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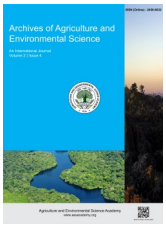

ORIGINAL RESEARCH ARTICLE

Effects of bio-slurry with chemical fertilizer on the performance of some high yielding varieties of boro rice (*Oryza sativa* L.)

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ABSTRACT

Rice yield is greatly influenced by application of manures and fertilizer. Integrated use of organic manure and chemical fertilizer would be quite promising in providing better yield. To evaluate the effect of bio-slurry along with chemical fertilizer, a field experiment was conducted in the Agronomy Field Laboratory, Bangladesh Agricultural University, Mymensingh, Bangladesh. The experiment was comprised of four varieties of *boro* (dry season irrigated) rice viz., (i) BRRI dhan28, (ii) BRRI dhan29 (iii) Binadhan-8 (iv) Binadhan-10 and four fertilizer management *viz*., (i) control, (ii) recommended dose of inorganic fertilizer, (iii) bio-slurry@ 5 t ha^{-1} + inorganic fertilizer, (iv) farmers' practice (average 15 farmers). The experiment was laid out in a randomized complete block design with three replications. It is evident that variety and fertilizer management had significant effect on effective tillers $hill^{-1}$, number of grains $panicle^{-1}$ which ultimately influenced grain yield. The highest grain yield was (6.03 t ha^{-1}) in Binadhan-8 followed by Binadhan-10 and BRRI dhan29. The lowest grain yield was found from BRRI dhan28. In respect of fertilizer management, grain yield was highest (5.90 t ha^{-1}) in bio-slurry @ 5 t/ha + inorganic fertilizer. The lowest grain yield was found from control. The combined effect of variety and fertilizer application showed that highest grain yield (6.10 t ha^{-1}) was found from Binadhan-8 with bio-slurry @ 5 t ha^{-1} + inorganic fertilizer and the lowest grain yield (4.68 t ha^{-1}) was found from BRRI dhan28 with farmers' practice. Thus, the variety Binadhan-8 with application of bio-slurry @ 5 t ha^{-1} + inorganic fertilizer was superior for obtaining highest yield.

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INTRODUCTION

The dependency on agriculture in Bangladesh is gradually increasing, most of the people of Bangladesh earn their living from agriculture directly or indirectly and predominantly rice based, which contributes a lot to our gross domestic product (GDP). In proportion to our population the cultivable land is not enough. Moreover, farmers' of our country are not well aware regarding cultivation of rice varieties (Khan *et al*., 2015; Islam *et al*., 2017). Use of local cultivars indiscriminately is one of the most important reasons for low yield. The farmers' of our country are not well aware of selection of potential variety. Moreover, to meet the demand of increasing population farmers are using excessive chemical fertilizers for their crop production which ultimately create hazardous situation to soil. Soil fertility is also declining because of increasing cropping intensity coupled with the minimum use of organic manure (Khan *et al*., 2015; Cuong *et al*., 2017). According to an appraisal report of

Bangladesh soil resources, soils of about 6.10 m ha contain very low (less than 1%) organic matter, 2.15 m ha contain low (1-2%) organic matter and the remaining 0.90 m ha contain more than 2% organic matter (Mondal, 2000). A good soil should have an organic matter content of at least 2.5% (BARC, 2005). But in Bangladesh, most soils have less than 1.7%, and some soils have even less than 1% organic matter. The average organic matter content of top soils has declined by 20-46% over past 20 years due to intensive cropping without inclusion of legume crops, imbalance use of fertilizer, use of modern varieties and scanty use of organic manure (Jeptoo *et al*., 2013; Dada *et al*., 2015).

