

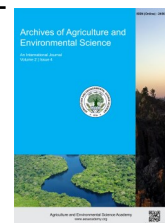


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ORIGINAL RESEARCH ARTICLE



Effect of integrated nutrient management on the growth and yield of boro rice (*Oryza sativa* L.) cultivars

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ABSTRACT

For sustainable *boro* rice production in Bangladesh, a balanced fertilization to improve the current soil condition caused by mono-application of inorganic fertilizers and appropriate rice variety selection are very crucial. Therefore, an experiment was conducted at the Agronomy Field Laboratory, Bangladesh Agricultural University, Mymensingh, during the *boro* season of December 2016 to May 2017 to evaluate the effect of integrated nutrient management on two *boro* rice cultivars. The varieties were BRRI dhan28 and BRRI dhan29 and eight kinds of nutrient management viz., control (no fertilizers), recommended dose of inorganic fertilizers ($120-60-40$ N, P_2O_5 , K_2O kg ha^{-1} + gypsum 60 kg ha^{-1} and $ZnSO_4$ @ 10 kg ha^{-1}), full dose of poultry manure @ 5 t ha^{-1} , cowdung @ 10 t ha^{-1} , poultry manure @ 2.5 t ha^{-1} + 50% prilled urea and full dose of other inorganic fertilizers, cowdung @ 5 t ha^{-1} + 50% prilled urea and full dose of inorganic fertilizers, poultry manure @ 2.5 t ha^{-1} + 75% prilled urea and full dose of inorganic fertilizers, and cowdung @ 5 t ha^{-1} + 75% prilled urea and full dose of other inorganic fertilizers. The experiment was laid out in a split plot design with three replications. Result showed that, yield and yield components of *boro* rice were significantly influenced by variety, nutrient management and interaction of variety and nutrient management. In respect of grain yield, BRRI dhan29 produced the maximum yield (5.46 t ha^{-1}). BRRI dhan28 showed poor performance with all characters and gave the minimum yield (4.07 t ha^{-1}). In case of nutrient managements, the highest yield and yield component were obtained from poultry manure @ 2.5 t ha^{-1} + 50% prilled urea and full dose of inorganic fertilizers and produced the maximum grain yield (5.70 t ha^{-1}). In the interaction of variety and integrated nutrient management, the highest grain yield (6.83 t ha^{-1}) and straw yield (7.61 t ha^{-1}) was obtained from poultry manure @ 2.5 t ha^{-1} + 50% prilled urea and full dose of inorganic fertilizers with BRRI dhan29 variety. So, BRRI dhan29 with 2.5 t ha^{-1} poultry manure + 50% prilled urea and full dose of the recommended inorganic fertilizers might be a promising practice for *boro* rice cultivation.

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INTRODUCTION

Agriculture is the largest food producing sector of the economy of Bangladesh since it comprises of 13.82% of the country's GDP and employs around 45% of the total labour forces (BBS, 2019). Rice (*Oryza sativa* L.) is the major cultivated food crop in Bangladesh which contributes 95% of the annual food grain

production and provides nearly 48% of rural employment, about 75% of calorie supply and about 50% of the total protein intake of an average person in the country (Chowdhury and Hassan, 2013). According to the provisional data by the Bangladesh Bureau of Statistics in FY 2017-18, the production of milled rice reached around 36.28 million tons among which *boro* rice occupies 19.57 million tons (BBS, 2019). Bangladesh ranks third

among the rice producing countries of the world (Childs, 2020) as it has excellent geographic condition for growing rice. But the country's population is increasing and agricultural land is decreasing which limits the expansion of rice area and production. Therefore, to be self-sufficient and meeting the demand of the ever-increasing population in Bangladesh rice production has been given the highest priority.

