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EFFECT OF BED WIDTH AND HILL SPACING ON THE PERFORMANCE OF T. AMAN RICE CV. *SUPERAMANDHAN*

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ABSTRACT

Roy S, Islam N, Hoshain S, Hasan AK, Hossen K (2017) Effect of bed width and hill spacing on the performance of T. Aman rice cv. *Superamandhan. Int. J. Sustain. Crop Prod.* 12(3), 1-6.

An experiment was carried out at the Agronomy Field Laboratory of Bangladesh Agricultural University, Mymensingh during the period from June to December 2015 to study the effect of bed planting and their spacing on the yield performance of transplant T. *Aman* rice cv. *Superamandhan.* The experiment was laid out in a randomized complete block design (RCBD) with three replications. The highest plant height (184.17 cm), total tillers hill^{-1} (36.44), effective tillers hill^{-1} (31.51), number of grains panicle^{-1} (244.96) and the highest grain yield (6.01 t hill^{-1}) were obtained from different planting beds in different planting width. The highest number of total number of tillers hill^{-1}, effective tillers hill^{-1} and highest number of grain panicle^{-1} were obtained from 60 cm bed size with 50 cm spacing. From the analysis of the yield data it was observed that due to shorter spacing of bed size (30 cm) and spacing (40 cm) more yield was produced because of its higher density of plants. The highest plant height, grain yield, straw yield and biological yield hill^{-1} were obtained from the combination of 30 cm bed size with 40 cm spacing. But in case of yield plant^{-1} in a specific area, data indicates wider size of bed (60 cm) and plant spacing (40 cm) was very much suitable for producing higher yield of T. *Aman* rice cv. *Superamandhan.*

Key words: *density, planting bed, variety, T. Aman, yield*

INTRODUCTION

Rice (*Oryza sativa* L.) is the most important cereal grain in the diets of billions of people all over the world and it is also the staple food of Bangladesh which covers about 75% of total cropped area all over the country (BBS 2015). Agriculture of Bangladesh is characterized by intensive crop production with rice based cropping systems. Geographic and agro-ecological conditions of Bangladesh are congenial for rice cultivation. Bangladesh has three rice cropping seasons within a year; the *Boro* crop, the Transplant *Aman* (T. *Aman*) crop and the *Aus* crop, which account for approximately 55%, 38% and 7% of total annual rice production, respectively (BBS 2014). Among the three rice growing seasons, T. *Aman* rice covers some 52% of the total rice areas with a production of 13.19 million tons from 55, 30,014 hectares in 2014 (BBS 2015). The harvested area of T. *Aman* rice has decreased by 1.42% in the year 2013 compared to that of 2012 (BBS 2014). The average yield of T. *Aman* rice in Bangladesh is only 2.34 t ha^{-1} which is still much lower compared to the national rice average yield of 2.92 t ha^{-1} (BBS 2015). Therefore, attempts should be taken to increase the yield through the use of modern production technologies, such as adopting different planting methods, use of quality seeds, high yielding and modern varieties, optimum age of seedling, spacing, plant protection measures and seedling raising techniques. Thus bed planting and spacing could improve the yield and quality of rice which might contribute a lot to the economy of Bangladesh.

Bed planting technique of rice production system may improve the ha^{-1} yield. In this system, generally crops are planted in single or double rows on the raised beds and irrigation water is applied in the furrows between the beds. Water moves horizontally from the furrows into the beds Balasubramanian *et al.* (2003). Preliminary research on bed planting at the Bangladesh Rice Research Institute showed positive responses. Therefore, bed planting for rice production systems is an emerging challenge issue for the present situation in Bangladesh. Recent researches indicates that about 42% of the irrigation water and time for application could be saved through bed planting in T. *Aman* rice cropping system. Water use efficiency and crop productivity for grain production are higher in bed planting over conventional method (Bhuyan *et al*. 2012). Determination of different agronomic aspects of bed planting for rice production systems like appropriate width of beds, optimum number of plant rows per seed bed and spacings are essential for development of sustainable resource conservation technologies.