It is agreed that decreases in soil fertility is a major constraint for higher crop production in Bangladesh. The beneficial effect of organic manure in crop production has been demonstrated by many workers (Jeptoo *et al*., 2013; Asadul *et al*., 2015). Maintenance of soil fertility is a prerequisite for long term sustainable crop production and it is certain that organic manure (e.g. bio-slurry) can play a vital role in the sustainability of soil fertility and crop production (Shankarappa *et al*., 2012; Khan *et al*., 2015). Application of by-product of the recently popularized biogas technology named 'bio-slurry'. Bio-slurry is a good source of plant nutrients and can improve soil properties (Garg *et al*., 2005; Asadul *et al*., 2015). Gupta (2007) reported that bio-slurry contains many rich and nutritive elements including N, P, K and trace elements (Zn, Fe, Cu, Ni, Ca etc). Bio-slurry contains appreciable amounts of organic matter (20 to 30%) very much needed for our hungry soils. Bio-slurry can be utilized as a potential bio-manure in crop production (Khan *et al*., 2015). It can improve the physical and biological quality of soil by adding organic matter to the soil. It also provides both macro and micro -nutrients such as zinc, iron, manganese and copper that are also essential for plants but required in trace amounts to crops (Jeptoo *et al*., 2013). These improve in water holding capacity, cation exchange capacity, lesser soil erosion and provision of nutrients to plants and soil micro-flora including N fixing and phosphorus solubilizing organisms. So bio-slurry can play a vital role in increasing yield as well as to maintain soil health (Shankarappa *et al*., 2012; Asadul *et al*., 2015; Khan *et al*., 2015; Islam *et al*., 2017). Considering the above mentioned points the experiment was undertaken to evaluate the effects of variety on the yield and yield contributing characters of *boro* rice, to determine the suitability of different sources of organic and inorganic fertilizer including bio-slurry on yield contributing characters of *boro* rice and to find interaction of variety and fertilizer management for *boro* rice yield.

MATERIALS AND METHODS

Experimental site and design

The experiments were performed at the Agronomy Field Laboratory of Bangladesh Agricultural University, Mymensingh during the period of November 2015 to June 2016 to study the effect of bio-slurry on the performance of *boro* rice. The experimental site is located at 24°75' N latitude and 90°50' E longitude at an elevation of 18m above the mean sea level. The experimental area is characterized by non-calcareous dark grey floodplain soil belonging to the Sonatola Soil Series under the Old Brahmaputra Floodplain, Agro-Ecological Zone 9 (FAO and UNDP, 1988). The soil of the experimental field was more or less neutral in reaction with pH value 6.8, low in organic matter and fertility level. The land type was medium high with silty loam in texture. The experimental treatments consists of four cultivars namely V_1= BRRI dhan28, V_2 = BRRI dhan29, V_3 = Binadhan-8 and V_4 = Binadhan-10 and four fertilizer doses T_1= Control (no manure and fertilizer), T_2= Recommended dose of inorganic fertilizer (N-P-K-S-Zn@140-60-80-2-10 kg ha^{-1}), T_3= Bio-slurry @ 5t/ha + inorganic fertilizer and T_4= Farmers' practice (average 15 farmers). The experiment was laid out in a randomized complete block design (RCBD) with three replications. The unit plot size was 4.0 m × 2.5 m. The distance maintained between the individual unit plots was 0.5m and that between the replications 1.0 m. The experimental land was first opened with a tractor drawn disc plough. The land was then puddled thoroughly by repeated ploughing and cross ploughing with a country plough and subsequently leveled by laddering. Weeds and stubbles were cleared off from individual plot.

Cultivation practices and fertilizer management

Fertilizer was applied as per specification based on treatment. Calculation of nutrients on IPNS basis was done and only required amount were applied from fertilizers. Whole amounts of other fertilizers except Urea were applied during the final land preparation. Urea was applied in three equal splits at 15, 40 and 70 days after transplanting (DAT), respectively. Thirty five day old seedlings of rice were transplanted on the well puddled experimental plots on 24 January 2016. The plot were kept weed free up to 60 days after transplanting by hand weeding as and when needed but afterwards no weeding was done. Irrigation was given to maintain a level of standing water up to 2 -4cm till maximum tillering stage and after that, a water level of 7-10 cm was maintained up to grain filling stage and then drained out of the field after milk stage to enhance maturity.

Observation and data collection

The experimental crop of each plot was harvested separately at full maturity on 7 May 2016. The grain and straw weights for each plot were recorded after proper sun drying and then converted into ton per hectare. The grain yield was adjusted at 14% moisture level. Prior to harvesting, five plants were selected randomly from each plot excluding border plants and uprooted carefully for collecting data on yield contributing characters.

Statistical analysis

All the collected data were analyzed following the Analysis of Variance (ANOVA) technique and mean differences were adjudged by Duncan's Multiple Range Test (DMRT) (Gomez and Gomez, 1984) using a computer operated programme named MSTAT.

