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GROWTH AND YIELD OF TRANSPLANTED AUS RICE AS INFLUENCED BY VARIETY AND NUMBER OF SEEDLINGS PER HILL

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ABSTRACT

Rashid MH, Ali AKM, Kamal MA, Jamil Uddin FM (2015) Growth and yield of transplanted aus rice as influenced by variety and number of seedlings per hill. *Int. J. Expt. Agric.* 5(2), 15-17.

The experiment was conducted at the Agronomy Field Laboratory, Bangladesh Agricultural University, Mymensingh to evaluate the influence of variety and number of seedlings hill^{-1} on the growth and yield of transplanted *aus* rice. The experiment consisted of two rice varieties *viz*., BR 3 and BR 26, and four levels of seedlings hill^{-1} *viz.*, 1, 2, 3 and 4 seedlings hill^{-1}. Variety significantly influenced all the growth parameters, yields and yield components of transplanted rice plants. BR 3 produced higher panicle length (22.33 cm), number of grains panicle^{-1} (67.99), weight of 1000 grains (24.55 g) and grain yield (3.46 t ha^{-1}) than BR 26. On the other hand, number of seedlings hill^{-1} significantly influenced all the characters studied except weight of 1000 grains. The highest grain yield (3.42 t ha^{-1}) was obtained from 3 seedlings hill^{-1} which was statistically identical with 2 seedlings hill^{-1} (3.30 t ha^{-1}). The highest straw yield (4.40 t ha^{-1}) was observed in 4 seedlings hill^{-1} which was statistically identical with 3 seedlings hill^{-1} (4.28 t ha^{-1}) and the lowest (3.77 t ha^{-1}) was recorded from 1 seedling hill^{-1}. BR 3 with 3 seedlings hill^{-1} was found as the best seedling rate to produce higher grain yield than BR 26.

Key words: *aus rice, rice variety, seedling rate*

INTRODUCTION

Number of seedlings hill^{-1} is an important factor among the management practices of rice production. It influences the plant population per unit area and availability of sunlight, nutrient and other growth factors which ultimately influence the yield and yield contributing characters of rice (Chowdhury *et al*. 1993). Optimum number of seedlings may enable the rice plant to grow properly both in its aerial and underground parts by utilizing maximum radiant energy, nutrient, space and water also can reduce seedling cost of farmers (BINA 1987; Miah *et al.* 1966). Excess number of seedlings hill^{-1} may produce higher number of tillers hill^{-1} resulting in mutual shading and lodging and thus favoring the production of straw instead of grain. Less number of seedlings hill^{-1}, on the other hand, may cause insufficient use of space nutrient utilization and tiller growth and at the end, total number of panicles unit^{-1} area may be reduced resulting in poor yield (Uddin 1989; Rashid *et al.* 2004). Since rice varieties greatly differ for their vegetative growth, stature, growing season, etc., any management practices should be recommended for a specific or a group of varieties (Sohel *et al.* 2009; Zheng *et al.* 2014). Therefore, determining the optimum number of seedlings hill^{-1} for a particular variety or varieties which is considered an important means to increase the yield of transplant *aus* rice. BR 3 and BR 26 are two popular rice varieties in Bangladesh that are widely grown in *aus* season. Therefore, the present study was undertaken to investigate the yield of transplant *aus* rice as affected by cultivars and number of seedlings hill^{-1}.

MATERIALS AND METHODS

The experiment was conducted at the Agronomy Field Laboratory, Bangladesh Agricultural University, Mymensingh. The experimental site belongs to Old Brahmaputra floodplain (AEZ-9) with medium topography and loamy texture. The pH of the soil ranged from 6.6 to 7.0. The climate of the area is characterized by high temperature and heavy rainfall during *kharif* season (April to September) and scanty or no rainfall during *rabi* season (October to March). The experiment included two factors *viz*., (i) variety (BR 3 and BR 26) and (ii) number of seedlings hill^{-1} (1, 2, 3 and 4). The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. Each block representing a replication was divided into 8 unit plots where 8 treatment combinations were allocated randomly. The total number of unit plot was 24 and size of the unit plots was 5.0 m × 2.0 m. The entire quantity of recommended doses of phosphate (100 kg TSP ha^{-1}), potash (70 kg MP ha^{-1}), gypsum (60 kg ha^{-1}) and one third of nitrogenous fertilizer (50 kg urea ha^{-1}) were applied at the time of final land preparation. Third amount of urea was top dressed at maximum tillering stage and the rest before flowering. Thirty days-old seedlings were transplanted in the experimental plots. All intercultural operations were done as and when necessary. Data were recorded from ten randomly selected hills from each unit plot. The grain and straw yields were recorded for the whole plot. The collected data were analyzed statistically following analysis of variance (ANOVA) using MSTATC software and mean differences of treatments were separated by DMRT (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