The yield of T. *Aman* rice can be increased with the improved cultivation practices like proper spacing arrangements Rajesh and Thanunathan (2003). Among the different cultivation practices, spacing can play an important role in enhancing rice yield. Spacing is a key factor that needs to be considered during transplanting of rice. Optimum spacing supports the plants to uptake more nutrients from the soil. The plant spacing influences the availability of sunlight, leaf area, and nutrient to the plant leading to increased photosynthesis and respiration unit^{-1} area which has a direct effect on the yield of rice Rao and Moorthy (2003). Too close a spacing may hamper intercultural operations and increase competition among the plants for light and nutrients. Optimum spacing can ensure the plants to grow properly with their aerial and underground parts utilizing more solar radiation and nutrients (Miah *et al.* 1990). In transplant rice, plant densities both row to row and hill to hill in a row constitute the plant population. The tillering habit and production of grains panicle^{-1} depend to a great extent on the spacing of transplanting which is responsible for the variation in rice yield. Thus, spacing can be one of the important factors of manipulation for optimizing rice yield. In case of too wide spacing, farmers do not get desired number of hills unit^{-1} area which can reduce the yield. In closer spacing, more seedlings and laborers are needed which increase production cost and is a loss concern (Uddin 1989). Therefore, an experiment was undertaken to study the effect of bed planting and spacing on yield and yield attributes of *Superamandhan* on the raised bed with the following objectives: to determine the suitable planting arrangement in bed planting system compared to traditional planting in terms of yield and yield attributes of *Superamandhan*, to find out the suitable spacing for *Superamandhan* and to study the interaction effect of bed planting and spacing on yield performance of *Superamandhan*.

MATERIALS AND METHODS

The experimental field was located at 24°75' N latitude and 90°50' E longitude and at an altitude of 18 meter. The experimental area belongs to the non-calcareous dark grey soil under Agro-ecological Zone of the Old Brahmaputra Floodplain (AEZ-9). The land was medium high and well drained with silty-loam texture. The soil of the experimental field was more or less neutral in reaction with pH value 6.82, low in organic matter content (1.19%) and the general fertility level of the soil was low. The experimental area was located under the sub-tropical climate which is specialized by moderately high temperature and heavy rainfall during the *kharif* season (April-September). The factors and treatments included in the experiment were as follows: Factor A: Bed width (3): 30 cm (S_1), 40 cm (S_2) and 60 cm (S_3), Factor B: Hill Spacing (4): 30 cm (T_1), 40 cm (T_2), 50 cm (T_3) and 60 cm (T_4). As the variety is tall (>170 cm) with higher number (>20) of tillers hill^{-1}, wider spacing (≥30 cm) were tried which were higher than the normal standard (25 cm × 15 cm). For the double row spacing, three raised beds of 30 cm, 40 cm and 60 cm width (12 m^2) were made in every plot. Seedlings were transplanted in double rows on each bed maintaining distances of 30 cm, 40 cm, 50cm and 60 cm between two hills in above mentioned bed systems. The experiment was laid out in a randomized complete block design with three replications. There were two sets of treatments. Each treatment set was replicated thrice. Each block was divided into 12 unit plots where the treatment combinations were allocated at random. Thus the total numbers of unit plots were 36. The area of each unit plot was 12 m^2 (4 m x 3 m).

