J. Agrofor. Environ. 3 (2): 141-144, 2010 ISSN 1995-6983

Performance of advanced genotypes of aromatic rice under different transplanting dates

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Abstract: The experiment was conducted at the Agronomy Field of Sher-e-Bangla Agricultural University (SAU), Dhaka during July to November 2005 to study the performance of newly developed Subash, promising aromatic genotypes under different transplanting dates along with BRRIdhan38. The experiment consists of two factors viz. A: Cultivar: Subash 1, Subash 2, Subash 5 and BRRIdhan38, B: Transplanting date: 15 July, 1st August, 15 August and 1st September. The experiment was laid out in split plot design with three replications. Experimental result showed that variety/genotypes and transplanting date individually had significant effect on the agronomic attributes. The results reveled that among the variety/genotypes Subash 1 gave the highest yield (3.95 t ha^{-1}) but it was lowest in Subash 2 (3.47 t ha^{-1}). 1st August transplanting gave the highest grain yield (4.13 t ha^{-1}) and lowest grain yield was found in 1st September transplanting. The combined effect of variety/genotypes and date of transplanting had also significant effect on yield and yield contributing characters. Subash 1 and BRRIdhan38 planted on 1st August showed highest yield attaining good yield contributing characters.

Key words: Performance, aromatic rice, transplanting date

Introduction

Rice (*Oryza sativa* L.) being the worlds most widely consumed cereal grain play an unique role in combating global hunger (IRRI, 2004). Rice production in Bangladesh has almost double during the past three decades. Among the aromatic rice, Badshabhog, Kataribhog, Kalizira, Tulshimala, Chinigura, BRRIdhan37 and BRRIdhan38 are the most highly valued commodity in Bangladesh agricultural trade market for having small grain and pleasant aroma. Islam *et al*. (1996) observed that the yield of aromatic rice was lower but its higher price and low cost of cultivation generate higher profit margins compared to other varieties grown in the area. Most of the aromatic rice germplasm available in our country are traditional type, low yield potential, photoperiod sensitive and grown during Aman season in the rainfed condition (Begum *et al*., 1993). All the aromatic rice traits are genetically governed and inherited their expression under natural condition is very much dependent on environment, soil and management practices. Farmers sown seed in seed bed and than transfer to main field. Delayed transplanting resulted in poor vegetative growth as well as yield. Planting date of a crop is an important factor for obtaining higher yield (Bhuiyan, 1992). Narayanaswamy *et al*. (1982) reported that early transplanting of Aman rice in 1 July produced the higher grain yield 2.6 t ha^{-1} than other dates 15 July and 1 August transplanting. Rice planted in mid July gave the highest grain yield and with the advancement of planting date yield reduced. However, appropriate planting date is required for higher yield with better quality of aromatic rice. Under the above circumstances, the present research has been taken to evaluate the yield performance of transplanted aromatic rice in respect to planting time.

Materials and Methods

The research work was conducted at the Agronomy research field, Sher-e-Bangla Agricultural University, Dhaka during July to December, 2005. The experiment consists of two factors viz. (A) Cultivar: Subash 1(C_1), Subash 2(C_2), Subash 5 (C_3), and BRRI dhan 38 (C_4); (B) Transplanting date: D_1= 15 July, D_2= 1st August, D_3= 15 August, D_4 = 1st September. The experiment was laid out in split plot design where the cultivars were assigned in main plots and date of transplanting in sub-plots. The unit plot size was 4m X 2.5m. Thirty days old seedlings were transplanted in different dates maintaining the spacing of 20cm X 15cm. The experiment was replicated thrice. The land was fertilized with Urea, TSP, MP, Gypsum and Zinc Sulphate @ 270-130-120-70-10 kg ha^{-1} respectively. The entire amount of TSP, MP, Gypsum and Zinc Sulphate was applied at final land preparation. The entire amount of Urea was top dressed in three equal installments at 15, 30 and 45 days after transplanting (DAT). All intercultural operations were performed in time as per requirement of the crop. Plot-wise grain and straw yields were recorded following the harvesting of the central 3 m^2 area $plot^{-1}$ and converted to t ha^{-1} and expressed at 14% moisture content basis. Crops were harvested at maturity when 80% grain become in golden colour due to the variation of planting dates and variation of life cycle of rice genotypes/varieties. Collected data were analyzed statistically by using the analysis of variance technique and the significance of mean difference were analyzed by DMRT (Gomez and Gomez, 1984).

