Original Research Article

INFLUENCE OF NITROGEN ON THE PLANT GROWTH AND SEED QUALITY OF THREE T. (Transplanting) AMAN RICE VARIETIES

ABSTRACT

A field experiment was conducted at the Agronomy field of central research farm of Sher-e-Bangla Agricultural University, Dhaka, Bangladesh during the period from June 2014 to December 2014 to study the influence of nitrogen on growth and seed quality of T. Aman rice variety with interaction effects between nitrogen doses and T. Aman rice varieties. The experiment consisted of two factors such as nitrogen fertilizer and variety. these were as follows: Factor A: nitrogenous fertilizer (6 levels) *viz.* N_0- controlled, N_1- 50% less than BRRI recommended dose, N_2- 25% less than BRRI recommended dose, N_3- BRRI Recommended dose, N_4- 25% higher than BRRI recommended dose, N_5- 50% higher than BRRI recommended dose and Factor B: T. Aman rice (3 varieties) *viz.* V_1 – BRRI dhan44, V_2 - BRRI dhan54, V_3 - BRRI dhan56. The experiment was laid out in a split-plot design with three replications. Nitrogen was assigned to main plots and variety to sub-plots. In case of different levels of nitrogen, the treatment N4 (25% higher than BRRI recommended dose) showed good morphological growth and also produced good quality seed than other treatments which is also true for variety V1 (BRRI dhan44). The interaction of N_4V_1 (25% higher than recommended dose with BRRI dhan44) treatment is suitable for producing better plant growth and seed of T. Aman rice. The study was concluded that higher dose of urea than BRRI recommendation dose with BRRI dhan44 variety produced good quality seed.

Keywords: Rice, urea, seed quality, BRRI T. Aman rice varieties

1. INTRODUCTION (ARIAL, BOLD, 11 FONT, LEFT ALIGNED, CAPS)

Agriculture in Bangladesh is characterized by intensive crop production mainly rice. Rice plays absolutely dominant role in Bangladesh agriculture as it covers 68.35% of the total cropped area [1]. Annual per capita consumption of rice in Bangladesh is the highest in the world [2]. It provides about 70% of an average citizen's total calorie intake [3]. Rice (Oryza sativa L.) is one of the essential food of the human diet [4, 5]. It contributes 76% of the caloric and 66% of the protein intake [6]. Rice accounts for nearly 18% of Bangladesh GDP [7].

The total production of rice in aus, aman and boro season was 2.40, 13.20 and 19.10 million metric tonnes, respectively [8]. Rapid population growth, increased urbanization and limited cultivated land etc. are an alarming issues for utilizing limited resources by adopting new cultivars and technology. Instead, some land should be released for other non-rice crops and farming practices. Therefore, it is an urgent need of time to increase rice production through increasing yield. At the same time, it is realized that the yield of high yielding varieties of rice has come to a stagnation in spite of using relatively high inputs and standard agronomic

management practices. So, it is deemed important to look for an alternative way to boost up the production. Proper practices are the most effective means for increasing yield of rice at farmer's level which can be achieved by using inbred and hybrid varieties [9]. Scientists are quite optimistic to break the existing yield ceiling by introducing a new approach to rice production through the use of hybrid technology.

Advanced agronomic practices such as weed control, modern cultivars and fertilization can improve crop productivity and profitability also reduce adverse environmental impacts [10,11, 12, 13, 14]. Nitrogen is the main nutrient associated with yield, but it responds differently to rice type, cultivar, geographic zone, and other crop practices [10, 11, 13, 15, 16, 17].

One of the major constraints in rice production is insufficiency of quality seed for modern rice varieties in Bangladesh. Only 15-20% of total seed demand in the country is fulfill by Government and NGO seed supply systems. Use of quality seed can increase rice yield at 12-15% at a given management practices [18]. Rice yield can be increased up to 15-20% by using quality seed in alone [19, 20]. In general, rice seed yield is often lower than the grain yield because of seedling mortality, rouging and low nutrient application. Nutrient management strategy in seed crop may be somewhat different from the normal grain crop. Grain yield and rice quality were significantly correlated with variations of N absorption and utilization [21]. Excessive doses of N fertilizer over recommended level produce succulent plants and enhance plants sensitivity to water and temperature stress, increase susceptibility to lodging, pest and disease attack which show negative impact in growth and produce quality seed of rice[22]. Considering the above facts, the present study was undertaken to investigate the suitable variety with interaction effect of nitrogen rate and T. Aman rice for production quality seed of T.