Table 1. Effect of cultivars on plan characters, yield and yield components of *boro* rice varieties.

Treatment	Plant height (cm)	No. of total tillers hill^{-1}	No. of effective tillers hill^{-1}	Panicle length (cm)	No. of grains panicle^{-1}	1000- grain weight (g)	Harvest index (%)
V_1	74.17	12.09 c	8.87 c	19.82	73.54 b	25.23b	24.35c
V_2	77.39	12.96 b	10.27 b	19.56	83.33 a	25.85a	33.27b
V_3	77.30	14.16 a	13.56a	19.90	86.86 a	24.97b	47.25a
V_4	80.06	12.72 b	11.76b	20.60	85.87 a	24.74b	45.60d
Level of significance	NS	**	**	NS	**	**	**
CV (%)	3.47	2.81	4.30	3.33	1.95	1.37	4.65

In a column, figures with same letters or without letters do not differ significantly whereas figures with dissimilar letter differ significantly as per DMRT; NS = Non-significant; ** = Significant at 1% level of probability; V_1 = BRRI dhan28, V_2 = BRRI dhan29, V_3 = Binadhan-8, V_4 = Binadhan-10.

Table 2. Effect of fertilizer management on plan characters, yield and yield components of *boro* rice varieties.

Treatment	Plant height (cm)	No. of total tillers hill^{-1}	No. of effective tillers hill^{-1}	Panicle length (cm)	No. of grains panicle^{-1}	1000- grain weight (g)	Harvest index (%)
T_1	75.91	12.18 c	10.14 c	19.08 b	77.77 c	24.68 b	24.38 d
T_2	77.59	13.24 ab	11.31 ab	20.34 a	84.08 a	25.10 b	34.68 c
T_3	79.15	13.76 a	12.03 a	20.60 a	85.32 a	25.94 a	46.75 a
T_4	76.29	12.75 bc	11.03 b	19.87 ab	81.43 b	25.07 b	43.25 b
Level of significance	NS	**	**	*	**	**	**
CV (%)	3.47	2.81	4.30	3.33	1.95	1.37	4.65

In a column, figures with same letters or without letters do not differ significantly whereas figures with dissimilar letter differ significantly as per DMRT; NS = Non-significant; * = Significant at 5% level of probability; ** = Significant at 1% level of probability; T_1 = Control (no manure & fertilizer), T_2 = Recommended dose of inorganic fertilizer; T_3 = Bio-slurry @ 5 t/ha + Inorganic fertilizer, T_4 = Farmers' practice (average 15 farmers).

Table 3. Interaction effect of variety and fertilizer management on plan characters, yield and yield components of boro rice varieties.

Cultivars × treatment	Plant height (cm)	No. of total till-ers hill^{-1}	No. of effective tillers hill^{-1}	Panicle length (cm)	No. of grains panicle^{-1}	1000-grain weight (g)	Grain yield (t ha$^{-1)}$	Straw yield (t ha^{-1})	Harvest index (%)
V_1T_1	72.93e	10.87h	7.80j	18.40g	70.84h	25.10def	4.76g	4.75k	29.40f
V_1T_2	73.73de	12.50ef	8.43ij	20.50abc	74.05fg	25.03efg	4.93f	5.25j	30.10f
V_1T_3	77.90bc	12.97de	9.87fg	21.28a	75.87f	25.80bc	4.83ge	6.00h	33.50 e
V_1T_4	72.13e	12.00fg	9.37gh	19.10efg	73.40g	24.97efg	4.68g	5.35ij	34.81e
V_2T_1	72.83e	11.93g	8.90hi	18.90fg	79.43e	25.50cd	5.03f	5.40i	30.30 ef
V_2T_2	78.20b	13.27cd	10.67de	19.48def	83.97c	26.03ab	5.83d	6.00h	33.20 e
V_2T_3	79.40b	13.70bc	11.37d	19.93bcde	84.49c	26.47a	5.90cd	6.40ef	42.80bc
V_2T_4	79.13b	12.93de	10.13ef	19.90bcde	81.40de	25.40cde	5.43e	6.22g	40.60 bc
V_3T_1	74.00cde	13.93b	13.07b	18.43g	80.67e	24.00h	6.03ab	5.90h	30.45h
V_3T_2	79.00b	14.07ab	13.80a	20.60abc	89.33ab	24.60g	6.00abc	6.55cd	35.68 d
V_3T_3	79.27 b	14.69a	13.93a	20.81ab	90.11a	26.17ab	6.10a	7.10a	51.27a
V_3T_4	76.93bcd	14.03b	13.50 ab	19.76cdef	87.33b	25.10def	5.95bcd	6.65bc	42.79 bc
V_4T_1	83.87 a	11.97fg	10.77de	20.57abc	80.12e	24.10 h	5.95bcd	6.00h	32.95 e
V_4T_2	79.40b	13.10d	12.33c	20.75ab	88.97ab	24.73fg	6.00abc	6.30fg	39.67 cd
V_4T_3	80.00ab	13.77bc	12.93bc	20.39abcd	90.79a	25.30de	5.850d	6.70b	50.10ab
V_4T_4	76.97bcd	12.03fg	11.10d	20.69abc	83.59cd	24.80fg	5.98a	6.45de	45.23 b
Level of significance	**	**	**	**	**	**	**	**	**
CV (%)	3.47	2.81	4.30	3.33	1.74	1.37	1.23	1.38	4.65