A piece of high land was selected for raising seedlings. The land was prepared thoroughly by tilling once with a power tiller and subsequently ploughing three times with country plough followed by laddering. Immediately after final land preparation, the field layout was made on 29th June, 2015 according to experimental specification. Individual plots were puddled with spade and leveled before transplanting of seedlings on 30th June, 2015 as per experimental treatments. Raised beds and furrows were made manually by spade following the conventional land preparation. According to the treatments 30 cm, 40 cm and 60 cm wide beds were made for double rows and the furrows between beds were 30 cm, 40 cm and 40 cm respectively in successive plots. Both organic and inorganic fertilizers were applied in the experimental plots. Cowdung @ 10 t ha^{-1} was applied before land preparation. The chemical fertilizers were applied @ 200 kg, 150 kg, 150 kg, 120 kg and 12 kg ha^{-1} as urea, triple super phosphate (TSP), muriate of potash (MoP), and gypsum and zinc sulphate, respectively. The full doses of TSP, MoP, gypsum and zinc sulphate were applied before transplanting on the top of the beds. Urea was top dressed in three equal splits, at 15, 35 and 55 DATs. Eight day old seedlings were uprooted and transplanted with one seedling hill^{-1} in the unit plot using 4 different spacing on 1st July 2015 as per experimental specification. Care was taken during the growing period for adequate growth and development of the crop. When 80-90% of the grains became golden yellow, the crop was considered to be matured. Five hills (excluding border hills) were selected randomly from each experimental plot to record necessary data. Individual plots were harvested at maturity on 21 November 2015. The harvested crop of each plot was separately bundled, properly tagged and then brought to the clean threshing floor. The crop was threshed manually. Grains were cleaned, weighed and moisture reading was taken by using a moisture meter. Then grain yield was converted to 14% moisture content. Straw were sun dried properly then weighed. Finally straw and grain yields plot^{-1} were recorded and converted to t ha^{-1}. Data on the following plant characters and yield were recorded: Plant height, Number of total tillers hill^{-1}, Number of effective tillers hill^{-1}, Number of non-effective tillers hill^{-1}, Panicle length, Number of grains panicle^{-1}, Number of unfilled grains panicle^{-1}, Weight of 1000-grain, Grain yield, Straw yield, Biological yield and Harvest index. The collected data were compiled and tabulated in the proper form and analyzed statistically. Analysis of variance was done following the randomized complete block design (RCBD) with the help of computer package MSTAT and the mean differences among the treatments were adjudged by Duncan's Multiple Range Test (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

Effect of bed width on different characters of T. *Aman* rice cv. *Superamandhan*

All characters of T. *Aman* rice were significant both at 1% level of probability and 5% level of probability without plant height and biological yield. The taller plants (176.7 cm) were found in 40 cm bed spacing and the shortest ones (174.3 cm) were obtained from 30 cm bed size (Table 1). The highest numbers of total tillers (26.38) were found in 60 cm bed spacing of bed planting method. The lowest number of total tillers hill^{-1} (19.71) obtained from 30 cm width of bed. Singh *et al.* (2009) found that number of tillers of rice plant is higher in bed planting method than conventional method and Karim *et al.* (2002) also reported that highest number of total tillers hill^{-1} was found in wider spacing. A further analysis of the data on number of total tillers hill^{-1} shows that tiller production was a function of increased spacing; as the spacing increased number of tillers hill^{-1} increased linearly. The highest number effective tillers hill^{-1} (24.31) was obtained from 60 cm double row bed spacing. The number of effective tillers hill^{-1} decreased with low spacing of the bed size probably due to competition for nutrition and space. So, the results showed that wider spacing had a tendency to produce more number of effective tillers hill^{-1} than that of closer spacing. The lowest number effective tillers hill^{-1} (17.36) was obtained from 30 cm double row bed spacing. Mia *et al.* (1990) reported that the highest numbers of effective tillers was produced in wider spacing and the lowest one in the narrowest spacing. The highest number non-effective tillers hill^{-1} (2.35) was obtained from 30 cm double row bed spacing. The lowest number non-effective tillers hill^{-1} (2.048) was obtained from 40 cm double row bed spacing. The highest panicle length (26.51 cm) was found in 60 cm plant spacing of bed planting method and minimum panicle length (27.70 cm) was found in 30 cm of bed size. The highest (193.5) number of filled grains panicle^{-1} was obtained from the widest spacing (S_3), which followed by medium spacing (S_2) and the value (157.0) was achieved from the closest spacing (S_1). Sarkar *et al.* (2000) and Ghosh *et al.* (1988) also stated that wider spacing produced higher number of grains panicle^{-1}. The highest number of sterile spikelets panicle^{-1} (31.42) was observed in 30 cm of bed planting and the lowest (29.65) one was found in 40 cm of bed planting. The highest (29.24) and lowest (27.70) 1000-grain weight was recorded from 60 cm and 30 cm size of bed planting method respectively. Grain yield was highest (4.967 t hill^{-1}) in 30 cm of bed spacing planting method. The lower (4.835 t hill^{-1}) grain yield was obtained from 40 cm of bed size. Due to higher plant density 30 cm bed planting method produced more yield. But in case of yield obtain per plant is higher in 60 cm of bed (4.980 t hill^{-1}) planting method. Similar result was also reported by Hobbs and Gupta (2003). The highest straw yield (6.097 t hill^{-1}) was obtained from 60 cm bed spacing and the lowest straw yield (5.868 t hill^{-1}) was recorded from 30 cm of bed planting method. Although the highest biological yield (11.08 t hill^{-1}) was obtained from 60 cm double row bed spacing of bed planting method. The lowest biological yield (10.72 t hill^{-1}) was obtained from 50 cm double row bed spacing of bed planting method. The highest harvest index (45.88%) was observed from 30 cm double row bed size and the lowest one (44.95%) was obtained from 60 cm of double row bed size of bed planting method.