2. MATERIAL AND METHODS

2.1 EXPERIMENTAL SITE

The experiment was conducted at the Sher-e-Bangla Agricultural University research farm, Dhaka, Bangladesh during the period from June, 2014 to December 2014. The experimental site was located at 23°77′ N latitude and 90°37′ E longitudes with an altitude of 9 m [23]. The geographical location of the experimental site was under the sub-tropical climate characterized by three distinct seasons. The monsoon or rainy season extend from May to October which is associated with high temperature, high humidity and heavy rainfall. The land was well drained with good irrigation practices. The experimental site was a medium high land. The top soil was silty clay in texture, red brown terrace soil type, olive–grey with common fine to medium distinct dark yellowish brown mottles. The soil pH was 5.6 and organic carbon was 0.45%.

2.2 PLANTING MATERIAL

The three test varieties were BRRI dhan44, BRRI dhan54 and BRRI dhan56. The rice seeds were collected from Bangladesh Rice Research Institute (BRRI), Joydebpur, Gazipur, Bangladesh.

2.3 FERTILIZERS AND MANURE APPLICATION

The fertilizers were N, P, K, S and Zn in the form of urea, Triple superphosphate (TSP), Muriate of Potash (MoP), Gypsum and Zinc sulphate, respectively which were applied @ 250, 150, 175, 100 and 15 kg ha^{-1} (BRRI recommendation dose). The full doses of all fertilizers except urea were applied as

basal dose through broadcasting method. Urea was applied in three equal splits at 20 and 40 days after transplanting (DAT) and during maximum tillering stage as per treatment.

2.4 EXPERIMENTAL DESIGN AND TREATMENT

The experiment was laid out in a split-plot design with three replications thus comprised 54 plots. Nitrogen was assigned to main plots and Varieties to sub-plots. The layout of the experiment was prepared for distributing the combination of nitrogen and variety. The size of each unit sub plot 4 m × 2.5 m. The spacing between blocks and plots was 1.0 m and 0.5 m, respectively. The experiment consisted of two factors such as nitrogenous fertilizer and T. Aman rice varieties. The treatments were as follows: Factor A: Nitrogenous fertilizer (6 levels) viz. No- N_o nitrogen, N_1- 50% less than BRRI recommended dose, N_2- 25% less than BRRI recommended dose, N_3- BRRI Recommended dose, N_4- 25% higher than BRRI recommended dose, N_5- 50% higher than BRRI recommended dose and Factor B: Varieties (3 types) viz. V_1 – BRRI dhan44, V_2 – BRRI dhan54 and V_3 – BRRI dhan56.

2.5 DATA COLLECTION

Data were collected on the following parameters **–** plant height (cm) (at 25, 45, 65, 85 DAT and at harvest), total tillers hill^{-1} (no.) (at 25, 45, 65 and 85 DAT), Dry matter weight hill^{-1} (g) (at 30, 60 and 90 DAT), germination (%), dry weight seedling^{-1} (g), root length seedling^{-1} (cm),Shoot length seedling^{-1} (cm) and Seedling length (cm).

2.6 STATISTICAL ANALYSIS:

The data obtained for different characters were statistically analysed to observe the significant difference among the treatment by using the MSTAT-C computer package program. The significance of the difference among the treatments means was estimated by the Least Significant Different (LSD) at 5% level of probability [24].

3. RESULTS AND DISCUSSION

3.1. GROWTH PARAMETER

3.1.1 NITROGEN RESPONSE

Plant height, total number of tillers hills^{-1} and dry matter weight hill^{-1} of T. Aman rice was significantly influenced by the application of different levels of nitrogen (Figure 1, 2, 3). The rate of increase in plant height was much higher into 65 DAT and then the rate was slower than earlier stage of growth. Whereas, the tallest plants at 25, 45, 65, 85 DAT and harvest (55.81, 96.52, 116.70, 127.30 and 130.00 cm, respectively) were recorded from N_4 (25% higher than recommended dose) treatment. In comparison, the shortest plants at 25, 45, 65, 85 and harvest (45.82, 72.45, 87.89, 103.20 and 114.00 cm, respectively) were obtained from N_0 (no nitrogen) treatment. Zhilin *et al*. [25] stated that pant height was increased significantly due to nitrogen application.

