

Performance of modern aromatic rice (cv. BRR1 dhan50) under different fertilizer management practices in *boro* season

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Abstract: The experiment was conducted at the Hajee Mohammad Danesh Science and Technology University Farm, Dinajpur, Bangladesh during *boro* season (January to May) of 2009 to observe the influence of fertilizers on the yield and yield contributing characters of modern aromatic rice cv. BRR1 dhan50 (*Banglamati*). The experiment was laid out in a randomized complete block design with four replications. The experiment comprised of six fertilizer treatments viz., i) Control (no fertilizer), ii) general recommended dose of chemical NPKSZn fertilizers (Urea @ 150 kg ha⁻¹, TSP @ 60 kg ha⁻¹, MOP @ 50 kg ha⁻¹, Gypsum @ 30 kg ha⁻¹, ZnSO₄ @ 2.25 kg ha⁻¹), iii) well-decomposed cow dung @ 5 t ha⁻¹, iv) well-decomposed cow dung @ 5 t ha⁻¹ + recommended dose of NPKSZn chemical fertilizers, v) 150% of recommended N fertilizer with recommended PKSZn fertilizers and vi) 200% of the recommended N fertilizer with recommended PKSZn fertilizers. All the fertilizer treatments produced significantly higher grain yield than control treatment. Growth attributes of aromatic rice such as tillers hill⁻¹, fertile tillers hill⁻¹, spikelets panicle⁻¹, grains panicle⁻¹ and 1000-grains weight showed higher value with the incorporation of cow dung in combination with recommended dose of chemical fertilizers. Cow dung @ 5 t ha⁻¹ in combination with recommended chemical fertilizers (NPKSZn) produced the highest grain yield that was statistically similar to the application of 200% of the recommended N fertilizer with recommended PKSZn fertilizers.

Key words: Fertilizer, Cow dung, Yield, Aromatic rice, BRR1 dhan50

Introduction

Rice research started in the country with a view to meet the national need and thus initial research efforts was to get grain yield. Now the country is near to self-sufficiency in rice and research efforts has been focused to develop premium quality rice for export and domestic consumption. There are also a few local popular premium quality cultivars in the country but low yield they are not been cultivated widely. Premium quality rice variety with desirable physicochemical quality and with good milling recovery would meet the millers as well as consumers preference. Recently, Bangladesh Rice Research Institute (BRRI) developed a new aromatic rice variety having long grain namely *Banglamati* (BRR1 dhan50) for *boro* season. Aromatic rice is rated best in quality and fetches much higher price than high quality non-aromatic rice in the domestic and international market. The demand of aromatic rice for internal consumption and also for export is increasing day by day (Das and Baqui, 2000). Dinajpur region is a native area of some indigenous aromatic rice cultivars. About 30% of rice land in Dinajpur is covered by aromatic rice varieties during '*Aman*' season (Baqui *et al* 1997). Due to low yield and limited market facilities farmers seem to have little interest to continue growing these aromatic rice cultivars. Farmer's observation at present day is that aromatic rice gradually losing their aroma and other qualities due to lack of organic matter in soil and more use of chemical fertilizers. The organic fertilizer is traditionally an important source for supplying nutrients for rice cultivation in Bangladesh but use of inorganic fertilizers has increased dramatically, as availability of organic fertilizers is decreased. Higher yields depend on rational and effective application of chemical fertilizers (Plucknett *et al.*, 1986). The application of farmyard manure meets N requirement, provides micronutrients and modifies soil physical properties and thus favours rice production and probably it may affect the quality of rice. Moreover, use of farmyard manure not only acts as a source of N and other nutrients but also increases the efficiency of applied nitrogen. Organic matter measures determine the fertility and nutrient status

of a soil. Use of judicious combination of organic and inorganic fertilizer is very important for tropical country like Bangladesh (Khan *et al.*, 1986). This will ultimately economize fertilizer use and maintain soil productivity and yield. The information is limited on varietal quality responses to different organic and inorganic fertilizers with their interactions particularly in respect of yield of modern aromatic rice varieties in *boro* season. Therefore, the present investigation was aimed to study the effects of fertilizers on yield and yield attributes of newly released aromatic rice cv. BRR1 dhan50 in *boro* season.