In a column, figures with same letters or without letters do not differ significantly whereas figures with dissimilar letter differ significantly as per DMRT; NS=Non-significant; **=Significant at 1% level of probability; V_1 = BRRI dhan28, V_2 = BRRI dhan29, V_3 = Binadhan-8, V_4 = Binadhan-10; T_1 = Control (no manure & fertilizer), T_2 = Recommended dose of inorganic fertilizer; T_3 = Bio-slurry @ 5 t/ha + inorganic fertilizer, T_4 = Farmers' practice (average 15 farmers).

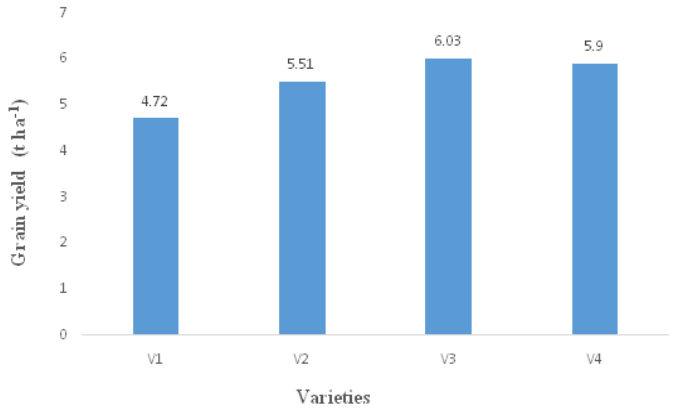

Figure 1. *Effect of varieties on grain yield in boro rice.*

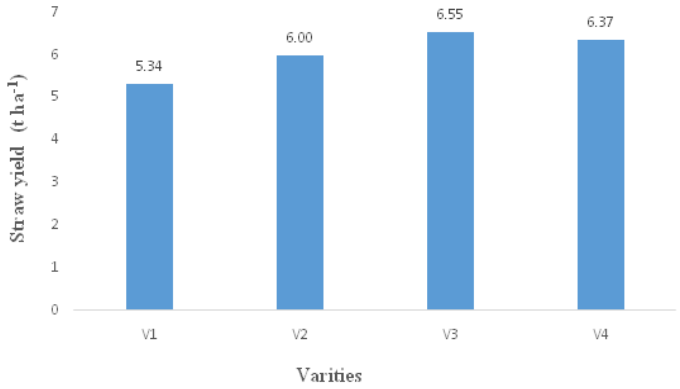

Figure 2. *Effect of varieties on straw yield in boro rice; V_1 = BRRI dhan28, V_2 = BRRI dhan29, V_3 = Binadhan-8, V_4 = Binadhan-10.*

