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PRODUCTIVITY IMPROVEMENT OFPREMIUM QUALITY RICETHROUGH FERTILIZER MANAGEMENT IN THE *HAOR* AREAS

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Abstract

The experiment was conducted at the farmers' fields of two villages namely Bahadurpur and Noagaonat Sadar upazilla and Daskin Sunamganj, respectively under Dekhar *haor* of Sunamganj district during the period from November, 2015 to May 2016 to find out the effect of variety and fertilizer on the, yield and yield contributing characters of premium quality rice in *haor* area. Two varieties (BRRI dhan50 and BRRI dhan63) and three fertilizer treatments (Farmers' practice, FRG and Soil test based fertilizers) were included in the experiment. The experiment was laid out in a Factorial Randomized Complete Block Design (RCBD) with three dispersed replications. Tillers $hill^{-1}$ was significantly affected due to different varieties at 60, 75, 90 DAT (Days after Trasplnting) and at harvest but significantly varied due to different fertilizers application at 30 and 60 DAT interaction at 45 and 60 DAT. The maximum grain and straw yield of 3.86 and 5.67 t ha^{-1}, respectively was produced from the BRRI dhan63. Though the grain yield was identical but lower yield in the STB and maximum in farmers' practice due to higher fertilizer. practices.

Introduction

Rice grain is categorized into coarse, medium and fine with different colors based on physical properties. In Bangladesh, a number of fine rice and premium quality rice are grown by the farmers. Some of them have special characteristics for their aroma. Such common varieties / cultivars are Chinisagar, Basmati, Badshabhog, BRRI dhan34, BR5, Kalizira, Tulsimla, BRRI dhan37, BRRI dhan38, BRRI dhan50, Bina dhan12 and Bina dhan15. Fine rice is mainly used by the people in the preparation of palatable dishes and sold at a higher price in the market due to its special characters for aroma and acceptability. Bangladesh has already exported fine rice in different countries with small quantity but bright prospect for export of this fine rice to earn foreign exchange. The grain yield of fine rice is lower than that of coarse and medium rice. The reason for low yield is mainly associated with lack of improved varieties and judicious fertilizer management especially of organic fertilizer and inorganic fertilizer. Selection of a potential variety, planting in appropriate method and application of optimum amount of nutrient elements can play an important role to increase yield. However, fine rice is grown well under low levels of inputs. Most of the fine rice varieties are grown as T. aman season due to their photosensitivity character. Some premium quality rice like, BRRI dhan50, BRRI dhan63 are cultivated in Bangladesh during Boro season.. Due to high organic matter in *haor,* the quality of premium quality rice rice may be superior from other region. After receding of water, plant should be planted earlier so that they can avoid flash flood. Among the management practices, application of nitrogen fertilizer and variety are the important ones In this context the trial was conducted to find out suitable variety and optimum fertilizer for premium rice of haor areas.

Materials and Methods

The experiment was conducted at the farmers' fields of two villages namely Bahadurpur and Noagaon at Sadar upazilla and Daskin at Sunamganjunder Dekhar *haor* of Sunamganj district during the period from November, 2015 to May 2016. Two varieties- V_1= BRRI dhan50 and V_2= BRRI dhan63 and three fertilizer treatments- F_1= Farmers' practice (180-42-42 kg/ha of urea-TSP-MoP), F_2= Ferilizer Recommendatio Guide '12 based on fertilizers dose (300-112-127-75-11 kg/ha of urea-TSP-MoP-$CaSO_4$-$ZnSO_4$) and F_3= Soil test based fertilizers (265-175-134-35-4 kg/ha of urea-TSP-MoP-$CaSO_4$-$ZnSO_4$) were included in the experiment.The initial soil properties of the experimental sites are presented in Table 1. Soil texture, pH, organic matter, available P and S, Zn and exchangeable K, were determined following standard methods (Black, 1965; Jackson, 1962; Walkley and Black, 1935; Olsen *et al.*, 1954 and Page *et al.*, 1982). The experiment was laid out in a Factorial Randomized Complete Block Design (RCBD) with three dispersed replications. Seeds were sown in seedbed on 28 November 2015. Seedlings were transplanted on 4-5 January 2016 at 25 cm × 15 cm spacing. Urea was applied as top dressing in three equal splits at 15, 30 and 45 days after transplanting.. Two hand weddings were done where first weeding at 25 days after transplanting followed by second weeding after first weeding at 45 days. Standing water was maintained 2-3 cm in the field throughout the growing period. Five hills were tagged for counting the tillers and measuring the plant height. Harvesting was done on 21-22 April 2016. Ten hills were collected from each plot to record the yield contributing characters. The grain and straw yields were recorded. The data were analyzed and mean separation was done by DMRT.