Table 1. Effect of bed width on different characters of T. *Aman* rice cv. *Superamandhan*

Bed width	**Plant height (cm)**	**Total tillers hill^{-1} (no.)**	**Effective tillers hill^{-1} (no.)**	**Non-effective tillers hill^{-1}(no.)**	**Panicle length (cm)**	**Filled grains panicle^{-1} (no.)**	**Unfilled grains panicle^{-1} (no.)**	**1000-grain weight (g)**	**Grain yield (t ha^{-1})**	**Straw yield (t ha^{-1})**	**Biological yield (t ha^{-1})**	**Harvest index (%)**
S_1	174.3	19.71c	17.36c	2.350a	25.62b	157.0c	31.42a	27.70b	4.967a	5.868b	10.84	45.88a
S_2	176.7	23.82b	21.77b	2.048b	26.18ab	182.3b	29.65b	28.62ab	4.835b	5.880b	10.72	45.13ab
S_3	174.9	26.38a	24.31a	2.076b	26.51a	193.5a	30.92a	29.24a	4.980a	6.097a	11.08	44.95b
Sx	1.58	0.294	0.317	0.068	0.230	3.21	0.402	0.327	0.043	0.067	0.118	0.263
Level of significance	NS	**	**	**	*	**	**	**	*	*	NS	*
CV (%)	3.14	4.38	5.21	10.93	3.05	6.26	4.55	3.97	3.04	3.89	3.77	2.01

In a column, figures with same letter (s) or without letter do not differ significantly whereas figures with dissimilar letter differ significantly (as per DMRT)

** = Significant at 1% level of probability, * = Significant at 5% level of probability,

NS = Not significant

S_1 = 30 cm, S_2 = 40 cm and S_3 = 60 cm

Effect of plant spacing on different plant characters of T. *Aman* rice cv. *Superamandhan*