Materials and Methods

The experiment was conducted at the Hajee Mohammad Danesh Science and Technology University Farm, Dinajpur, Bangladesh during *boro* season (January to May) of 2009. The experimental site was a medium high land with sandy loam soil having a pH value of 6.0. The experiment was laid out in a randomized complete block design with four replications. The experiment comprised of six fertilizer treatments viz., i) Control (no fertilizer) (T₁), ii) general recommended dose of chemical NPKSZn fertilizers (Urea @ 150 kg ha⁻¹, TSP @ 60 kg ha⁻¹, MOP @ 50 kg ha⁻¹, Gypsum @ 30 kg ha⁻¹, ZnSO₄ @ 2.25 kg ha⁻¹) (T₂), iii) well-decomposed cow dung @ 5 t ha⁻¹ (T₃), iv) well-decomposed cow dung @ 5 t ha⁻¹ + recommended dose of NPKSZn chemical fertilizers (T₄), v) 150% of recommended N fertilizer with recommended PKSZn fertilizers (T₅) and vi) 200% of the recommended N fertilizer with recommended PKSZn fertilizers (T₆). The unit plot size was 4.0m x 2.5m. According to the experimental specification, no fertilizer was used under control treatment (T₁). Phosphorous, K, S and Zn were applied as basal through TSP, MOP, gypsum and ZnSO₄ at final land preparation as per treatments. Well decomposed sun dry cow-dung @ 5.0 t ha⁻¹ was mixed in the specific plots before 7 days of final land preparation. Nitrogen fertilizer was applied in the form of urea in two equal splits at 20 and 45 days after transplanting. Forty-day-old seedlings were transplanted in the plots at a spacing of 20 cm x 15 cm using 3 seedlings hill⁻¹ on 15

January, 2009. All other cultural practices were done uniformly as per recommendation. Five hills from each plot were collected for data collection and whole plots were harvested to obtain grain and straw yields. . Data were analyzed following the ANOVA technique and mean differences were adjudged with Duncan's Multiple Range Test (DMRT).

Results and Discussion

Plant height was significantly influenced by fertilizer treatment. The tallest plant (73.05 cm) was found with well-decomposed cow dung @ 5 t ha⁻¹ + recommended dose of chemical fertilizers (NPKSZn) (T₄) which was statistically similar to 150% of recommended N fertilizer with recommended PKSzn fertilizers (T₅) and 200% of

recommended N fertilizer with recommended PKSzn fertilizers(T₆). The lowest plant height (63.73cm) was observed in control treatment (T₁). The tallest plant with cow dung @ 5 t ha⁻¹ + recommended dose of NPKSZn might be due to sufficient supply and absorption of nutrients to crop. This result agreed with the findings of Hossain *et al.* (1997) and Sarkar *et al.* (2004).The highest number of total tillers hill⁻¹ (14.68) was observed with cow dung @ 5 t ha⁻¹+ recommended dose of chemical fertilizers (T₄) and it was statistically similar to 150% of recommended N fertilizer with recommended PKSzn fertilizers (T₅) and lowest total tillers hill⁻¹ (10.13) observed under control treatment (T₁) which was statistically similar to recommended fertilizer dose of NPKSZn (T₂) and cowdung @ 5 t ha⁻¹ (T₃) (Table1).

Table 1. Effect of fertilizer dose on the yield and yield contributing characteristics of aromatic rice cv.Banglamati in *Boro* season

Treatment	Yield and yield components								
	Plant height (cm)	Total tillers hill ⁻¹	Fertile tillers hill ⁻¹	Panicle length (cm)	Spikelets panicle ⁻¹	Grains panicle ⁻¹	1000 grain wt. (g)	Grain yield (t ha ⁻¹)	Straw yield (t ha ⁻¹)
T ₁	63.73d	10.13d	9.25e	18.00	75.43e	64.88d	17.45c	1.08d	1.38c
T ₂	70.56bc	11.20cd	9.73de	19.25	85.48c	68.73cd	18.78a	2.53c	2.63b
T ₃	70.08c	11.60cd	10.60cd	17.88	80.78d	71.30bc	18.40b	2.58c	2.53b
T ₄	73.05a	14.68a	13.13a	19.23	96.20a	80.35a	18.40b	3.08a	3.53a
T ₅	72.60ab	12.60bc	11.20bc	19.13	88.40bc	70.55c	18.43ab	2.70bc	3.40a
T ₆	72.70ab	13.45ab	11.73b	19.23	92.75ab	75.65b	18.70ab	2.90a	3.58a
CV (%)	1.93	8.61	6.01	5.09	3.37	4.15	1.23	7.86	5.87
Level of sig.	0.01	0.01	0.01	NS	0.01	0.01	0.01	0.01	0.01