Varietal performance on the yield and yield attributes of transplanted *aus* rice

BR 3 out-yielded the variety BR 26 in terms of grain yield but when straw yield was concerned BR 26 was found to be superior (Table 1). The yield difference for grain and straw were 0.64 t ha^{-1} (22.7%) and 0.59 t ha^{-1} (13.5%), respectively. From Table 1, it is noticeable that crop characters and yields differed significantly

between the varieties. Taller plants (90.27 cm) were produced by BR 26. It was found to have more tillers hill^{-1}, in terms of both total and effective. However, the higher grain yield of BR 3 was due to favorable effect of panicle length, number of total spikelets and grains panicle^{-1} and 1000-grain weight. BR 3 could easily compensate the less number of tillers hill^{-1} by 26.9% more grains panicle^{-1} and 17.9% more 1000-grain weight and as a result gave higher grain yield. The reason why BR 26 gave higher straw yield might be that it produced taller plants and more number of tiller hill^{-1}. Variations in grain and straw yield between the two cultivars occurred mainly due to their difference in genetic makeup. BRRI (2004) reported that the growth duration of BR 3 is longer than that of BR 26, for which the former could out-yielded the later one when grown even under same management practices.

Table 1. Varietals performance of for crop characters and yields

Variety	Plant height (cm)	Number of total tillers hill^{-1}	Number of effective tillers hill^{-1}	Panicle length (cm)	Number of total spikelets panicle^{-1}	Number of grains panicle	Weight of 1000 grains (g)	Grain yield (t ha^{-1})	Straw yield (t ha^{-1})
V_1 (BR 3)	87.21	10.44	7.74	22.33	80.31	67.99	24.55	3.46	4.36
V_2 (BR 26)	90.27	12.60	8.85	20.79	62.96	54.35	20.81	2.82	3.95

Effect of number of seedlings hill^{-1} on the yield and yield attributes of transplanted *aus* rice

Number of seedlings hill^{-1} exerted significant influence on all crop characters and yields except 1000-grain weight (Table 2). Plant height showed reverse linear relation with number of seedlings hill^{-1}. This might be due to intra-hill competition of the tillers for light and denser population enabled the tillers to grow taller. Sohel *et al.* (2009) reported that intra-hill competition due to closer spacing in *T. aman* rice produced taller culm than those given wider spacing. Number of total tillers hill^{-1} was sensitive to number of seedlings hill^{-1} and followed the similar trend as of plant height. The trend of production of effective tillers, however, was quite different and increased with number of seedlings hill^{-1} up to 3 seedlings and then declined. Grain yield, number of total spikelets and grains panicle^{-1} (66.68) also followed the similar pattern. Highest number of total spikelets (78.37) and grains panicle^{-1} were found from 3 seedlings hill^{-1} and 1, 2 and 4 seedlings hill^{-1} produced the statistically similar effect. Though highest grain yield (3.42 t ha^{-1}) was recorded from 3 seedlings hill^{-1}, it was followed by 2 seedling hill^{-1} with statistically similar yield (3.30 t ha^{-1}). The yield difference was only 3.6%. This result is in conformity with Rajendra *et al.* (1998) who reported that 2 or 3 seedlings hill^{-1} produced the highest grain yield. Straw yield increased progressively with number of seedlings hill^{-1}. However, 3 and 4 seedlings hill^{-1} produced the statistically similar straw yield. This pattern of straw yield is obviously due to the similar pattern as in case of plant height and number of total tillers hill^{-1}. The same observation has been made by Karim *et al.* (1987) who reported that 4 seedlings hill^{-1} produced higher straw yield than 1 seedling hill^{-1}.