Table 1.Chemical characteristics of the initial soil of the experimental site

Constituents	Characteristics
Soil pH	4.9
Organic matter(%)	1.7
Total Nitrogen (%)	0.11
Exchangeable K (milimol 100 g^{-1} soil)	0.15
Available P (µg g^{-1} soil)	1.00
Available S (µg g^{-1} soil)	27
Available Zn (µg g^{-1} soil)	0.3

Results and Discussion

Plant height of BRRI dhan50 was significantly higher than BRRI dhan63 at 15 DAT (Table 2). Plant height was also varied significantly due to different fertilizer application at 45 DAT and at harvest and their interaction at 15 DAT. The maximum plant height was produced for application of STB fertilizer at 15 DAT (23.30 cm), 45 DAT (53.21 cm) and at harvest (88.50cm) while lower height from farmers dose. There was trend to increase height with advancement of date of transplanting upto 90 DAT and then slightly decrease at harvest. The number of tillers $hill^{-1}$ of BRRI dhan50 was significantly higher than BRRI dhan63 at 60 DAT (15.91), 75 DAT (16.84), 90 DAT (16.65) and at harvest (15.57) (Table 3). Number of tillers $hill^{-1}$ was significantly varied due to application of different fertilizer doses at 30 and 60 DAT. The highest number of tillers $hill^{-1}$(15.90) was produced due to soil test based fertilizers (Table 3). Number of tillers $hill^{-1}$ was significantly varied due to variety and fertilizer interaction at 45 and 60

DAT. Number of effective tillers hill^{-1} and number of grains panicle^{-1} was not significant due to variety, different fertilizer doses and their interaction. Number of sterile spikelets panicle^{-1} of BRRI dhan63 was significantly higher than BRRI dhan50 but not significantly varied due to different fertilizer doses and its interaction. Tillers/hill increased with advancement of days and declined at harvest. Panicle length was varied significantly due to variety where BRRIdhan50 showed higher than BRRIdhan 63. The 1000- grains weight was not varied significantly due to variety and different fertilizer doses but significant variation was observed in interaction where BRRIdhan 50 with soil test based fertilizer showed higher grain weight.

Grain and straw yield was not significantly influenced by varieties, fertilizer doses and in their interaction. Though insignificant but higher grain yield was obtained from BRRIdhan 50 with farmers fertilizer dose followed by soil test based fertilizer dose. It is interesting to note that STB fertilizer dose showed lower yield as well as FRG with much higher dose than farmers practices failed to show higher yield.

Table 2. Effect of variety and fertilizers on plant height of premium quality rice at different days after transplanting

Treatment	Plant height (cm)						
	15 DAT	30 DAT	45 DAT	60 DAT	75 DAT	90 DAT	At harvest
Variety							
BRRIdhan50	22.83	33.66	51.01	69.78	78.53	88.46	85.96
BRRIdhan63	20.86	32.83	52.52	70.06	77.70	90.63	85.76
Level of significance	**	NS	NS	NS	NS	NS	NS
Fertilizer level							
F_1	21.10	33.50	50.03	69.90	76.95	86.25	81.20
F_2	21.15	32.55	52.05	68.95	78.60	90.60	87.90
F_3	23.30	33.70	53.21	70.93	78.80	91.80	88.50
Level of significance	*	NS	*	NS	NS	NS	**
Variety x Fertilizer							
V_1F_1	23.40	35.30	49.90	68.10	75.40	85.10	82.40
V_1F_2	22.40	32.30	52.20	70.40	80.00	88.00	88.30
V_1F_3	22.70	33.40	50.93	70.86	80.20	92.30	87.20
V_2F_1	18.80	31.70	50.16	71.70	78.50	87.40	80.00
V_2F_2	19.90	32.80	51.90	67.50	77.20	93.20	87.50
V_2F_3	23.90	34.00	55.50	71.00	77.40	91.30	89.80
Level of significance	**	NS	NS	NS	NS	NS	NS

** = Significant at 1 % level of provability; * = Significant at 5 % level of provability,
NS= Non-significant V_1 = BRRI dhan50 V_2 = BRRI dhan63
F_1= Farmers' practice (180-42-42 kgha^{-1} of Urea-TSP-MoP)
F_2= Fertilizer Recommendation Guide (300-112-127-75-11 kgha^{-1} of Urea-TSP-MoP-$CaSO_4$- $ZnSO_4$),
F_3= Soil test based (265-175-134-35-4 kgha^{-1} of Urea-TSP-MoP-$CaSO_4$-$ZnSO_4$).