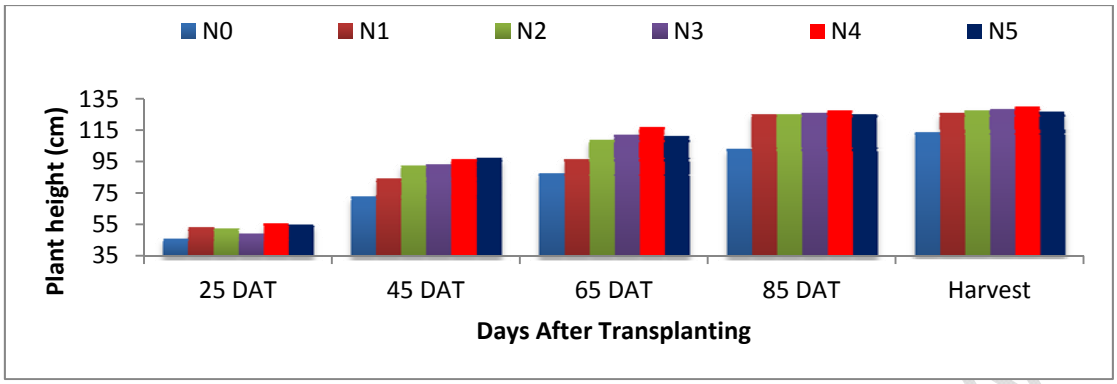

Figure 1: Effect of nitrogen level on plant height of T. Aman rice (LSD value = 2.44, 3.01, 0.81, 0.49 and 0.63 at 25, 45, 65, 85 DAT and harvest, respectively)

The figure indicated that irrespective of N doses increased the tiller number hill^{-1} into 45 DAT but after that, it gradually declined into harvesting. This may perhaps the dying of late tillering at the end of the life cycle. The maximum number of tiller hill^{-1} at 25, 45, 65 and 85 DAT (8.17, 14.53, 11.36 and 9.86, respectively) was recorded from N_4 (25% higher than BRRI recommended dose) treatment. On the other hand, the minimum number of tiller hill^{-1} at 25, 45, 65 and 85 DAT (5.83, 8.36, 8.50 and 7.30, respectively) was obtained from N_0 (no nitrogen) treatment.

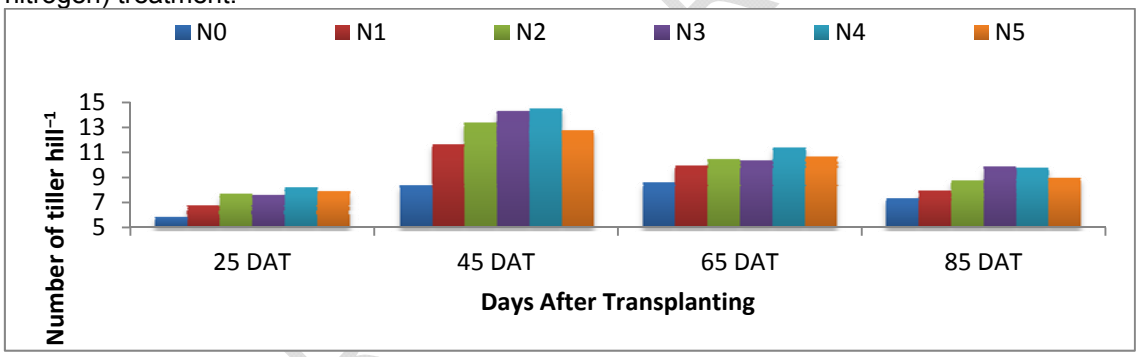

Figure 2: Effect of nitrogen on number of tiller hill^{-1} of T. Aman rice (LSD value = 0.29, 0.05, 0.24 and 0.30 at 25, 45, 65 and 85 DAT, respectively)

Figure indicated that irrespective of N doses increased dry matter production/hill. Among the all nitrogen doses dry matter production was highest with N_4 (25% higher than BRRI recommended dose) followed by N_3 (BRRI recommended dose) and N_2 (25% lower than BRRI recommended dose). The highest dry matter weight hill^{-1} at 30, 60 and 90 DAT (6.61, 20.84 and 38.44 g, respectively) was recorded from N_4 (25% higher than BRRI recommended dose) treatment. On the other hand, the lowest dry matter weight hill^{-1} at 30, 60 and 90 DAT (4.44, 12.76 and 23.56 g, respectively) was obtained from N_0 (no nitrogen) treatment.