Table 2. Effect of number of seedlings hill^{-1} on crop characters and yields

Number of seedlings hill^{-1}	Plant height (cm)	Number of total tillers hill^{-1}	Number of effective tillers hill^{-1}	Panicle length (cm)	Number of total spikelets panicle^{-1}	Number of grains panicle	Weight of 1000 grains (g)	Grain yield (t ha^{-1})	Straw yield (t ha^{-1})
S_1	87.61d	10.33d	7.40d	22.18a	69.42b	59.63b	22.57	2.70c	3.77c
S_2	88.37c	10.99c	8.59b	21.83a	69.48b	59.67b	22.62	3.30ab	4.16b
S_3	89.15b	12.20b	8.93a	21.20b	78.37a	66.68a	23.01	3.42a	4.28a
S_4	89.84a	12.55a	8.26c	21.02b	69.27b	58.70b	22.55	3.15b	4.40a

S_1, S_2, S_3 and S_4 denote 1, 2, 3 and 4 seedlings hill^{-1}, respectively

Effect of interaction on the yield and yield attributes of transplanted *aus* rice

All crop characters and yields were significantly affected by the interaction of variety and number of seedlings hill^{-1} (Table 3). Highest grain yield (3.73 t ha^{-1}) was found from BR 3 when 3 seedlings hill^{-1} were transplanted and the highest straw yield (4.62 t ha^{-1}) from the same variety with 4 seedlings hii^{-1}. BR 26 produced the tallest plants with 4 seedlings hill^{-1}. It is noticeable from Table 3 that although number of seedlings hill^{-1} did not play any significant role in 1000-grain weight variation, it produced significant effect when coupled with variety. The highest 1000-grain weight (25.26 g) was recorded from the combination of BR 3 variety and 3 seedlings hill^{-1}. Plant height and number of total tillers hill^{-1} followed reverse relation with number of seedlings hill^{-1} within the varieties.

Table 3. Interaction effect of variety and number of seedlings hill^{-1} on crop characters and yields

V_1 x S_1	Plant height (cm)	Number of total tillers hill^{-1}	Number of effective tillers hill^{-1}	Panicle length (cm)	Number of total spikelets panicle^{-1}	Number of grains panicle	Weight of 1000 grains (g)	Grain yield (t ha^{-1})	Straw yield (t ha^{-1})
V_1S_1	86.16h	9.09f	7.12f	22.83a	75.30d	64.77c	24.15b	2.97b	3.88e
V_1S_2	87.07g	9.92e	7.94de	22.53a	81.23b	68.97b	24.45b	3.67a	4.44b
V_1S_3	87.57f	11.13d	8.01d	21.97ab	87.13a	73.40a	25.26a	3.73a	4.48ab
V_1S_4	88.04e	11.61c	7.89de	21.97ab	77.57c	64.83c	24.36b	3.47a	4.62a
V_2S_1	89.05d	11.57c	7.67e	21.53b	63.53f	54.50e	20.99c	2.43c	3.65e
V_2S_2	89.67c	12.07b	9.25b	21.13bc	57.73h	50.37f	20.79c	2.92b	3.88d
V_2S_3	90.72b	13.27a	9.85a	20.43cd	69.60e	59.97d	20.75c	3.10b	4.09c
V_2S_4	91.64a	13.49a	8.62c	20.07d	60.97g	52.57ef	20.74c	2.83b	4.19c

V_1 and V_2 stand for BR 3 and BR 26, respectively. S_1, S_2, S_3 and S_4 denote 1, 2, 3 and 4 seedlings hill^{-1}, respectively

CONCLUSION

It may be concluded that number of seedlings hill^{-1} affects the yield of the studied rice varieties. Though 3 seedlings per hill gave better grain yield, statistically it was similar to that of 2 seedlings hill^{-1}. Therefore, to reduce the cost of planting, it is recommended that 2 seedlings should be planted per hill for BR 3 and BR 26 rice in *aus* season.

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