The use of inorganic fertilizer in rice cultivation has been progressively increasing since its introduction. However, available reports indicate that the repeated use of chemical fertilizer alone fails to sustain desired yield, impairs soil physical condition and exhausts organic matter content (Mohammad, 2010) leads to environmental degradation and soil health especially due to their continuous use. Cost of inorganic fertilizer is high and thus identifying appropriate and economically feasible approaches, which are environmentally friendly and soil healthy, is imperative. Integrated nutrient management seems to be suitable approach to achieve the goals. The limitations associated with inorganic sources of plant nutrients are often overcome when they used in judicious combination with organic manures. Combine application of organic and inorganic fertilizer may also reduce the cost of production by lowering the need for chemical fertilizers. To improve the current soil condition and mitigate the yield gap among other higher rice yielding countries and Bangladesh, the best remedy is to apply a combination of both organic and inorganic fertilizers where inorganic fertilizer provides nutrients and the organic fertilizers increases soil organic matter and improve soil structure as well as ameliorate the buffering capacity of the soil. Use of organic amendment like cowdung and poultry manure is generally considered as a key to the soil health and sustainability in intensive rice-based cropping systems, both in terms of maintaining the amount and quality of soil organic matter and in terms of supplying important nutrients (Ali et al., 2009). Again, the average yield of *boro* rice in Bangladesh is 4.028 t ha⁻¹ (BBS, 2019) which is lower compared with other Asian countries like Indonesia, Malaysia etc. (Rahman et al., 2019). The genetic constituents of varieties, and different management practices could be responsible for low yield. Among these management practices, lack of judicious selection of variety is one of the main reasons. Therefore, to get the maximum benefit from *boro* rice, it is essential to develop appropriate package of practices for successful cultivation and yield maximization. Among the various cultural practices, suitable combination of variety along with judicious application of organic and inorganic fertilizer is necessary for yield maximization. The present investigation was, therefore, undertaken to observe the effect of variety with integration of organic and inorganic fertilizers on the yield performance of *boro* rice.

MATERIALS AND METHODS

Experimental design and treatments

The experimental study was conducted at the Agronomy Field Laboratory, Bangladesh Agricultural University (BAU), Mymensingh. The experimental field belongs to the non-

calcareous dark grey floodplain soil under the Agro-ecological Zone of the Old Brahmaputra Floodplain (AEZ-9) (UNDP and FAO, 1988) located at 24.75° N latitude and 90.50°E longitude at an elevation of 18 m above the sea level. The field was a medium high land with flat and well drained condition with the pH value was 5.9-6.5. The organic and mineral composition of the soil was generally poor. The organic matter, total nitrogen, available phosphorus (P₂O₅) and potassium of the soil ranged from 0.93%, 0.13%, 16.3 ppm and 0.28%, respectively (Laila et al., 2018). The experiment was set up in a two-factorial split-block design, with three replications. There were two rice cultivars (first factor) in the experiment: (1) BRRI dhan28 and (2) BRRI dhan29 assigned in the main plot. Each of the varieties was treated with eight nutrient management practices (second factor) in the sub-plots: (1) Control (no fertilizers) (2) Recommended dose of inorganic fertilizers (120-60-40 N, P₂O₅, K₂O kg ha⁻¹ + gypsum 60 kg ha⁻¹ and ZnSO₄ @ 10 kg ha⁻¹) (FRG, 2012) (3) Full dose of poultry manure @ 5 t ha⁻¹ (4) Cowdung @ 10 t ha⁻¹ (5) Poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers (6) Cowdung @ 5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers (7) Poultry manure @ 2.5 t ha⁻¹ + 75% prilled urea and full dose of other inorganic fertilizers (8) Cowdung @ 5 t ha⁻¹ + 75% prilled urea and full dose of other inorganic fertilizers (Table 1).

Rice cultivation practices

The size of the unit plot was 5 m² (2.5 m × 2.0 m). The sprouted seeds were sown in the nursery bed on 27 November 2016. After the preparation of the main field, the land was fertilized as per treatment specifications. The whole amount of manures and triple superphosphate, muriate of potash, gypsum and zinc sulphate were applied at final land preparation as per treatment. Prilled urea was applied in three equal splits at 15, 30 and 45 days after transplanting (DAT). The seedlings were uprooted and immediately transferred to the main field on 8 January 2017 at the rate of three seedlings per hill maintaining a spacing of 25 cm × 15 cm. Intercultural operations were done as and when necessary. When 90% of the panicles turned into golden yellow color, the crop was assessed to attain maturity. Five hills (excluding border hills and central 1 m² harvest area) were selected randomly from each unit plot for recording data. An area of central 1 m × 1 m was selected from each plot to record the yield of grain and straw. The two varieties were harvested at different dates. Harvesting of BRRI dhan28 and BRRI dhan29 were done on 30 April 2017 and 8 May 2017, respectively. Grains were then sun dried at 14% moisture level and cleaned. The straw was also sun dried properly. Finally, the yield of grain and straw plot⁻¹ were recorded and converted to t ha⁻¹.