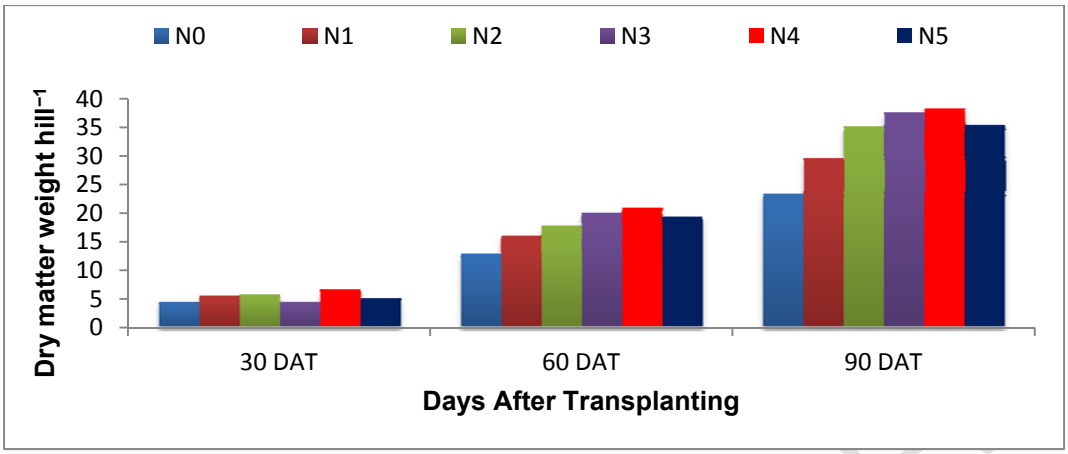

Figure 3: Effect of nitrogen on dry matter weight hill^{-1} of T. Aman rice (LSD value = 0.10, 0.38 and 0.46 at 30, 60 and 90 DAT, respectively)

3.1.2 VARIETY RESPONSE

Different varieties exhibited significant effect on plant height, total number of tillers hills^{-1} and dry matter weight hill^{-1} of T. Aman rice (Figure 4, 5, 6). The V_1 (BRRI dhan44) variety performed better and produced the tallest plant followed by variety V_2 (BRRI dhan54) and V_3 (BRRI dhan56).The tallest plant were 56.32, 94.09, 111.20, 127.70 and 131.10 cm respectively, produced by the variety V_1 (BRRI dhan44) treatment at 25, 45, 65, 85 and harvest. Whereas, the shortest plant were 48.52, 84.44, 98.17, 115.20 and 119.20 cm respectively, produced by the variety V_3 (BRRI dhan56) treatment at 25, 45, 65, 85 and harvest. Variation of plant height might be due to the differences in their genetic make-up. Mishra *et al.* [26] observed plant heights vary among the variety to variety.

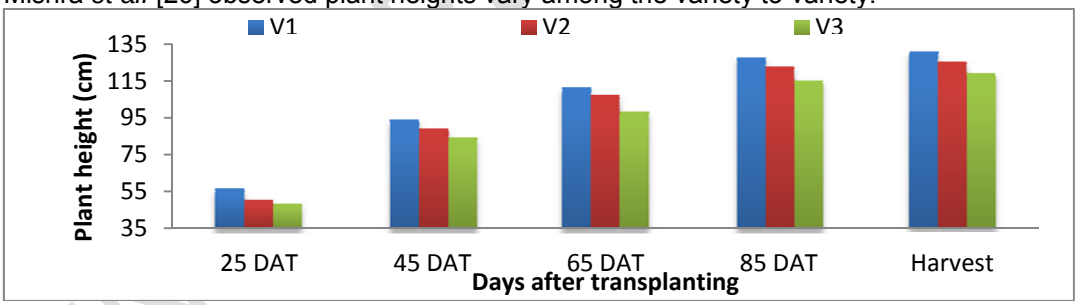

Figure 4: Effect of variety on plant height of T. Aman rice (LSD value = 1.62, 2.07, 2.62, 0.40 and 0.56 at 25, 45, 65, 85 DAT and harvest, respectively)

The figure indicated that irrespective of varieties increased rapidly the tiller number hill^{-1} into 45 DAT but after that, gradual full up to at 85 DAT. The variety V_1 (BRRI dhan44) produced the highest tillers hill^{-1} followed by V_2 (BRRI dhan54) and V_3 (BRRI dhan56). Numerically, the highest number of tillers hill^{-1} at 25, 45, 65 and 85 DAT (8.21, 13.76, 11.45 and 9.92, respectively) was recorded from V_1 (BRRI dhan44) treatment. On the other hand, the lowest number of tillers hill^{-1} at 25, 45, 65 and 85 DAT (6.27, 10.80, 8.87 and 7.75, respectively) was observed from V_3 (BRRI dhan56) treatment.