Results and Discussion

Effect of Variety/Genotypes: Yield and yield contributing characters of rice except non-effective tillers/m^2, spikelet/ panicle and harvest index were significantly influenced by different varieties/genotypes. The highest plant height, panicle length, number of total tiller/m^2 were obtained from the treatment receiving from BRRI dhan 38 (Table 1). The yield components viz., number of effective tillers/m^2, number of grains/panicle was highest in BRRI dhan 38 but 1000 grain weight was highest in Subash 2 and it was statistically similar with Subash 1. The inbred variety BRRIdhan38 produced the lowest weight of 1000 grain (17.08) that was 8.41% lower than the highest one (Table 2). The result is agreed with the findings of BRRI (1998b) that thousand grain weight of some aromatic rice varieties ranged from 12 to 20 (g) and it differed significantly from variety to variety. The grain yield was highest in Subash 1 may be due to its higher number of tillers/m^2, number of filled grain/panicle and weight of thousand grains than other variety/genotypes. The lowest grain yield was observed in Subash 5. Two Subash varieties (Subash 1 and Subash 2)

showed statistically similar grain yield. However, Subash 1 out yielded over Subash 5, Subash 2 and BRRIdhan38 by 0.55, 0.14 and 0.23 to ha^{-1}respectively. The result is corroborates with the findings of Chabder and Jitender (1996) who reported that the average productivity of aromatic rice is very low. The highest straw yield and biological yield was recorded in BRRIdhan38 which was statistically similar with Subash 1 Subash 2. Harvest index was not affected significantly by the varieties/genotypes.

Effect of Date of Transplanting: The dates of transplanting resulted a significant influence on all the yield attributes and yield except 1000 grain weight. The tallest plant height, panicle length and maximum number of total tiller/m^2 was found in 15 July transplanting whereas lowest response of plant height, panicle length, number of total tiller/m^2, number of total spikelet /panicle, number of effective tiller/m^2, number of filled grains/panicle, 1000 grains weight, grain yield and biological yield was observed from 1st September transplanting (Tables 3&4). After 1st August transplanting the grain yield reduced gradually with the delayed transplanting and the lowest yield (3.44 t ha^{-1}) was found in September transplanting. The result revealed that the 1st August transplanting out yielded over 1st September, 15 August and 15 July transplanting by 0.65, 0.54 and 0.15 t ha^{-1} respectively. The result corroborates with the findings of Ali *et al.* (1995) who stated that delayed transplanting reduced grain yield of aromatic rice in Aman season.

Interaction effect between Variety/genotypes and Date of transplanting: The combined effect of variety and date of transplanting was found to be significant for all the parameters. The tallest plant height and panicle length was obtained from BRRI dhan38 with 15 July transplanting and lowest one was found 15 August transplanting with Subash 2 and 1st September transplanting with Subash 1 respectively (Table 5). The treatment combination of 1st August planting with BRRIdhan38 produced the highest number of total tiller/m^2, number of total spikelet /panicle, number of effective tillers/m^2, number of filled grains/panicle and grain yield. The highest straw yield and biological yield was obtained from combined effect of 15 July transplanting with BRRIdhan38. The lowest number of total tiller/m^2, number of total spikelet/panicle, number of effective tiller/m^2, number of filled grains/panicle and biological yield was observed from 1st September transplanting with Subash 5 variety/genotypes. However, the lowest grain yield (3.10 t ha^{-1}) recorded from 1st September transplanting with BRRIdhan38 interaction treatment (Table 6). Yield decreases more rapidly in BRRIdhan38 from early transplanting date to late transplanting date than other tested varieties/genotypes.

Table 1. Effect of variety/genotypes on the crop characters of aromatic rice

Variety/ Genotypes	Plant height (cm)	Panicle length (cm)	Total tiller/m^2	No-effective tiller/m^2	Spikelet sterility (%)
Subash 1	96.55	26.31	188.40	28.83	9.41
Subash 2	96.98	26.74	186.00	27.08	9.43
Subash 5	96.03	26.65	172.00	28.67	9.45
BRRIdhan38	112.10	27.69	190.70	27.00	4.85
CV%	5.10	2.31	5.40	NS	7.99
LSD	4.41	0.52	8.39	10.76	0.55

Table 2. Effect of variety/genotypes on yield and yield components of aromatic rice

Variety /Genotypes	Total spikelet /panicle	Effective tiller/m^2	Filled grain /panicle	1000 Grain weight (g)	Grain Yield (t ha^{-1})	Straw Yield (t ha^{-1})	Biological Yield (t ha^{-1})	Harvest Index (%)
Subash 1	159.40	157.90	145.90	17.98	3.95	5.41	9.25	42.01
Subash 2	158.20	157.20	144.60	18.27	3.81	5.25	9.06	42.05
Subash 5	152.00	145.20	139.10	17.94	3.47	4.77	8.25	42.06
BRRIdhan38	160.60	164.50	153.20	17.08	3.89	5.53	9.48	41.56
CV%	7.54	8.10	9.14	2.86	0.33	4.81	0.10	5.04
LSD	NS	6.15	7.45	0.29	10.25	0.21	0.46	NS

Table 3. Effect of date of transplanting on the crop characters of aromatic rice

Date of transplanting	Plant height (cm)	Panicle length (cm)	Total tiller/m^2	Non-effective tiller/m^2	Spikelet Sterility (%)
15 July	109.00	28.37	188.60	24.25	7.39
1st August	107.50	27.12	186.90	23.42	6.27
15 August	93.14	26.23	181.20	30.08	9.38
1st September	90.91	25.66	180.00	33.83	10.06
CV%	5.10	2.31	5.40	10.76	7.99
LSD	8.25	0.70	5.38	2.34	0.43