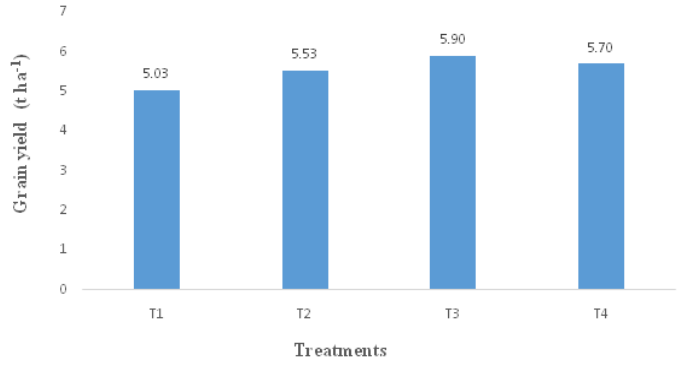

Figure 3. *Effect of fertilizer management on grain yield in boro rice.*

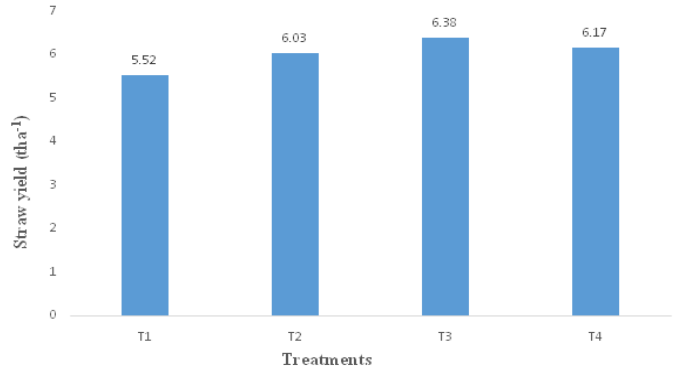

Figure 4. *Effect of fertilizer management on straw yield in boro rice; T_1 = Control (no manure & fertilizer), T_2 = Recommended dose of inorganic fertilizer, T_3 = Bio-slurry @ 5 t/ha + inorganic fertilizer, T_4 = Farmers' practice (average 15 farmers).*

RESULTS AND DISCUSSION

Effect on plant characters

Plant height

The plant height was non-significant for the variety and fertilizer management (Tables 1 and 2). However the tallest plant height (80.06 cm) was observed in V_4(Binadhan-10) and the shortest plant height (74.17 cm) was observed in BRRI dhan28. In case of fertilizer management, the tallest plant height (79.15 cm) was observed in T_3(bio-slurry @ 5t/ha + inorganic fertilizer) and the lowest was found on T_1(control). Variation in plant height might be due to the differences in their genetic makeup. The genetic makeup of the cultivar was responsible for the variation in plant height. This result is in agreement with Hossain and Alam (1999).

Total tillers plant^{-1}

The total tillers plant^{-1}was significantly influenced by the variety and fertilizer management (Tables 1 and 2). Highest tiller (14.16) was found on V_3(Binadhan-8) and lowest tiller (12.09) was found on V_1(BRRI dhan28). The variation in total number of tillers plant^{-1} may be due to individual tillering habit of the varieties. Variable effect of variety on total number of tillers plant^{-1} was also reported by Hussain (1989) who noticed that total number of tillers plant^{-1} differed among the varieties. In respect of fertilizer management, highest tiller in plant (13.76) was found on T_3(bio-slurry @ 5 t/ha + inorganic fertilizer) and lowest tiller (12.18) was found on T_1(control). Pandey *et al.* (1991) and Thakur (1993) also reported the similar results from their studies. Number of total tillers plant^{-1}was significantly influenced a by the interaction effect of variety and fertilizer application (Table 3). The Highest number of total tillers plant^{-1}(14.69) was produced by interaction betweenV_3× T_3(Binadhan-8 with bio-slurry @ 5 t/ha + inorganic fertilizer) and lowest tillers plant^{-1}(10.87) was produced by interaction betweenV_1× T_1(BRRI dhan28 with control).

Effective tillers plant^{-1}

The effective tillers plant^{-1}was significantly influenced by variety (Table 1). Highest no of effective tillers in plant was found on V_3(Binadhan-8) and lowest no of effective tillers (8.87) was found on V_1(BRRI dhan28). The probable reason of difference among the varieties in producing the number of effective tillers plant^{-1} is the genetic makeup of the varieties. The present result is in agreement with that of Chowdhury *et al.* (1993) who states that ear bearing tillers hill^{-1} varied with varieties.