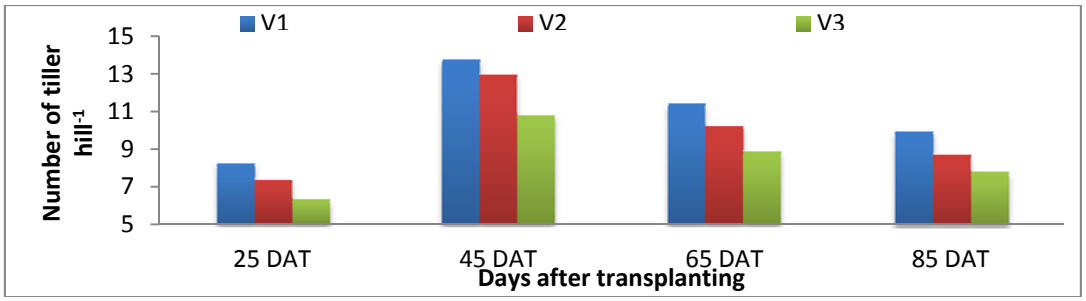

Figure 5: Effect of variety on number of tiller hill^{-1} of T. Aman rice (LSD value = 0.20, 0.04, 0.15 and 0.18 at 25, 45, 65 and 85 DAT, respectively)

It can be observed from the figure, the variety V_1 (BRRI dhan44) produced the highest dry matter plant^{-1} followed by V_2 (BRRI dhan54) and V_3 (BRRI dhan56). Numerically, the maximum dry matter weight hill^{-1} at 30, 60 and 90 DAT (6.51, 20.58 and 37.58 g, respectively) was recorded from V_1 (BRRI dhan44) treatment. On the other hand, the minimum dry matter weight hill^{-1} at 30, 60 and 90 DAT (4.15, 15.07 and 28.88 g, respectively) was obtained from V_3 (BRRI dhan56) treatment.

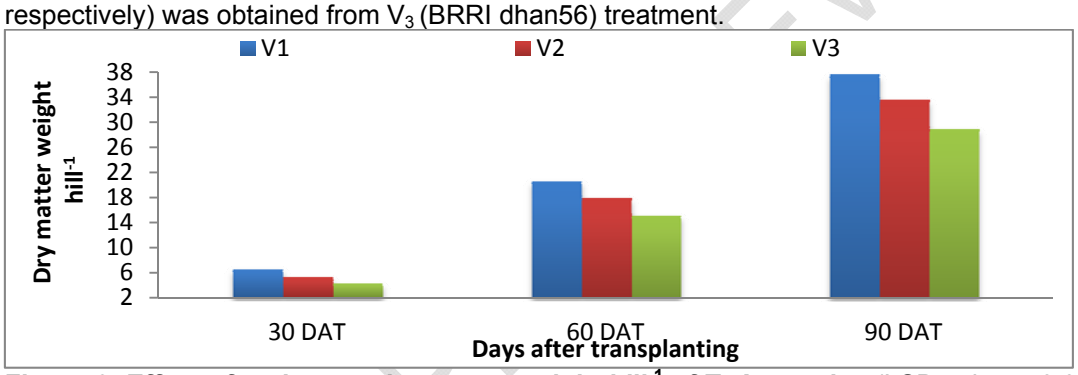

Figure 6: Effect of variety on dry matter weight hill^{-1} of T. Aman rice (LSD value = 0.07, 0.23 and 0.40 at 30, 60 and 90 DAT, respectively)

3.1.3 NITROGEN AND VARIETY INTERACTION

Plant height, number of tillers hill^{-1} and dry matter weight hill^{-1} of T. Aman were significantly influenced by the interaction of different levels of nitrogen doses and varieties (Table 1). The tallest plants 25, 45, 65, 85 DAT and harvest (61.34, 104.00, 122.70, 134.90 and 137.00 cm, respectively) were recorded from N_4V_1 (25% higher than recommended dose with BRRI dhan44) treatment combination. On the other hand, the shortest plants at 25, 45, 65, 85 DAT and harvest (42.00, 68.49, 78.67, 94.33 and 107.00 cm, respectively) were observed in N_0V_3 (no nitrogen with BRRI dhan56) treatment combination.