All characters of T. *Aman* rice were significant both at 1% level of probability and 5% level of probability without Plant height and panicle length. The tallest plant (176.6 cm) was obtained from medium spacing of 50 cm. The shortest plants (174.1 cm) were observed in close spacing of 30 cm, double rows (Table 2). The highest number of total tillers hill^{-1} (26.67) was produced by 60 cm plant spacing and the lowest one (18.59) was found in the closest spacing of 30 cm × 30 cm plant spacing. Hague (2002), Mia (2001) and Karim *et al.* (2002) found similar results. They reported that highest number of total tillers hill^{-1} was found in wider spacing. These might be due to the differences in facilities for air, light and nutrient availability by wider and narrower spacing. The highest number effective tillers hill^{-1} (24.81) was obtained from 60 cm, double row spacing and the lowest one (16.60) was obtained from the spacing of 30 cm, double rows. The results revealed that wider spacing had the greatest opportunity to produce more number of effective tillers hill^{-1}, while the closer spacing had the least chance to produce same number of effective tillers hill^{-1}. This differential response of the treatments might be due to the reason that wider spacing allowed more facilities for normal and healthy growth of the plant as it invited in less competition among them resulting in more effective tillers hill^{-1}. Similar results were also reported by Muhammad *et al.* (1987). The highest number of non-effective tillers hill^{-1} (2.443) was obtained from 40 cm spacing and the lowest number of non-effective tillers hill^{-1} (1.858) was obtained from widest spacing (60 cm) spacing. The longest panicle (26.49 cm) was produced by spacing of 60 cm and the shortest one (25.80 cm) was produced by spacing of 40 cm, double rows which is statistically more or less similar to the spacing of 30 cm. The plants grown in widest spacing got more light, space, air and nutrient facilities which stimulated positively towards panicle development than in closer spacing. Similar results were observed by Rekhasshari *et al.* (1997) who stated that closer spacing decreased panicle length. The highest number of filled grains panicle^{-1} (199.3) was obtained in 60 cm plant spacing and the lowest one (155.4) was obtained in 30 cm spacing. Rekhasshari *et al.* (1997) also found similar results. They found that highest number of total grains panicle^{-1} was observed in wider spacing. The highest number of unfilled grains panicle^{-1} (32.54) was found in the spacing of 50 cm. The lowest number of unfilled grains panicle^{-1} (29.10) was obtained from the wider spacing of 40 cm. Although it seems difference between the spacing and cumulatively the highest number of unfilled grains panicle^{-1} in closer spacing might be due to lower nutrient availability resulting from competitions among too many plants for limited space, light, nutrients and water. This result is in partial agreement with that of Chris (2002) who reported that closest spacing increased the number of unfilled grains panicle^{-1}. The highest (29.69 g) 1000-grain weight was obtained in 60 cm of plant spacing and the lowest (27.48 g) 1000-grain weight was found in 30 cm of plant spacing. The highest grain yield (5.150 t ha^{-1}) was obtained from the spacing of 40 cm double rows hill spacing and the lowest one (4.70 t ha^{-1}) was observed in 60 cm double rows spacing. It was observed that grain yield increased with closer spacing due to higher number of hills plot^{-1}. Similar results were reported by Rafiq *et al.* (1998). Siddiqui *et al.* (1999) also stated that grain yield of rice under closer spacings was significantly higher than wider spacings. The highest straw yield (6.303 t ha^{-1}) was obtained from 40 cm spacing and the lowest one (5.797 t ha^{-1}) was obtained from 60 cm spacing. The widest spacing produced the lowest straw yield when number of hills plot^{-1} was the lowest. The closest spacing produced the highest straw yield when number of hills plot^{-1} was the highest. The highest biological yield (11.46 t ha^{-1}) was obtained from 40 cm, double rows spacing and the lowest one (10.50 t ha^{-1}) was obtained from 60 cm, single row spacing. The highest harvest index (45.86%) was observed in 50 cm, double rows spacing and the lowest one (44.77%) was observed in 60 cm, double row spacing of bed planting method.

Table 2. Effect of plant spacing on different plant characters of T. *Aman* rice cv. *Superamandhan*

Plant spacing	**Plant height (cm)**	**Total tillers hill^{-1} (no.)**	**Effective tillers hill^{-1} (no.)**	**Non-effective tillers hill^{-1} (no.)**	**Panicle length (cm)**	**Filled grains panicle^{-1} (no.)**	**Unfilled grains panicle^{-1} (no.)**	**1000-grain weight (g)**	**Grain yield (t ha^{-1})**	**Straw yield (t ha^{-1})**	**Biological yield (t ha^{-1})**	**Harvest index (%)**
T_1	174.1	18.59d	16.60d	1.990b	25.83	155.4d	31.58a	27.48b	4.777b	5.884c	10.46b	45.66ab
T_2	175.2	22.57c	20.13c	2.443a	25.80	171.7c	29.10b	27.86b	5.150a	6.303a	11.46a	44.98ab
T_3	176.6	25.38b	23.04b	2.340a	26.30	184.1b	32.54a	29.03a	5.080a	6.010b	11.09a	45.86a
T_4	175.1	26.67a	24.81a	1.858b	26.49	199.3a	29.42b	29.69a	4.702b	5.797bc	10.50b	44.77b
Sx	1.83	0.340	0.367	0.079	0.265	3.71	0.464	0.377	0.049	0.077	0.137	0.303
Level of significance	NS	**	**	**	NS	**	**	**	**	**	**	*
CV (%)	3.14	4.38	5.21	10.93	3.05	6.26	4.55	3.97	3.04	3.89	3.77	2.01

In a column, figures with same letter (s) or without letter do not differ significantly whereas figures with dissimilar letter differ significantly (as per DMRT)

** = Significant at 1% level of probability, * = Significant at 5% level of probability,

NS = Not significant.

