

**Row spacing effect on the yield and yield components of T. Aus rice cv. BR26 (Shraboni)****M. Abuyusuf<sup>1</sup> and M. Ahmed<sup>2</sup>**<sup>1</sup>Department of Agronomy, Patuakhali Science and Technology University, Dumki, Patuakhali<sup>2</sup>Department of Agronomy, Bangladesh Agricultural University, Mymensingh

**Abstract:** The performance of T. Aus rice cv. BR26(Shraboni) under five row spacing viz. 35cm, 30cm, 25cm, 20cm and 15cm with hill spacing of 15cm was studied at the Agronomy Field Laboratory, Bangladesh Agricultural University, Mymensingh, during the period from March 2006 to June 2006. Row spacing had significant effect on plant height, number of effective tiller hill<sup>-1</sup>, number of non-effective tiller hill<sup>-1</sup>, panicle length, number of total spikelet panicle<sup>-1</sup>, grain yield, straw yield, biological yield and harvest index. The widest row spacing 35cm produced the highest number of sterile spikelet panicle<sup>-1</sup>(74.75), total number of spikelet panicle<sup>-1</sup>(103.00), straw yield (13.72 t ha<sup>-1</sup>) and biological yield(17.48 t ha<sup>-1</sup>) where as the closer row spacing 15cm produced lowest panicle length(19.56cm) and total number of spikelet panicle<sup>-1</sup>(85.00).The row spacing of 25cm produced higher plant height(110.20cm), number of effective tiller hill<sup>-1</sup>(10.34), total number of tiller hill<sup>-1</sup>(15.42), panicle length(23.91cm), number of grain panicle<sup>-1</sup> (62.83), grain yield(4.35t ha<sup>-1</sup>) and harvest index(28.43%). From the experiment, it is concluded that a row spacing of 25cm with 15cm distance between hills may be considered to be optimum to produce better grain yield for transplanted aus rice cv. BR 26 (Shraboni).

**Key words:** Aus rice, Spacing, Grain yield

**Introduction**

Rice is the staple food crop for over half of the world's population. Bangladesh ranks fourth in acreage and production (FAO,1994) and 39<sup>th</sup> in yield among the rice growing countries (IRRI,1995).The total area, production and average yield of rice in Bangladesh are 10.80million hectares, 25.08 million tons and 2.32tons, respectively (BBS,2001).There are three distinct rice growing season in Bangladesh namely: *aus*, *aman* and *boro* (Alim,1982). Besides these there are two types of *aus* one is transplant and other is broadcast. The annual production of *aus*, *aman* and *boro* rice were 1.85, 11.11 and 12.22 million tons, respectively and *aus* rice shares about 7% of the total rice production (BBS, 2004). Since horizontal expansion of rice area is not possible, the only option left is to increase the yield per unit area through the adoption of high yielding rice varieties and improved management practices as well. The growth, development, yield and yield components of rice are greatly influenced by plant spacing. Optimum plant spacing ensures plants to grow properly utilizing more solar radiation and nutrients (Miah *et al.*, 1990). When the planting densities exceed optimum level, competition among plants for light and nutrients become severe. Consequently, the growth slows down and the grain yield decreases. On the other hand, wide spacing lead to uneconomic utilization of space, encourage profuse growth of weeds and pest and this can reduce the yield. In closer spacing, more seedlings and laborers are needed which increase production cost (Uddin, 1989). The grain yield of rice is a function of radiation and leaf area index (LAI) which is regulated by spacing and thus determines the total number of ear bearing tiller per unit area. So, adjustment of spacing is necessary depending upon variety, location, season and actual condition and to create suitable microclimate for obtaining the maximum grain yield of rice. In view of the above circumstances, the present study was undertaken to estimate the effect of row spacing on the yield and yield components of T. *aus* rice cv. BR26 (Shraboni).

**Materials and Methods**

The experiment was carried out at the Agronomy Field Laboratory, Bangladesh Agricultural University,