The highest number of tillers hill^{-1} at 25, 45, 65 and 85 DAT (9.50, 16.50, 14.03 and 12.40, respectively) were recorded from N_4V_1 (25% higher than recommended dose with BRRI dhan44) treatment combination. Whereas, the lowest (4.50, 6.03, 7.10 and 6.20, respectively) were observed in N_0V_3 (no nitrogen with BRRI dhan56) treatment combination.

The highest dry matter weight hill^{-1} at 30, 60 and 90 DAT (8.20, 25.00 and 44.33 g, respectively) was recorded from N_4V_1 (25% higher than recommended dose with BRRI dhan44) treatment combination. Whereas, the lowest at 30, 60 and 90 DAT (3.08, 10.08 and 19.50 g, respectively) was observed in N_0V_3 (no nitrogen with BRRI dhan56) treatment combination.

Table 1: Interaction effect of nitrogen and variety on plant height, number of tillers hill^{-1} and dry matter weight hill^{-1} of T. Aman rice at different days after transplanting

Treatment	Plant height at different days after transplanting (cm)					Number of tiller hill^{-1} at different days after transplanting				Dry matter weight per hill at different days after transplanting (g)		
	25	45	65	85	Harvest	25	45	65	85	30	60	90
N_0V_1	50.34eh	75.23 j	97.67 k	110.30 k	120.30 j	7.00e	10.03 k	8.49 j	8.00 g	6.00d	15.20 j	27.87 k
N_0V_2	45.11 j	73.62 j	87.33 m	105.00 l	114.70 k	6.00 f	9.00 l	9.90 f	7.70 h	4.23 i	13.00 l	23.00 m
N_0V_3	42.00 k	68.49 k	78.67 n	94.33 m	107.00 l	4.50 g	6.03 m	7.10 k	6.20 j	3.08 k	10.08 m	19.50 n
N_1V_1	57.54 bc	88.39 fg	102.00 j	126.00 e	130.30 d	8.00cd	12.75 g	10.47 d	8.80 ef	7.00 b	17.67 f	33.48 g
N_1V_2	49.87 f-i	83.58 h	97.33 k	131.70 c	126.00 g	6.03 f	12.13 i	9.80 f	7.60 hi	5.48 g	16.30 i	30.93 i
N_1V_3	51.22 ef	79.69 i	90.00 l	118.30 j	120.30 j	6.00 f	10.07 k	9.40 g	7.40 i	4.08 j	14.00 k	24.59 l
N_2V_1	58.79 bc	96.79bc	114.30 d	130.00 d	132.70 c	8.00cd	14.00 d	11.85 b	9.83 c	6.00 d	21.20 c	38.00 d
N_2V_2	48.17 hi	93.11de	110.30 f	125.10 f	128.00 f	7.80 d	13.53 e	10.13 e	8.70 f	6.10 c	17.50 fg	35.50 f
N_2V_3	49.65 f-i	88.13 fg	101.70 j	120.10 hi	121.30 i	7.00 e	12.47 h	9.17 hi	7.73 h	5.00 h	15.00 j	32.00 h
N_3V_1	50.79eg	98.22 b	118.00 b	132.90 b	134.00 b	8.40 b	15.00 b	12.00 b	10.51 b	5.90 e	22.22 b	41.10 b
N_3V_2	48.76 gi	94.35cd	113.00 e	125.00 f	129.00 e	8.20bc	15.00 b	10.00 ef	10.00 c	4.00 j	21.10 c	36.67 e
N_3V_3	47.95 i	87.54 g	104.30 i	120.00 i	121.70 i	6.00 f	13.00 f	9.00 i	9.17 d	3.00 k	17.00 h	35.50 f
N_4V_1	61.34 a	104.0 a	122.70 a	134.90 a	137.00 a	9.50 a	16.50 a	14.03 a	12.40 a	8.20 a	25.00 a	44.33 a
N_4V_2	53.92 d	95.00cd	118.70 b	126.30 e	130.30 d	8.00cd	15.00 b	10.79 c	9.00 de	5.90 e	20.20 d	39.00 c
N_4V_3	52.18de	90.60 ef	108.70 g	120.60 h	122.70 h	7.00 e	12.10 i	9.27 gh	8.00 g	5.72 f	17.33 g	32.00 h
N_5V_1	59.13ab	101.9 a	112.30 e	132.00 c	132.00 c	8.33 b	14.30 c	11.85 b	10.00 c	6.00 d	22.20 b	40.67 b
N_5V_2	56.82 c	96.39bc	115.30 c	124.30 g	126.00 g	8.00cd	13.00 f	10.87 c	9.00 de	5.00 h	19.00 e	36.33 e
N_5V_3	48.11 hi	92.20de	105.70 h	118.00 j	121.30 i	7.10 e	11.10 j	9.20 g-i	8.00 g	4.00 j	17.00 h	29.67 j
$LSD_{(0.05)}$	2.29	2.93	0.89	0.56	0.79	0.28	0.05	0.21	0.26	0.09	0.32	0.56
CV (%)	2.62	4.94	3.5	3.98	5.38	2.3	4.3	5.25	4.17	5.97	4.08	6

In a column means having a similar letter(s) are statistically similar and those having dissimilar letter(s) differ significantly by LSD at 0.05 levels of probability.

