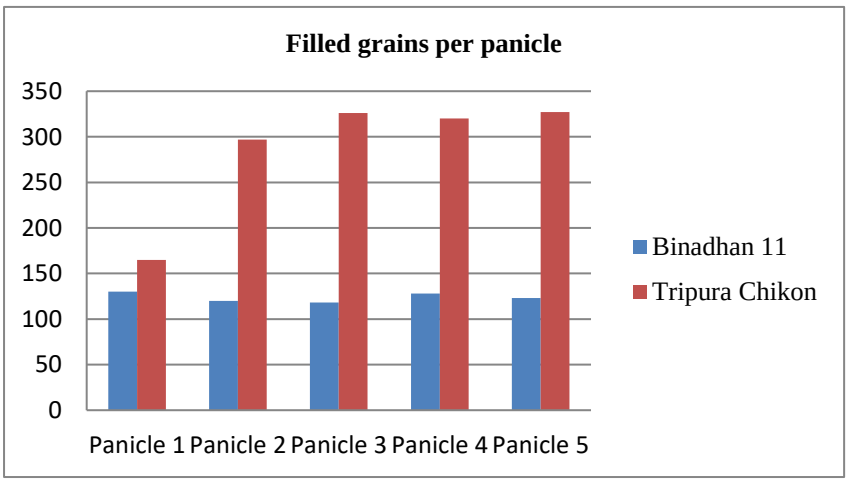

Fig 2: Comparative study of filled grains per panicle for Binadhan 11 and Tripura chikan

E. Biomass yield of 5 square meter area:

Biomass yield of 5 square meter area recorded highest (13.46 kg) in case of Binadhan 11 and lowest in case of Tripura Chikan (9.19 kg) (Table 5). This may be due to the higher plant height and number of tillers per hill of Binadhan 11 than that of Tripura Chikan.

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F. Grain yield of 5 square meter area at fresh harvest and test weight:

From the crop cut data of 5 square meter area, grain yield was recorded highest for Binadhan 11(2.85 kg) and lowest for Tripura Chikan (2.33 kg) (Table 5). Test weight of both the varieties was also recorded and found to be 13.01 g for Tripura Chikan and 20.16 g for Binadhan 11.

Table 5: Biomass Yield and Total Grain Yield (Kg) of Binadhan 11 and Tripura Chikan at the Time of Harvest

	Binadhan 11		Tripura Chikan	
	Biomass yield (kg)	**Total grain yield (kg)**	**Biomass yield (kg)**	**Total grain yield (kg)**
Spot 1	11.54	2.78	9.19	2.38
Spot 2	12.44	2.85	10.41	2.45
Spot 3	13.46	2.76	10.22	2.33
Average	**12.48**	**2.80**	**9.94**	**2.39**

IV. CONCLUSION

From the above study, it has been found that tillers per hill and plant height was higher in Binadhan 11 than that of Tripura Chikan. Number of panicles per meter square was also higher in Binadhan 11 than that of Tripura Chikan. Biomass yield and grain yield of Binadhan 11 was found to be higher than that of Tripura Chikan inspite of the fact that Tripura Chikan showed higher number of total grains and filled grains per panicle.

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