T_1 = 30 cm, T_2 = 40 cm, T_3 = 50 cm and T_4 = 60 cm

Interaction effects of bed width and plant spacing on different characters of T. *Aman* rice cv. *Superamandhan*

All characters of T. *Aman* rice were significant both at 1% level of probability and 5% level of probability without panicle length 1000-grain weight and harvest index (Table 3). The tallest plants (178.8 cm) were recorded from 30 cm bed width and 50 cm double rows spacing. The plant height reduced gradually due to reducing both bed width and spacing. The lowest plants heights (165.8 cm) were observed from 30 cm bed width and 30 cm plant spacing. The highest number of total tillers (31.25) was obtained from the combination of S_3T_3 (60 cm of bed width and 50 cm of hill spacing) and the lowest one (14.88) was obtained from the combination S_1T_1 (30 cm of bed width and 30 cm of hill spacing). The highest number effective tillers hill^{-1} (28.19) was recorded from the combination of S_3T_3 (bed width 60 cm and hill spacing 50 cm) and the lowest one (12.50) was found in the combination of S_1T_1 (30 cm bed width and 30 cm hill spacing. The highest number of non-effective tillers hill^{-1} (3.07) was produced by the combination of S_1T_2 (30 cm of bed width and 40 cm of hill spacing). The lowest number of non-effective tillers hill^{-1} (5.67) was recorded from the combination of S_2T_1 (40 cm of bed width and 30 cm, double rows spacing). Although the highest (26.94 cm) and the lowest (24.88 cm) panicle lengths were observed in the S_3T_4 (60 cm of bed width and 60 cm hill spacing) and S_1T_2 (30 cm of bed width and 40 cm of hill spacing) respectively. The highest number of total grains panicle^{-1} (212.3) was obtained from the combination of S_3T_3 (60 cm of bed width and 50 cm of hill spacing). The lowest number of total grains panicle^{-1} (135.4) was observed in the combination of S_1T_1 (30 cm of bed width and 30 cm of hill spacing. The highest number of unfilled grains panicle^{-1} (36.60) was found in the interaction of 30 cm of bed width and 40 cm of spacing. The lowest number of unfilled grains panicle^{-1} (23.42) was observed in the combination of S_2T_4 (40 cm of bed width and 60 cm of spacing). The highest 1000-grain weight (30.45 g) was found in the combination of S_3T_4 (60 cm of bed width and 60 cm of hill spacing) and the lowest 1000-grain weight (26.88 g) was found in the combination of S_1T_1 (30 cm of bed width and 30 cm of hill spacing). The highest grain yield (5.44 t ha^{-1}) was obtained from the combination of S_1T_2 (30 cm of bed width and 40 cm of hill spacing) and the lowest grain yield (4.45 t ha^{-1}) was found in the combination of S_2T_1 (40 cm of bed width and 30 cm of hill spacing) due to higher density of plants in both cases of closer bed width and plant spacing. The highest straw yield (6.70 t ha^{-1}) was observed in the combination of S_1T_2 (30 cm of bed width and 40 cm of hill spacing), and the lowest straw yield (5.39 t ha^{-1}) was observed in the combination of S_2T_1 planting method (40 cm of bed width and 30 cm of hill spacing). The highest biological yield (12.14 t ha^{-1}) was observed in the combination of S_1T_2 (30 cm of bed width and 40 cm of hill spacing) and the lowest biological yield (5.0 t ha^{-1}) was in the combination of S_2T_1 (40 cm of bed width and 30 cm of hill spacing). The highest harvest index (46.96%) was found in the combination of S_1T_3 (30 cm of bed width and 50 cm of hill spacing) and the lowest harvest index (44.38%) was in the combination of S_3T_4 (60 cm of bed width and 60 cm of hill spacing).