Note: N_0- No nitrogen, N_1- 50% less than recommended dose, N_2- 25% less than recommended dose, N_3- Recommended dose, N_4- 25% higher than recommended dose, N_5- 50% higher than recommended dose and V_1- BRRI dhan44, V_2- BRRI dhan54, V_3- BRRI dhan56.

3.2 SEED QUALITY PARAMETER

3.2.1 NITROGEN RESPONSE

Germination, dry weight seedling^{-1}, root length seedling^{-1}, shoot length seedling^{-1} and seedling length of T. Aman rice was significantly influenced by the application of different

levels of nitrogen (Table 2). The highest germination (90.00 %), highest dry weight seedling^{-1} (0.13 g), longest root (6.32 cm) , longest shoot length (27.41 cm) and tallest seedling (33.35 cm) were recorded from N_4 (25% higher than recommended dose) treatment. Whereas, the lowest germination (75.00 %), the lowest dry weight seedling^{-1} (0.07 g) , shortest root (4.57 cm) , shortest shoot length (22.06 cm) and shortest seedling (26.59 cm) were observed in N_0 (no nitrogen) treatment. This result is similar to Hossain *et al*. [27] stated that, N fertilizer much affected seed germination of the vigor of aromatic rice seeds.

Table 2: Effect of nitrogen on germination, dry weight seedling^{-1}, root length seedling^{-1}, shoot length seedling^{-1} and seedling length of T. Aman rice

Treatment	Germination (%)	Dry weight seedling^{-1} (g)	Root length seedling^{-1} (cm)	Shoot length seedling^{-1} (cm)	Seedling length (cm)
N_0	75.00 d	0.07 c	4.57 f	22.06 f	26.59 e
N_1	82.00 c	0.11 b	5.20 c	23.42 e	28.60 d
N_2	86.00 b	0.11 b	5.93 b	25.36 c	30.13 c
N_3	87.00 b	0.10 b	4.77 e	26.12 b	32.44 b
N_4	90.00 a	0.13 a	6.32 a	27.41 a	33.35 a
N_5	80.00 c	0.10 b	5.06 d	25.07 d	30.15 c
$LSD_{(0.05)}$	**2.61**	**0.02**	**0.08**	**0.09**	**0.25**
CV (%)	**1.25**	**1.83**	**3.37**	**1.00**	**1.12**

In a column means having similar letter(s) are statistically similar and those having dissimilar letter(s) differ significantly by LSD at 0.05 levels of probability.

Note: N_0- No nitrogen, N_1- 50% less than recommended dose, N_2- 25% less than recommended dose, N_3- Recommended dose, N_4- 25% higher than recommended dose, N_5- 50% higher than recommended dose.

3.2.2 VARIETY RESPONSE

Different varieties showed significant effect on germination, dry weight seedling^{-1}, root length seedling^{-1}, shoot length seedling^{-1} and seedling length of T. Aman rice (Table 3). The maximum germination (88.33 %), maximum dry weight seedling^{-1} (0.12 g), maximum root length (5.91 cm) , maximum shoot length (26.43 cm) and tallest seedling (32.35 cm) were recorded from V_1 (BRRI dhan44) treatment. In comparison, the minimum germination (81.00 %), minimum dry weight seedling^{-1} (0.08 g), minimum root length (4.58 cm) , minimum shoot length (23.27 cm) and shortest seedling (27.84 cm) was observed in V_3 (BRRI dhan56) treatment.