The effective tillers plant^{-1}was significantly influenced by different level of fertilizer application (Table 2). Highest no of effective tiller (12.03) in plant was found on T_3(bio-slurry @ 5 t/ha + inorganic fertilizer) and lowest tiller (10.14) was found on T_1(control). Number of effective tillers hill^{-1}was significantly influenced by the interaction effect of variety and fertilizer management (Table 3). The highest number of effective tiller

plant^{-1}(13.93) was produced by interaction between V_3×T_3 (Binadhan-8 with bio-slurry @ 5 t/ha + inorganic fertilizer) and lowest tillers plant^{1} (7.80) was produced by interaction betweenV_1× T_1(BRRI dhan28 with control). The results corroborated with findings of Jeptoo *et al.* (2013) and Li *et al.* (2014).

Panicle length

The panicle length of the plant was not significant for variety (Table 1). However the longest panicle (20.60 cm) was found on V_4(Binadhan-10) and shortest (19.56 cm) was for V_2(BRRI dhan29). The panicle length of the plant was found significant for fertilizer management (Table 2). Longest panicle (20.60) was found on T_3(bio-slurry @ 5 t/ha + inorganic fertilizer) and shortest panicle (19.08) found from T_1(control). Awan *et al.* (1984) reported the almost similar effect of different nitrogen applications on rice grain yield while Rafey *et al.* (1989) also observed similar effect of N of growth, yield and nutrient uptake of upland rice. Panicle length of the plant was significantly influenced by the interaction effect of variety and fertilizer management (Table 3). The longest panicle (21.28 cm) was found from interaction between V_1×T_3(BRRI dhan28 with bio-slurry @ 5 t/ha + inorganic fertilizer) and shortest panicle (18.40 cm) was produced by interaction between V_1×T_1(BRRI dhan28 with control).

Grains panicle^{-1}

The grains panicle^{-1}was found significant for the variety (Table 1). Highest grains panicle^{-1}(86.86) was found on V_3(Binadhan-8) and lowest grains panicle^{-1}(73.54) was found on V_1(BRRI dhan28). Varietals differences regarding the number of grains panicle^{-1} might be due to their difference in genetic constituents. BRRI (1994) reported that the number of grains panicle^{-1} influenced significantly due to variety. The grains panicle^{-1} influenced by fertilizer management (Table 2) and found significant. Highest grains panicle^{-1}(85.32) was found on T_3(bio-slurry @ 5 t/ha + inorganic fertilizer) and lowest grains panicle^{-1}(77.77) found from T_1(control). The grains panicle^{-1} of the plant was significantly influenced by the interaction effect of variety and fertilizer management (Table 3). The Highest grains panicle^{-1} (90.11) was produced by interaction between V_4×T_3(Binadhan-10 with bio-slurry @ 5 t/ha + inorganic fertilizer) and lowest grains panicle^{-1}(70.84) was produced by interaction between V_1×T_1(BRRI dhan28 with control).

1000 grains weight

The 1000-grains weight was found significant for variety (Table 1). Highest grains weight (25.85 g) was found on V_2(BRRI dhan29) and lowest grains weight (24.74 g) was found on V_4 (Binadhan-10). The variation in weight of 1000 grain might be due to different sizes of grain that was partly controlled by genetic make up of the studied varieties. Chowdhury *et al.* (1993) also expressed almost similar views on the effect of variety and number of seedlings hill^{-1} on the yield and its components of *boro* rice. The 1000-grains weight was found significant for fertilizer management (Table 2). Highest grains weight (25.94 g) was found on T_3(bio-slurry @ 5 t/ha + inorganic fertilizer) and lowest grains weight (24.68 g) found from T_1 (control). The results were in consistent with the report of Chandrasharan and Salam (1995).The weight of 1000-grains of the plant was significantly influenced by the interaction effect of variety and fertilizer management (Table 3). The highest grains weight (26.47 g) was produced by interaction between V_2×T_3 (BRRI dhan29 with bio-slurry @ 5 t/ha + inorganic fertilizer) and lowest grains weight (24.00) was produced by interaction betweenV_3×T_1(Binadhan-8 with control).