Data collection and statistical analysis

Data were collected on plant height (cm), number of total tillers plant⁻¹, number of effective tillers plant⁻¹, panicle length (cm), number of grains panicle⁻¹, number of sterile spikelets panicle⁻¹, 1000-grain weight (g), grain yield (t ha⁻¹), straw yield (t ha⁻¹) and harvest index (%). The collected data were compiled

Table 1. Total amount of nutrient applied in different treatments.

Treatments	Total nutrient applied (Kg ha ⁻¹)					
	N	P	K	Ca	Zn	S
Control	0	0	0	0	0	0
Recommended dose of inorganic fertilizer	120	60	40	19.8	3.6	12.6
Full dose of poultry manure @ 5 t ha ⁻¹	95	28	37.5	0	0	55
Cowdung @ 10 t ha ⁻¹	120	100	160	0	0	13
Poultry manure @ 2.5 t ha ⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers	107.6	74	58.75	19.8	3.6	40.1
Cowdung @ 5 t ha ⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers	120	110	120	19.8	3.6	19.1
Poultry manure @ 2.5 t ha ⁻¹ + 75% prilled urea and full dose of other inorganic fertilizers	137.5	74	58.75	19.8	3.6	40.1
Cowdung @ 5 t ha ⁻¹ + 75% prilled urea and full dose of other inorganic fertilizers	150	110	120	19.8	3.6	19.1

and tabulated in proper form and subjected to statistical analysis. Data were analyzed using the analysis of variance technique with the help of computer package program MSTAT-C (Russel, 1986) and mean differences were adjudged by Duncan's Multiple Range Test (DMRT) (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

Effect of variety on yield contributing characters and yield

Different yield contributing characters of *boro* rice differed significantly due to varietal differences except plant height, sterile spikelets panicle⁻¹ and harvest index (Table 2). The highest number of total and effective tillers hill⁻¹ was observed in BRR1 dhan29 and the lowest was recorded in BRR1 dhan28. Effect of variety on total and effective tillers hill⁻¹ was also reported by Rahman et al. (2020) and Saha et al. (2014) who observed that number of total and effective tillers hill⁻¹ differed among the varieties. The longest panicle and the highest number of grains panicle⁻¹ was obtained from BRR1 dhan29 and the shortest panicle length and lowest number of grains panicle⁻¹ was obtained from BRR1 dhan28. 1000-grain weight is a varietal character and it varies from variety to variety. The heaviest 1000-grain weight was found in BRR1 dhan29 and the lowest weight was recorded in BRR1 dhan28. Rahman et al. 2019 also found the lowest 1000-grain weight in terms of BRR1 dhan28. The highest grain and straw yield was produced in BRR1 dhan29 while the lowest grain and straw yield was produced in BRR1 dhan28. This might be due to the fact that BRR1 dhan29 performed best in every yield contributing characters which ultimately contributed to the highest grain yield. Grain yield of *boro* rice was significantly affected by variety which was recorded by Tyeb et al. (2013) and Adhikari et al. (2018).

Effect of integrated nutrient management on yield contributing characters and yield

Plant height, number of total and effective tillers hill⁻¹, number of sterile spikelets panicle⁻¹ and 1000-grain weight varied significantly due to different nutrient managements (Table 3). The highest plant height was obtained from poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers and the lowest plant height was obtained from control treatment which was statistically identical to recommended dose of

inorganic fertilizers treatment. The highest number of total and effective tillers hill⁻¹ was obtained in poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers treatment and the lowest number was obtained from control treatment (no fertilizers). It is may be due to the enhanced and continuous supply of nutrients by the combination of poultry manure and inorganic fertilizer which led to better tiller production. Sarkar et al. (2016) and Islam et al. (2013) found similar result that integrated nutrient management had significant effect on total and effective tillers hill⁻¹. The highest number of sterile spikelets panicle⁻¹ was recorded in control and the lowest number of sterile spikelets panicle⁻¹ was obtained from poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers which was at par with poultry manure @ 2.5 t ha⁻¹ + 75% prilled urea and full dose of inorganic fertilizers treatment. The highest value of 1000-grain weight was recorded in poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers treatment and the lowest value was found in no fertilizer treatment which was statistically identical to all treatments. Islam et al. (2015) and Suresh et al. (2013) also reported that combination of organic and inorganic fertilizer in soil prolongs the availability of essential nutrient which help to accumulate greater source and efficient translocation of photosynthates into the sink as indicated by higher 1000-grain weight. The highest grain yield was found in poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers which was statistically identical to poultry manure @ 2.5 t ha⁻¹ + 75% prilled urea and full dose of inorganic fertilizers. Integrated nutrient management might allowed the plant roots to compete with loss mechanisms and absorb more nutrients leading to better yield by producing highest total and effective tillers hill⁻¹, less sterile spikelet panicle⁻¹ and the heaviest 1000-grain weight. Similar variation due to nutrient management was reported by Xia et al. (2011) and Naher and Poul (2017). The highest straw yield was produced from poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers treatment which was statistically identical to full dose of poultry manure @ 5 t ha⁻¹ and poultry manure @ 2.5 t ha⁻¹ + 75% prilled urea and full dose of inorganic fertilizers treatments. Combined application of inorganic fertilizers and organic manures produced the highest straw yield was reported by Jahan et al. (2017).