Table 3: Effect of variety on germination, dry weight seedling^{-1}, root length seedling^{-1}, shoot length seedling^{-1} and seedling length of T. Aman rice

Treatment	Germination (%)	Dry weight seedling^{-1} (g)	Root length seedling^{-1} (cm)	Shoot length seedling^{-1} (cm)	Seedling length (cm)
V_1	88.33 a	0.12 a	5.91 a	26.43 a	32.35 a
V_2	84.67 b	0.10 b	5.42 b	25.02 b	30.44 b
V_3	81.00 c	0.08 c	4.58 c	23.27 c	27.84 c
$LSD_{(0.05)}$	**1.64**	**0.01**	**0.05**	**0.05**	**0.16**
CV (%)	**1.62**	**2.15**	**3.91**	**1.19**	**1.43**

In a column means having similar letter(s) are statistically similar and those having dissimilar letter(s) differ significantly by LSD at 0.05 levels of probability.

Note: V_1- BRRI dhan44, V_2- BRRI dhan54, V_3- BRRI dhan56.

3.2.3 NITROGEN AND VARIETY INTERACTION

The interaction of nitrogen doses with varieties showed significant influenced on germination, dry weight seedling^{-1}, root length seedling^{-1}, shoot length seedling^{-1} and seedling length of T. Aman. Rice (Table 4). The highest germination (95.00 %), highest dry weight seedling^{-1} (0.17 g), longest root (6.76 cm), longest shoot (29.14 cm) and tallest seedling (35.38 cm) were recorded from N_4V_1 (25% Higher than recommended dose with BRRI dhan44) treatment combination. On the other hand, the lowest germination (74.00 %), lowest dry weight seedling^{-1} (0.07 g), shortest root (3.70 cm), shortest shoot (20.10 cm) and shortest seedling (24.20 cm) were observed in N_0V_3 (no nitrogen with BRRI dhan56) treatment combination.

Table 4: Interaction effect of nitrogen and variety on germination, dry weight seedling^{-1}, root length seedling^{-1}, shoot length seedling^{-1} and seedling length of T. Aman rice

Treatment	Germination (%)	Dry weight seedling^{-1} (g)	Root length seedling^{-1} (cm)	Shoot length seedling^{-1} (cm)	Seedling length (cm)
N_0V_1	85.00 e	0.08 gh	4.30 k	22.48 o	26.78 l
N_0V_2	90.00 cd	0.11 c-e	4.20 l	23.60 l	28.80 i
N_0V_3	74.00 j	0.07 h	3.70 n	20.10 p	24.20 m
N_1V_1	85.00 e	0.12 b-d	5.62 e	24.38 i	30.00 g
N_1V_2	82.00 fg	0.10 d-f	4.50 j	22.78 n	27.19 k
N_1V_3	79.00 hi	0.10 d-f	5.50 f	23.10 m	28.60 i
N_2V_1	82.00 fg	0.13 b	6.24 b	26.70 e	32.70 de
N_2V_2	78.00 hi	0.12 b-d	5.52 f	25.34 gh	30.86 f
N_2V_3	92.00 bc	0.13 b	6.04 c	27.76 c	33.80 c
N_3V_1	92.00 b	0.13 b	6.26 b	28.00 b	34.70 b
N_3V_2	88.00 d	0.09 fg	5.50 f	24.28 j	29.78 h
N_3V_3	83.00 ef	0.11 c-f	6.00 c	26.08 f	32.84 d
N_4V_1	95.00 a	0.17 a	6.76 a	29.14 a	35.38 a
N_4V_2	90.00 cd	0.09 ef	5.20 h	24.00 k	27.70 j
N_4V_3	88.00 d	0.11 d-f	4.60 i	25.38 g	29.98 gh
N_5V_1	83.00 ef	0.12 b-c	5.75 d	26.78 d	32.51 e
N_5V_2	80.00 gh	0.09 e-g	4.08 m	23.14 m	27.29 k
N_5V_3	77.00 i	0.11 d-f	5.35 g	25.30 h	30.65 f
$LSD_{(0.05)}$	**2.32**	**0.02**	**0.07**	**0.07**	**0.22**
CV (%)	**1.62**	**2.15**	**3.91**	**1.19**	**1.43**

In a column means having similar letter(s) are statistically similar and those having dissimilar letter(s) differ significantly by LSD at 0.05 levels of probability.

Note: N_0- No nitrogen, N_1- 50% less than recommended dose, N_2- 25% less than recommended dose, N_3- Recommended dose, N_4- 25% higher than recommended dose, N_5- 50% higher than recommended dose and V_1- BRRI dhan44, V_2- BRRI dhan54, V_3- BRRI dhan56.

4. CONCLUSION

From these results, it might be concluded that application of nitrogen (25% higher than BRRI recommended dose) in alone or with interaction between variety (BRRI dhan44) showed better performance on plant growth and produced high quality seed of T. Aman rice.

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