Table 3. Effect of variety and fertilizers on the tiller production of modern boro fine rice at different days after transplanting

Treatment	Tillers hill^{-1}(no.)						
	15 DAT	30 DAT	45 DAT	60 DAT	75 DAT	90 DAT	At harvest

Variety							
BRRIdhan50	3.03	6.10	12.13	15.91	16.84	16.65	15.57
BRRIdhan63	2.76	5.66	11.66	13.63	15.41	15.17	14.48
Level of significance	NS	NS	NS	**	*	**	*
Fertilizer							
F_1	2.65	5.25	11.20	13.36	15.36	15.45	14.40
F_2	2.95	6.65	12.35	15.05	16.50	16.20	14.95
F_3	3.10	5.75	12.15	15.90	16.51	16.10	15.75
Level of significance	NS	*	NS	**	NS	NS	NS
Variety x Fertilizer							
V_1F_1	2.40	5.10	11.40	13.80	16.10	16.40	15.00
V_1F_2	3.40	7.20	13.80	17.33	17.90	17.50	15.83
V_1F_3	3.30	6.00	11.20	16.60	16.53	16.06	15.90
V_2F_1	2.90	5.40	11.00	12.93	14.63	14.50	13.80
V_2F_2	2.50	6.10	10.90	12.76	15.10	14.90	14.06
V_2F_3	2.90	5.50	13.10	15.20	16.50	16.13	15.60
Level of significance	NS	NS	**	**	NS	NS	NS

** = Significant at 1 % level of provability; * = Significant at 5 % level of provability,
NS= Non-significant V_1 = BRRI dhan50 V_2 = BRRI dhan63
F_1= Farmers' practice (180-42-42 $kgha^{-1}$ of Urea-TSP-MoP)
F_2= Fertilizer Recommendation Guide (300-112-127-75-11 $kgha^{-1}$ of Urea-TSP-MoP-$CaS0_4$- $ZnS0_4$),
F_3= Soil test based (265-175-134-35-4 $kgha^{-1}$ of Urea-TSP-MoP-$CaS0_4$-$ZnS0_4$).

Table 4. Effect of variety and fertilizers on the yield and yield contributing characters of modern boro fine rice

Treatment	Effective tillers $hill^{-1}$ (no.)	Grains $panicle^{-1}$ (no.)	Sterile spikelets $panicle^{-1}$ (no.)	Panicle length (cm)	1000-grain weight (g)	Grain yield (tha^{-1})	Straw yield ($t\ ha^{-1}$)
Variety							
BRRIdhan50	14.65	108.70	10.16	21.34	19.87	3.25	5.58
BRRIdhan63	13.84	110.74	11.96	19.76	19.71	3.86	5.67
Level of significance	NS	NS	*	**	NS	NS	NS
Fertilizer							
F_1	13.71	105.61	11.10	20.75	19.28	3.64	5.43
F_2	14.21	114.55	11.25	20.60	20.25	3.59	5.54
F_3	14.81	109.00	10.85	20.31	19.85	3.44	5.91
Level of significance	NS	NS	NS	NS	NS	NS	NS
Variety x Fertilizer							
V_1F_1	14.20	104.10	9.30	21.03	17.73	3.15	4.95
V_1F_2	14.96	114.60	10.70	21.80	20.60	3.18	5.74
V_1F_3	14.80	107.40	10.50	21.20	21.30	3.42	6.06
V_2F_1	13.23	107.12	12.90	20.46	20.83	4.14	5.91
V_2F_2	13.46	114.50	11.80	19.40	19.90	4.00	5.34
V_2F_3	14.83	110.60	11.20	19.43	18.40	3.46	5.76
Level of significance	NS	NS	NS	NS	*	NS	NS

** = Significant at 1 % level of provability; * = Significant at 5 % level of provability,
NS= Non-significant V_1 = BRRI dhan50 V_2 = BRRI dhan63
F_1= Farmers' practice (180-42-42 kg ha^{-1} of Urea-TSP-MoP)
F_2= Fertilizer Recommendation Guide (300-112-127-75-11 kg ha^{-1} of Urea-TSP-MoP-$CaS0_4$- $ZnS0_4$),
F_3= Soil test based (265-175-134-35-4 kg ha^{-1} of Urea-TSP-MoP-$CaS0_4$-$ZnS0_4$).

Conclusion

The result of the experiment revealed that the higher grain and straw yield of 3.86 and 5.67 t ha^{-1}, respectively was produced from the BRRI dhan63. Soil test based fertilizer dose failed to show higher yield than farmer practice. Besides, FRG with high

fertilizer dose did not increase yield in both the varieties. Though slightly higher grain yield was obtained from BRRIdhan 63 with farmers practice with the use of affordable fertilizer dose and as such farmers of haor areas are very much concerned about use of fertilizer dose (180-42-42 kg ha^{-1} of Urea-TSP-MoP).

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