Grain yield

The grain yield was found significant for the variety (Figure 1). The grain yield ranges from 4.72 to 6.03 t ha^{-1}. Figure 1 indicates that highest grain yield (6.03 t ha^{-1}) was found in V_3(Binadhan-8) and lowest grain yield (4.72 t ha^{-1}) was found on V_1(BRRI dhan28). The grain yield weight influenced by fertilizer management (Figure 3). Highest grain yield (5.90 t ha^{-1}) was found on T_3 (bio-slurry @ 5 t/ha + inorganic fertilizer) and lowest grain yield (5.03 t ha^{-1}) found from T_1(control). The grain yield of the plant was significantly influenced by the interaction effect of variety and fertilizer management (Table 3). The highest grain yield (6.10 t ha^{-1}) was produced by both interaction between V_3×T_3 (Binadhan-8 with bio-slurry @ 5t/ha + inorganic fertilizer). The lowest grain yield (4.68 t ha^{1}) was produced by interaction of V_1×T_4(BRRI dhan28 with Farmers' practice). These results are in accordance with Akhtar (2011).

Straw yield

The straw yield was found significant for the variety (Figure 2). The straw yield ranges from 5.34 to 6.55 t ha^{-1}. Figure 2 indicates that highest straw yield (6.55 t ha^{-1}) was found on V_3 (Binadhan-8) and lowest straw yield (5.34 t ha^{-1}) was found on V_1(BRRI dhan28). These results are consistent with those obtained by Chowdhury *et al.* (1993) who reported differences in straw yield among varieties. The straw yield weight influenced by fertilizer management (Figure 4). Highest straw yield (6.38 t ha^{-1}) was found on T_3(bio-slurry @ 5 t/ha + inorganic f ertilizer) and lowest straw yield (5.52 t ha^{-1}) found fromT_1 (control). Usha *et al.* (2001) also reported the effects of low fertilizers management on different rice varieties. The straw yield of the plant was significantly influenced by the interaction effect of variety and fertilizer management (Table 3).The Highest straw yield (7.10 t ha^{1}) was produced by interaction between V_3×T_3 (Binadhan-8 with bio-slurry @ 5 t/ha + inorganic fertilizer) and lowest straw yield (4.75 t ha^{1}) was produced by interaction between V_1×T_1(BRRI dhan28 with control). Similar finding were also reported by Chaplot and Sumeriya (2013)

Harvest index

The harvest index was found significant for variety (Table 1). Highest harvest index (47.25%) was found on V_3(Binadhan-8) and lowest (24.35%) was recorded on V_1(BRRIdhan28). An irregular trend of increasing harvest index with the change of variety was observed in the result (Table 1). Application of

different level of fertilizer management exerted a significant influence on the harvest index (Table 2). The highest index (46.75%) was found on T_3(bio-slurry @ 5t/ha + inorganic fertilizer) and lowest (24.38%) found from T_1(control). The harvest index of the plant was significantly influenced by the interaction effect of variety and fertilizer management (Table 3). The highest index (51.27%) was produced by interaction between $V_4 \times T_3$ (Binadhan-10 with bio-slurry @ 5 t/ha + inorganic fertilizer) and lowest index (29.40%) was produced by interaction between $V_1 \times T_1$ (BRRI dhan28 with control).

Conclusion

Results of the experiment showed that variety had significant effect on yield contributing parameters and yield. The highest values of most of the characters were found on Binadhan-8. Results of the experiment also demonstrated that fertilizer management had significant effect on yield contributing parameters and yield. The highest value of all characters were observed with the application of T_3(Bio-slurry @ 5t/ha + inorganic fertilizer) followed by T_2(Recommended dose of inorganic fertilizer), T_4(farmers practice) and all cases the lowest one was observed when the land was fertilized with T_1(control). Interaction effects of variety and fertilizer management were significant for most of the yield contributing characters and yield. The highest grain yield (6.10 t ha^{-1}), the highest straw yield (7.10 t ha^{-1}), were found from the combination of $V_3 \times T_3$ (Binadhan-8 with bio-slurry @ 5 t/ha + inorganic fertilizer). The lowest grain yield (4.76 t ha^{-1}) and straw yield (4.75 t ha^{-1}) were found from the interaction of $V_1 \times T_1$ (BRRI dhan28 with control). Based on the present study it can be suggested that the farmers' can grow *boro* rice cv. Binadhan-8 with bio-slurry @ 5 t/ha + inorganic fertilizer in *boro* season for obtaining maximum grain yield.

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