The lowest grain and straw yield were obtained from control treatment. During the growth period control treated plots suffered from inadequate nutrient so it produced lower grain and straw. The highest harvest index was obtained from poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers treatment which was statistically identical to poultry manure @ 2.5 t ha⁻¹ + 75% prilled urea and full dose of inorganic fertilizers treatment and the lowest was found in control treatment. Ali *et al.* (2018) concluded from his findings that relatively higher harvest index was obtained with integrated nutrient management.

Effect of interaction between variety and integrated nutrient management on yield contributing characters and yield

Interaction of variety and integrated nutrient management had significant effect on grain yield and straw yield (Table 4). The highest grain yield (6.83 t ha⁻¹) was found in BRR1 dhan29 with poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers treatment combination which was

statistically identical to BRR1 dhan29 with poultry manure @ 2.5 t ha⁻¹ + 75% prilled urea and full dose of other inorganic fertilizers treatment (Figure 1). The highest straw yield (7.61 t ha⁻¹) was obtained from BRR1 dhan29 with poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers treatment which was statistically identical to BRR1 dhan29 × full dose of poultry manure @ 5 t ha⁻¹ and BRR1 dhan29 with poultry manure @ 2.5 t ha⁻¹ + 75% prilled urea and full dose of other inorganic fertilizers treatment combinations. The lowest grain and straw yield (3.29 t ha⁻¹ and 4.16 t ha⁻¹, respectively) was obtained from BRR1 dhan28 × no fertilizers treatment. The phenomena of integrated fertilization allowed plants to uptake higher nutrient which resulted in the greater source in plants and better translocation of photosynthates into the sink as indicated by higher yield attributes. Laila *et al.* (2020) and Sarkar *et al.* (2014) found that combine effect of variety and nutrient management had positive effect on rice yield due to steady nutrient release and higher nutrient uptake by plants.

Table 2. Effect of variety on crop characters, yield components and yield of *boro* rice.

Variety	Plant height (cm)	No. of total tillers hill ⁻¹	No. of effective tillers hill ⁻¹	Panicle length (cm)	No. of grains panicle ⁻¹	No. sterile spikelets panicle ⁻¹	1000-grain weight (g)	Grain yield (t ha ⁻¹)	Straw yield (t ha ⁻¹)	Harvest index (%)
BRR1 dhan28	80.81	9.46b*	8.59b	21.23b	135.96b	8.71	20.48b	4.07b	4.73b	46.21b
BRR1 dhan29	82.70	10.42a	9.75a	21.90a	137.17a	8.58	21.51a	5.46a	6.23a	46.63a
Sx ⁻	0.614	0.123	0.164	0.028	0.147	0.047	0.043	0.026	0.081	0.099
Level of significance	NS	*	*	**	*	NS	**	**	**	NS
CV (%)	3.68	6.08	8.79	0.64	0.53	2.64	1.01	2.65	7.25	1.05

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 = Non-significant.

Table 3. Effect of integrated nutrient management on crop characters, yield components and yield of *boro* rice.