*Figures in a column followed by different letters differ significantly but with common letter (s) do not differ significantly at 5% level of probability; T₁= Control (No fertilizer), T₂= Recommended dose of NPKSZn fertilizers (Urea=100 kg ha⁻¹, TSP=60 kg ha⁻¹, MP=50 kg ha⁻¹, Gypsum=30 kg ha⁻¹ & ZnSO₄ @2.25 kg ha⁻¹), T₃= Cow-dung= 5 t ha⁻¹, T₄= Cow-dung (5 t ha⁻¹) + Recommended dose of NPKSZn fertilizers (Urea=100 kg ha⁻¹, TSP=60 kg ha⁻¹, MP=50 kg ha⁻¹, Gypsum=30 kg ha⁻¹ & ZnSO₄ @2.25 kg ha⁻¹), T₅ = 150% recommended dose of N with recommended PKSzn fertilizers (Urea=150 kg ha⁻¹, TSP=60 kg ha⁻¹, MP=50 kg ha⁻¹, Gypsum=30 kg ha⁻¹, ZnSO₄ =2.25 kg ha⁻¹), T₆= 200% recommended dose of N with recommended PKSzn fertilizers (Urea=200 kg ha⁻¹, TSP=60 kg ha⁻¹, MP=50 kg ha⁻¹, Gypsum=30 kg ha⁻¹ & ZnSo₄ 2.25 kg ha⁻¹)

This result agreed with that of Ahmed and Rahman (1991).The highest fertile tillers hill⁻¹ (13.13) was observed with cow dung @5 t ha⁻¹ + recommended dose of NPKSZn chemical fertilizers (T₄). The lowest number of fertile tillers hill⁻¹ (9.25) was found in control treatment (T₁) (Table 1). Panicle length was not differed significantly due to fertilizer treatments but number of spikelets panicle⁻¹ was significantly influenced due to fertilizer treatment. The highest number of spikelets panicle⁻¹ (96.20) was observed in cow dung @5 t ha⁻¹+ recommended dose of chemical fertilizers (T₄) which was similar to 200% of recommended N fertilizer with recommended PKSzn fertilizers(T₆). The lowest number of spikelets panicle⁻¹ (75.43) was obtained from control treatment (T₁) (Table 1).The highest grains panicle⁻¹ (80.35) was recorded in cow dung @5 t ha⁻¹+ recommended dose of chemical fertilizers (T₄) and lowest number of grains panicle⁻¹ (64.88) was found in control treatment (T₁) (Table 1).Grain yield was significantly affected due to fertilizer treatments. The application of cow dung @5 t ha⁻¹ + recommended dose of chemical

fertilizers (T₄) showed a positive response on the yield components of BRR1 dhan50 variety of aromatic rice due to higher number of fertile tillers hill⁻¹ and grains panicle⁻¹ which might have the contribution to highest grain yield (3.08 t ha⁻¹) which was statistically similar to 200% of recommended N fertilizer with recommended PKSzn fertilizers (T₆) (Table 1). Reduction of grain yield in control treatment might be attributed due to significant reduction in fertile tillers hill⁻¹ and grains panicle⁻¹.The highest straw yield (3.58 t ha⁻¹) was obtained from 200% of recommended N fertilizer with recommended PKSzn fertilizers (T₆) and it was similar to 150% of recommended N fertilizer with recommended PKSzn fertilizers (T₅) and cow dung @ 5 t ha⁻¹ + recommended dose of chemical fertilizers (T₄). The lowest straw yield (1.38 t ha⁻¹) was found in control treatment (T₁). BRR1 dhan50 produced highest grain yield when recommended NPKSZn fertilizers were applied with cow-dung @ 5 t ha⁻¹ which was statistically similar to 200% of recommended N fertilizer with recommended PKSzn fertilizers. Therefore, it is concluded that this variety responds to

higher level of chemical fertilizers to get higher yield. Cow dung @ 5 t ha⁻¹ with recommended dose of NPKSZn fertilizers or 200% of recommended N fertilizer with recommended PKSZn fertilizers may be used to get maximum yield.

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