Table 3. Interaction effects of bed width and plant spacing on different characters of T. *Aman* rice cv. *Superamandhan*

Interaction (bed width x plant spacing)	Plant height (cm)	Total tillers hill^{-1} (no.)	Effective tillers hill^{-1} (no.)	Non-effective tillers hill^{-1} (no.)	Panicle length (cm)	Filled grains panicle^{-1} (no.)	Unfilled grains panicle^{-1} (no.)	1000-grain weight (g)	Grain yield (t ha^{-1})	Straw yield (t ha^{-1})	Biological yield (t ha^{-1})	Harvest index (%)
S_1T_1	165.8b	14.88g	12.50h	2.39bc	25.19	135.4f	31.20c	26.88	4.98cdef	5.66de	10.65def	46.79
S_1T_2	178.2a	18.48ef	15.41g	3.07a	24.88	143.1ef	27.19d	27.10	5.44a	6.70a	12.14a	44.83
S_1T_3	178.8a	19.91e	18.13f	1.78de	26.21	161.6de	36.60a	28.11	4.87ef	5.50e	10.37fg	46.96
S_1T_4	174.5ab	25.56bc	23.40cd	2.16cd	26.20	187.8bc	30.67c	28.70	4.57g	5.61de	10.19fg	44.92
S_2T_1	177.9a	17.48f	16.37fg	1.11f	26.17	167.8cd	31.41c	27.60	4.45g	5.39e	9.843g	45.22
S_2T_2	177.9a	25.64bc	22.91de	2.73ab	26.44	185.0bc	29.61c	27.83	4.71fg	5.80cde	10.52efg	44.83
S_2T_3	174.1ab	24.98cd	22.80de	2.18cd	25.79	178.3bcd	34.15ab	29.12	5.16bcd	6.20bc	11.36bcd	45.44
S_2T_4	176.8a	27.17b	25.00bc	2.17cd	26.34	198.2ab	23.42e	29.92	5.02cde	6.13bc	11.15bcde	45.01
S_3T_1	178.7a	23.41d	20.94e	2.47bc	26.14	162.9d	32.14bc	27.97	4.90def	6.00bcd	10.90cdef	44.97
S_3T_2	169.6ab	23.59d	22.06de	1.53ef	26.07	187.0bc	30.51c	28.66	5.30ab	6.41ab	11.71ab	45.27
S_3T_3	176.9a	31.25a	28.19a	3.06a	26.91	212.3a	26.86d	29.87	5.21abc	6.33ab	11.54abc	45.17
S_3T_4	174.2ab	27.28b	26.04b	1.24f	26.94	211.8a	34.16b	30.45	4.51g	5.65de	10.16fg	44.38
Sx	3.18	0.589	0.635	0.137	0.459	6.42	0.804	0.653	0.086	0.134	0.237	0.525
Level of sig.	*	**	**	**	NS	*	**	NS	**	**	**	NS
CV (%)	3.14	4.38	5.21	10.93	3.05	6.26	4.55	3.97	3.04	3.89	3.77	2.01

In a column, figures with same letter (s) or without letter do not differ significantly whereas figures with dissimilar letter differ significantly (as per DMRT)
** = Significant at 1% level of probability, * = Significant at 5% level of probability,
NS = Not significant
S_1 = 30 cm, S_2 = 40 cm, S_3 = 60 cm
T_1 = 30 cm, T_2 = 40 cm, T_3 = 50 cm and T_4 = 60 cm

CONCLUSION

From the results of the present study it may be concluded that the highest grain yield (5.44 t ha^{-1}) of T. *Aman* rice cv. *Superamandhan* produced when the crop was in 30 cm bed width of planting method and the size of the plant spacing was 40 cm. Due to higher number of plant densities on narrower bed width and plant spacing the yield was higher than the wider spacing. But in case of plant^{-1} yield production of T. *Aman* rice cv. *Superamandhan* wider spacings have positive impact than the closer spacing for both, width of the bed and plant spacing. However, further study will be needed for validation and confirmation of this result.

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