Integrated nutrient management	Plant height (cm)	No. of total tillers hill ⁻¹	No. of effective tillers hill ⁻¹	Panicle length (cm)	No. of grains panicle ⁻¹	No. of sterile spikelet panicle ⁻¹	1000- grain weight (g)	Grain yield (t ha ⁻¹)	Straw yield (t ha ⁻¹)	Harvest index (%)
N ₀	73.43f*	8.00f	6.94f*	21.23	135.33	9.00a	20.54b	3.73f	4.58d	44.84c
N ₁	74.33f	9.00e	8.01e	21.30	135.33	8.83ab	20.57b	4.15e	4.91cd	45.80b
N ₂	77.83e	9.50de	8.60de	21.48	135.83	8.83ab	20.71b	4.34e	5.00cd	46.44ab
N ₃	82.20d	9.83cd	9.00cd	21.50	136.67	8.67bc	20.80b	4.57d	5.23bc	46.62ab
N ₄	90.53a	11.83a	11.45a	22.05	138.33	8.333d	22.45a	5.70a	6.36a	47.26a
N ₅	85.43bc	10.50bc	9.87b	21.61	137.00	8.50cd	20.86b	5.28b	5.99a	46.83ab
N ₆	86.90b	10.67b	10.08b	21.79	137.33	8.33d	21.16b	5.548a	6.25a	46.99a
N ₇	83.37cd	10.17bcd	9.41bc	21.54	136.67	8.67bc	20.85b	4.78c	5.48b	46.60ab
Sx ⁻	0.902	0.221	0.223	0.209	0.911	0.089	0.305	0.071	0.153	0.322
Level of significance	**	**	**	NS	NS	**	**	**	**	**
CV (%)	2.71	5.47	5.96	2.38	1.63	2.53	3.56	3.63	6.83	1.70

*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 = Non-significant. N₀ = No fertilizer, N₁ = Recommended dose of inorganic fertilizers (120-60-40 N, P₂O₅, K₂O kg ha⁻¹ + gypsum 60 kg ha⁻¹ and ZnSO₄ @ 10 kg ha⁻¹), N₂ = Full dose of poultry manure @ 5 t ha⁻¹; N₃ = Cowdung @ 10 t ha⁻¹; N₄ = Poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers; N₅ = Cowdung @ 5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers; N₆ = Poultry manure @ 2.5 t ha⁻¹ + 75% prilled urea and full dose of other inorganic fertilizers; N₇ = Cowdung @ 5 t ha⁻¹ + 75% prilled urea and full dose of other inorganic fertilizers.

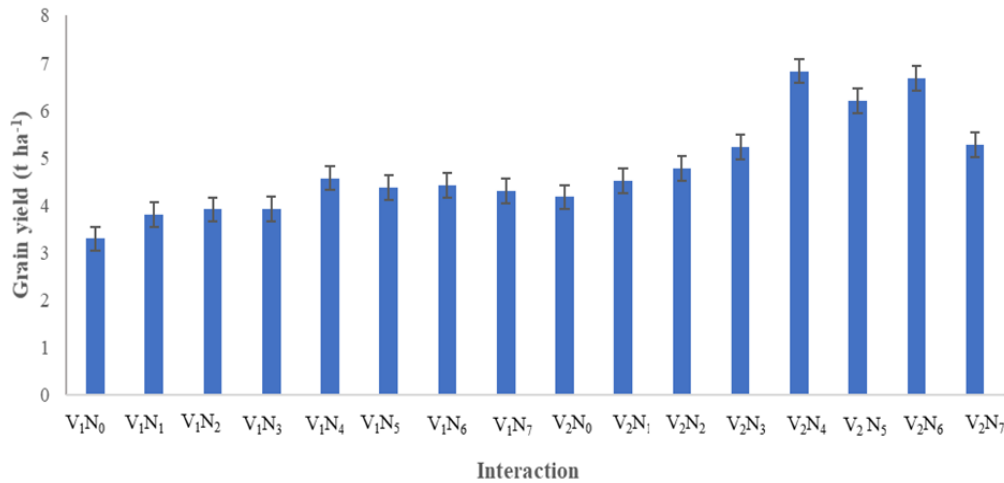


Figure 1. Interaction effect of variety and nutrient management on grain yield of boro rice.

V₁ = BRRI dhan34, V₂ = Binadhan-13, V₃ = Kalizira., N₀ = No fertilizer, N₁ = Recommended dose of inorganic fertilizers (120-60-40 N, P₂O₅, K₂O kg ha⁻¹ + gypsum 60 kg ha⁻¹ and ZnSO₄ @ 10 kg ha⁻¹), N₂ = Full dose of poultry manure @ 5 t ha⁻¹; N₃ = Cowdung @ 10 t ha⁻¹; N₄ = Poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers; N₅ = Cowdung @ 5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers; N₆ = Poultry manure @ 2.5 t ha⁻¹ + 75% prilled urea and full dose of other inorganic fertilizers; N₇ = Cowdung @ 5 t ha⁻¹ + 75% prilled urea and full dose of other inorganic fertilizers.