Mymensingh, during the period from March 2006 to June 2006 with a view to finding out the effect of row spacing on the yield and yield components of T. *aus* rice cv. BR26 (Shraboni). The experimental area experiences a sub tropical climate and belonged to Old Brahmaputra Floodplain (AEZ 9) (UNDP and FAO, 1988). The land was medium high having sandy loam soil and belonged to Sonatala series under the non calcareous dark grey floodplain soil. The treatment consisted of five row spacing: 35cm, 30cm, 25cm, 20cm and 15cm with 15cm hill apart. The experiment was laid out in a randomized complete block design with four replications. The area of each plot was 10 m<sup>2</sup> (4.0 m × 2.5 m). The total numbers of plots were 20. The land was fertilized with 150, 100, 70, 60 and 10 kg ha<sup>-1</sup> urea, triple super phosphate (TSP), muriate of potash (MOP), Gypsum and Zinc sulphate, respectively. The total amount of TSP, MOP, Gypsum, Zinc sulphate and one third of urea were applied at final land preparation as basal dose. Then one third of urea was topdressed at 21 days after transplanting and then rest amount of urea was applied at 35 days after transplanting. Thirty-five day's old seedlings were transplanted on the well puddle experimental plots on 27 March 2006 at 15cm hill apart and maintaining five different row spacing as per experimental treatments. Different intercultural operations such as gap filling, weeding, irrigation, pesticides application were done as and when necessary. The crop was harvested plot wise at full maturity on 28 June 2006. The data on crop characters were recorded at harvest. The yield contributing characters were recorded from five randomly selected hills in each plot and their mean values were determined. The yields of grains and straw were recorded then finally converted to hectare basis. The data were collected on the following crop parameters such as plant height(cm), total number of tillers hill<sup>-1</sup>, number of effective tillers hill<sup>-1</sup>, number of non-effective tillers hill<sup>-1</sup>, number of total spikelet panicle<sup>-1</sup>, panicle length (cm), number of grains panicle<sup>-1</sup>, number of sterile spikelet panicle<sup>-1</sup>, weight of 1000-grains (g), grain yield (t ha<sup>-1</sup>), straw yield (t ha<sup>-1</sup>), biological yield (t ha<sup>-1</sup>) and harvest index (%).The collected data were analyzed statistically using the

analysis of variance technique and the significance of mean differences were adjusting by Least Significant Differences (LSD) test.

### Result and Discussion

**Plant height:** It was observed that Plant height was significantly affected by row spacing. The plant grown with 25cm row spacing with 15cm hill spacing produced the tallest plant (110.20cm) which was closely followed by 15cm and 35cm row spacing and shortest plants (95.66cm) were produced in 30cm row spacing (Table-1).

**Total number of tillers hill<sup>-1</sup>:** Total number of tillers hill<sup>-1</sup> was not significantly affected by row spacing. The 25cm row spacing produced highest total number of tillers hill<sup>-1</sup> (15.42) and lowest total number of tillers hill<sup>-1</sup> (10.27) was obtained from the row spacing 35cm (Table-1).

**Number of effective tillers hill<sup>-1</sup>:** Number of effective tiller hill<sup>-1</sup> is one of the most important yield contributing characters in rice. It was evident that the number of effective tillers hill<sup>-1</sup> was significantly influenced by row spacing. From the experimental result, it was obtained that the 25cm row spacing produced highest number of effective tillers hill<sup>-1</sup> (10.34).

The lowest number of effective tillers hill<sup>-1</sup> (7.41) was produced where the plant was planted with 30cm row spacing (Table-1).

**Number of non-effective tillers hill<sup>-1</sup>:** The number of non-effective tillers hill<sup>-1</sup> was significantly influenced by row spacing. The highest number of non-effective tillers hill<sup>-1</sup> (5.91) was produced in 20cm and 30cm

row spacing where as the lowest number of non-effective tillers hill<sup>-1</sup> (1.94) was produced in 35cm row spacing (Table-1).

**Number of total spikelet panicle<sup>-1</sup>:** Number of total spikelet panicle<sup>-1</sup> is one of the most important yield contributing characters in rice. It was observed that row spacing exerted highly significant effect on the number of total spikelet panicle<sup>-1</sup>. It was found that the 35cm row spacing produced highest number of total spikelet panicle<sup>-1</sup> (103.00). The lowest number of total spikelet panicle<sup>-1</sup> (85.00) was produced at 15cm row spacing (Table-1).

**Panicle length:** Panicle length was significantly affected due to row spacing. Plant grown with 25cm row spacing produced the tallest panicle length (23.91cm) which was statistically similar with 20cm and 30cm row spacing. The shortest panicle length (19.56cm) was produced in 15cm row spacing (Table-1).

**Number of grains panicle<sup>-1</sup>:** Number of grains panicle<sup>-1</sup> was significantly influenced by row spacing. The plant stands under 25cm row spacing produced maximum number of grains panicle<sup>-1</sup> (62.83). The lowest number of grains panicle<sup>-1</sup> (28.25) was produced when the crop was planted at 35cm row spacing (Table-1)

**Number of sterile spikelet panicle<sup>-1</sup>:** It was observed that the effect of row spacing was highly significant on the production of sterile spikelet panicle<sup>-1</sup>. It was found that the 35cm row spacing produced maximum number of sterile spikelet panicle<sup>-1</sup> (74.75). The lowest number of sterile spikelet panicle<sup>-1</sup> (33.58) was produced at 25cm row spacing (Table-1).