Table 4. Effect of date of transplanting on yield and yield components of aromatic rice

Date of transplanting	Total spikelet /panicle	Effective tiller/m^2	Filled grain /panicle	1000 Grain weight (g)	Grain Yield (t ha^{-1})	Straw Yield (t ha^{-1})	Biological Yield (t ha^{-1})	Harvest Index (%)
15 July	162.60	163.00	151.80	17.79	3.97	5.74	9.72	41.46
1st August	165.10	164.02	155.50	17.94	4.13	5.69	9.84	41.99
15 August	155.10	151.03	142.00	17.78	3.59	4.86	8.46	42.41
1st September	147.30	146.72	133.40	17.76	3.44	4.66	8.02	41.82
CV%	7.54	6.15	7.45	2.86	10.28	4.81	6.10	5.04
LSD	9.06	3.50	8.12	NS	0.22	0.14	0.26	NS

Table 5. Interaction effect of variety/genotypes and date of transplanting on the crop characters of aromatic rice

Variety x Date of transplanting	Plant Height (cm)	Panicle Length (cm)	Total tiller/m^2	Non-effective tiller/m^2	Spikelet Sterility (%)
Subash 1 X 15 July	107.10	26.74	187.30	23.33	8.19
Subash 2 X 15 July	104.00	27.44	190.40	23.67	8.03
Subash 5 X 15 July	100.20	27.22	180.40	28.00	8.02
BRRIdhan38 X 15 July	124.50	32.09	196.30	23.33	5.33
Subash 1 X 1st August	103.30	27.24	192.50	24.02	6.52
Subash 2 X 1st August	108.20	27.22	184.30	23.87	7.46
Subash 5 X 1st August	108.40	27.49	170.90	24.02	6.66
BRRIdhan38 X1st August	110.10	26.53	199.90	23.03	4.46
Subash 1 X 15 August	88.14	25.96	187.10	32.06	10.81
Subash 2 X 15 August	88.02	26.25	183.70	30.01	10.33
Subash 5 X 15 August	89.12	26.22	170.10	30.35	11.60
BRRIdhan38 X 15 August	102.30	26.19	184.10	28.33	4.80
Subash 1 X 1st September	87.67	25.30	186.50	36.02	12.13
Subash 2 X 1st September	87.29	26.03	185.00	33.33	11.93
Subash 5 X 1st September	86.34	25.38	165.60	32.67	11.53
BRRIdhan38 X 1st September	107.30	25.94	182.60	33.33	4.82
CV%	5.10	2.31	5.40	10.76	7.78
LSD	8.82	1.04	17.48	5.06	1.12

Table 6. Interaction effect of variety/genotypes and date of transplanting on the yield and yield components of aromatic rice

Variety x Date of transplanting	Total spikelet /panicle	Effective tiller/m^2	Filled grain /panicle	1000 Grain weight (g)	Grain Yield (t ha^{-1})	Straw Yield (t ha^{-1})	Biological Yield (t ha^{-1})	Harvest Index (%)
Subash 1 X 15 July	160.00	162.00	147.90	17.65	3.88	5.86	9.75	41.12
Subash 2 X 15 July	163.90	164.70	151.70	18.44	4.03	5.49	9.53	42.28
Subash 5 X 15 July	157.90	152.40	146.10	17.96	3.56	5.03	8.59	41.36
BRRIdhan38 X15 July	168.60	172.90	161.30	17.13	4.40	6.58	10.99	41.07
Subash 1 X1st August	166.80	163.90	156.50	18.04	4.15	5.67	9.85	42.09
Subash 2 X1st August	165.80	161.70	153.80	18.52	4.04	5.82	9.86	40.88
Subash 5 X 1st August	156.10	153.60	146.30	18.19	3.78	5.13	8.92	42.42
BRRIdhan38 X 1st August	171.90	176.90	165.40	17.03	4.56	6.15	10.71	42.57
Subash 1X 15 August	159.60	155.10	144.10	18.23	3.86	5.28	9.15	42.26
Subash 2 X 15 August	155.30	153.70	140.70	18.05	3.68	4.92	8.60	42.74
Subash 5 X 15 August	150.00	139.60	134.40	17.77	3.29	4.49	7.78	41.19
BRRIdhan38 X 15 August	155.70	155.70	148.90	17.08	3.53	4.77	8.32	41.45
Subash 1 X 1st September	151.30	150.50	135.00	18.02	3.92	4.83	8.41	42.56
Subash 2 X 1st September	147.80	148.80	132.10	18.04	3.50	4.77	8.27	42.31
Subash 5 X 1st September	144.20	135.30	129.40	17.84	3.25	4.43	7.68	42.28
BRRIdhan38 X 1st September	146.00	152.30	137.10	17.10	3.10	4.62	7.73	40.15
CV%	7.54	6.70	7.45	1.69	10.25	4.81	6.10	5.04
LSD	20.02	16.20	18.30	0.52	0.65	0.42	0.93	1.71

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