Table 4. Interaction effects of variety and integrated nutrient management on yield contributing characters and yield of boro rice.

Interaction (Variety × Nutrient management)	Plant height (cm)	No. of total tillers hill ⁻¹	No. of effective tillers hill ⁻¹	Panicle length (cm)	No. of grains panicle ⁻¹	No. of sterile spikelets panicle ⁻¹	1000- grain weight (g)	Straw yield (t ha ⁻¹)	Harvest index (%)
V ₁ N ₀	72.53	7.33	6.17	20.91	134.33	9.00	20.04	4.16f	44.16
V ₁ N ₁	73.73	8.67	7.57	20.96	134.33	9.00	20.04	4.51ef	45.70
V ₁ N ₂	76.00	9.00	8.00	21.21	135.00	9.00	20.27	4.55ef	46.22
V ₁ N ₃	81.60	9.33	8.40	21.24	136.33	8.67	20.33	4.55ef	46.30
V ₁ N ₄	89.13	11.33	10.83	21.58	138.33	8.33	21.55	5.10de	47.23
V ₁ N ₅	84.60	10.00	9.27	21.32	136.33	8.67	20.39	4.99de	46.70
V ₁ N ₆	85.53	10.33	9.67	21.35	136.67	8.33	20.82	5.00de	46.85
V ₁ N ₇	83.33	9.67	8.82	21.26	136.33	8.67	20.38	4.94de	46.56
V ₂ N ₀	74.33	8.67	7.72	21.55	136.33	9.00	21.04	5.00de	45.51
V ₂ N ₁	74.93	9.33	8.44	21.64	136.33	8.67	21.10	5.31cd	45.90
V ₂ N ₂	79.67	10.00	9.20	21.75	136.67	8.67	21.15	5.45bcd	46.67
V ₂ N ₃	82.80	10.33	9.60	21.77	137.00	8.67	21.28	5.91bc	46.93
V ₂ N ₄	91.93	12.33	12.07	22.52	138.33	8.33	23.35	7.61a	47.29
V ₂ N ₅	86.27	11.00	10.47	21.91	137.67	8.33	21.33	7.00a	46.96
V ₂ N ₆	88.27	11.00	10.50	22.23	138.00	8.33	21.50	7.50a	47.12
V ₂ N ₇	83.40	10.67	10.00	21.82	137.00	8.67	21.32	6.03b	46.64
S _x	1.28	0.314	0.316	0.296	1.29	0.127	0.431	0.216	0.456
Level of significance	NS	NS	NS	NS	NS	NS	NS	**	NS
CV (%)	2.71	5.47	5.96	2.38	1.63	2.53	3.56	6.83	1.70

In a column figures having common letter(s) do not differ significantly as per DMRT; ** = Significant at 1% level of probability, * = Significant at 5% level of probability, NS = Not significant. V₁ = BRRI dhan34, V₂ = Binadhan-13, V₃ = Kalizira., N₀ = No fertilizer, N₁ = Recommended dose of inorganic fertilizers (120-60-40 N, P₂O₅, K₂O kg ha⁻¹ + gypsum 60 kg ha⁻¹ and ZnSO₄ @ 10 kg ha⁻¹), N₂ = Full dose of poultry manure @ 5 t ha⁻¹; N₃ = Cowdung @ 10 t ha⁻¹; N₄ = Poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers; N₅ = Cowdung @ 5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers; N₆ = Poultry manure @ 2.5 t ha⁻¹ + 75% prilled urea and full dose of other inorganic fertilizers; N₇ = Cowdung @ 5 t ha⁻¹ + 75% prilled urea and full dose of other inorganic fertilizers.

Conclusion

With detailed data on yield contributing characters and yield, the study has strong evidence that BRRI dhan29 produced the highest grain yield compared to BRRI dhan28 and poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers treatment provided the highest grain yield

compared to other nutrient managements. Therefore, BRRI dhan29 with poultry manure @ 2.5 t ha⁻¹ + 50% prilled urea and full dose of other inorganic fertilizers treatment combination can be used for increasing higher yield and improve soil health. But further studies are required in different regions of the country to confirm the results before recommending at different parts of Bangladesh.

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