**Table 1: Effect of row spacing on the yield contributing characters of T Aus rice cv. BR26 (Shraboni)**

Row spacing (cm)	Plant height (cm)	No. of effective tiller hill <sup>-1</sup>	No. of non-effective tiller hill <sup>-1</sup>	Total no. of tiller hill <sup>-1</sup>	Panicle length (cm)	No. of grain panicle <sup>-1</sup>	No. of sterile spikelet panicle <sup>-1</sup>	Total no. of spikelet panicle <sup>-1</sup>
15	108.50a	7.83b	5.08a	12.91	19.56c	49.25b	35.75c	85.00c
20	98.66bc	8.08b	5.91a	13.99	23.24ab	48.08b	51.08b	99.16a
25	110.20a	10.34a	5.08a	15.42	23.91a	62.83a	33.58c	96.41ab
30	95.66c	7.41b	5.91a	13.32	23.16ab	34.75c	52.33b	87.08b
35	104.80ab	8.33b	1.94b	10.27	21.83b	28.25d	74.75a	103.00a
Level of significance	0.01	0.05	0.01	NS	0.01	0.01	0.01	0.01

**Weight of 1000-grains:** The weight of 1000-grains was not significantly affected by row spacing. The highest weight of 1000-grains (25.82g) was observed when the plant was planted at 25cm row spacing (Table-2).

**Grain yield:** Grain yield was significantly influenced by the row spacing. The highest grain yield (4.35 t ha<sup>-1</sup>) was obtained at 25cm row spacing which was statistically similar with 35cm (3.76 t ha<sup>-1</sup>) and 20cm (3.68 t ha<sup>-1</sup>)

row spacing. The lowest grain yield (3.13 t ha<sup>-1</sup>) was obtained from the row spacing of 30cm (Table-2).

**Straw yield:** Analysis of variance revealed that row spacing greatly influenced the yield of straw. The highest straw yield (13.72 t ha<sup>-1</sup>) was obtained at 35cm row spacing followed by 30cm (12.93 t ha<sup>-1</sup>) row spacing and the lowest straw yield (10.95 t ha<sup>-1</sup>) was obtained from the row spacing of 25cm (Table-2).

**Biological yield:** Biological yield was significantly influenced by the row spacing. The highest biological yield (17.48 t ha<sup>-1</sup>) was obtained at 35cm row spacing

which was statistically similar with 30cm (16.06 t ha<sup>-1</sup>) and 20cm (16.30 t ha<sup>-1</sup>) row spacing. The lowest biological yield (15.81t ha<sup>-1</sup>) was obtained from the row spacing of 15cm (Table-2).

It was observed that the harvest Index was significantly influenced by row spacing. The highest harvest Index of *aus* rice (28.43%) was obtained at 25cm row spacing. The lowest (19.49%) was at 30cm row spacing (Table-2).

**Table: 2 Effect of row spacing on the yield parameter of T. *Aus* rice cv.BR26 (Shraboni)**

Row spacing (cm)	1000-grain weight (g)	Grain yield (t ha <sup>-1</sup> )	Straw yield (t ha <sup>-1</sup> )	Biological yield (t ha <sup>-1</sup> )	Harvest index (%)
15	24.39	3.40b	12.41b	15.81b	21.50b
20	25.19	3.68b	12.62b	16.30ab	22.58b
25	25.82	4.35a	10.95c	15.30b	28.43a
30	25.42	3.13b	12.93ab	16.06ab	19.49b
35	24.63	3.76b	13.72a	17.48a	21.51b
LSD value		0.589	0.932	1.408	3.199
Level of significance	NS	0.01	0.01	0.05	0.01

NS= Not significant. Same value(s) bearing same letter(s) do not differ significantly

**Harvest Index:** The result showed that grain yield increased with the increasing of row spacing up to 25cm, after that decreased with increasing row spacing. This might be due to the fact that yield contributing characters like grain panicle<sup>-1</sup>, and sterile spikelet panicle<sup>-1</sup>. Similar results were reported by Siddiqui *et al.* (1999). Patra and Nayak (2001) also reported that rice grain yield under closer spacing was significantly superior to wider spacing mainly due to higher number of panicle m<sup>-2</sup>. From the above discussion, it was observed that the highest grain yield (4.35 t ha<sup>-1</sup>) was produced when the crop was transplanted at 25cm row spacing with 15cm distance between hills.

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