ISSN 0258-7122
Bangladesh J. Agril. Res. 34(2) : 329-333, June 2009 **Short Communication**

INFLUENCE OF NITROGEN ON GRAIN QUALITIES OF FINE RICE GENOTYPES IN AMAN AND BORO SEASONS

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Key Words: Influence of nitrogen, grain qualities, fine rice, *aman* and *boro*.

The grain quality of fine rice genotypes is governed not only by the genotypic make up but also affected by applied nitrogen level. Higher doses of nitrogen sometimes adversely affected on grain quality. Thus, the application of nitrogen would be an optimum level to obtain quality rice. Long slender aromatic rice grain fetches a high price. Elongation of rice grain during cooking is one of the unique features of Basmati rice (Sakila *et al.,* 1999). The quality rice is always preferred by the consumers which contained optimum level of arnylose, expansion of grain lengthwise after cooking and emotion of aroma during cooking (BRRI, 1999). The higher level of protein in rice would mean an increased supply of protein in rice-based diet (BRRI, 2003). Thus, it is important to determine the optimum level of nitrogen and to find out the potential genotypes to obtain higher percentage of protein, aroma, and amylose content.

The experiment was conducted at the Bangladesh Rice Research Institute (BRRI), farm, Gazipur, in Aman and Boro seasons of 2000-01. Nitrogen was applied 0,25, 50, 75, and 100 kg N/ha in Arnan and 0, 35, 70, 105, and 140 kg Nha in Boro season. The test Basmati genotypes were Basmati PNR, Basmati 370,Basmati 375, Basmati-D, modem aromatic BR5, BRRI dhan34, BRRI dhan37, RRRI dhan38, and traditional aromatic rice Kalijira, Kataribhog, Chinigura, and Badshabhog. The treatments were distributed in a split plot design placing nitrogen in the main-plots and genotypes in the sub-plots replicated thrice. The soil of the experimental area was clay loam in texture with organic carbon 0.95 %, total nitrogen 0.09%, and the soil pH 6.16. The crop was grown with appropriate management practices in both the seasons. The standard procedures were followed to analyze the grain quality of the test genotypes. The analysis of the grain quality was done as single sample from the composite sample of the three replications of each treatment. The amylose content was determined by tbllowing the procedure as described by Cruz and Khush (2000). Waxy rice 0 - 2%, very low 3 - 9%, low 10 - 19%, intermediate 20 - 25%, and high> 25% amylose content. Protein content in rice samples were determined by macro kjeldahl procedures. The aroma was evaluated by following the method suggested by Sood (1978). Single Kernel along with its husk was placed in a vial with capped containing 0.5m1 of 1.7 % KOH solution. After 10 minutes, the cap

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was opened and aroma *was* inhaled through the nose. Aroma was scored as strong aroma, optimum aroma, and mild level of aroma (DRR, 1998).

Results indicated that the protein content of the grain was affected due to the application of nitrogen (Table 1). The percentage of protein increased with the increase of nitrogen rates. The higher percentage of protein was found in the Boro season. Similar findings were reported by Uppal and Sidhu (1995). Thus, emphasis should be given to apply optimum level of nitrogen to increase protein content in rice because rice is the major source of protein in Bangladeshi diet where it supplies about 50% of the protein in the diet. The protein content of the test genotypes varied from 7.1 to 10.6 % in brown rice. Basmati PNR contained higher protein followed by Basmati 370 and Chinigura. On the contrary, the lowest percentage of protein was found in Badshabhog. However, BRRI (2002) also found lower protein in Kalijira and Kataribhog and higher protein in modem aromatic rice in Arnan season. However, protein content <7 % in brown rice was not desirable (BRRI, 2003).

Table 1. Effect of nitrogen on the protein content of fine rice genotypes.

Genotypes	Protein content (%)									
	Aman (2002)					Boro (2001)				
	N_0	N_{25}	N_{50}	N_{75}	N_{100}	N_0	N_{35}	N_{70}	N_{105}	N_{140}
Basmati PNR	8.4	9.1	9.3	9.8	10.5	8.4	8.8	9.1	9.7	10.6
Basmati 370	8.4	8.8	9.4	9.8	10.1	8.5	8.9	9.6	9.8	10.2
Basmati 375	7.1	7.6	8.1	8.6	8.8	7.2	7.7	8.2	8.6	8.9
Basmati D	8.0	8.5	8.7	8.9	9.2	8.2	8.6	8.8	8.9	9.3
Kalijira	8.0	8.4	8.6	8.7	9.1	8.2	8.5	8.7	8.8	9.2
Kataribhog	8.0	8.4	8.6	8.9	9.2	8.1	8.4	8.7	8.9	9.3
Chinigura	8.4	8.5	8.9	9.2	9.6	8.5	8.6	8.9	9.2	9.6
Badshabhog	7.2	7.6	7.8	8.0	8.4	7.3	7.5	7.6	8.0	8.5
BR5	7.8	8.3	8.6	9.0	9.2	7.9	8.3	8.5	8.7	9.4
BRRI dhan34	8.0	8.2	8.6	8.9	9.2	8.2	8.4	8.7	9.0	9.3
BRRI dhan37	7.8	8.0	8.3	8.6	9.1	7.9	8.1	8.5	8.8	9.2
BRRI dhan38	8.0	8.2	8.6	8.9	9.4	8.1	8.3	8.6	8.9	9.5

The amylose content of the test genotypes remained almost stable at different levels of nitrogen (Table 2). Similar trend was also found by Uppal and Sidhu (1995). BRRI (2004) reported that amylose content is a major factor that influences the eating quality of rice. The variation of amylose content of the rice genotypes was 22 to 26 %. The Basmati PNR contained higher amylose (>25 %), while the lower amylose was found in Basmati 370, Basmati 375 (<24 %). The

findings of BRRI (2002) had the similarity with this result of this study. However, the intermediate level of amylose in grain (20-25 %) is preferred by the consumers.

Table 2. Effect of nitrogen on the amylose content of fine rice genotypes.

Genotypes	Amylose content (%)									
	Aman (2002)					Boro (2001)				
	N_0	N_{25}	N_{50}	N_{75}	N_{100}	N_0	N_{35}	N_{70}	N_{105}	N_{140}
Basmati PNR	26.0	25.0	25.0	25.7	26.5	*25.6*	*25.0*	*25.8*	26.0	26.5
Basmati 370	23.0	22.0	22.2	22.4	23.0	23.0	22.6	23.1	22.5	23.0
Basmati 375	22.0	23.0	22.0	23.0	22.3	22.6	23.5	23.4	24.0	23.9
Basmati D	24.0	24.5	23.0	24.6	*24.5*	22.0	23.0	23.2	23.2	23.5
Kalijira	24.4	23.8	24.3	24.0	24.2	23.6	23.4	23.5	23.0	22.9
Kataribhog	25.5	25.6	25.0	25.8	25.3	*25.5*	25.6	25.8	26.0	26.1
Chinigura	25.2	25.0	*25.5*	*25.6*	25.0	25.0	25.0	*24.5*	25.0	25.2
Badshabhog	24.0	24.5	24.1	24.0	24.7	23.5	24.0	24.0	24.3	24.0
BR5	23.5	23.4	24.0	23.5	23.6	23.5	23.8	24.0	24.0	23.5
BRRI dhan34	24.7	24.0	24.6	*24.5*	24.2	24.4	24.3	24.4	24.3	24.6
BRRI dhan37	25.1	24.5	24.6	24.2	25.0	24.5	24.3	24.6	25.1	25.0
BRRI dhan38	8.0	8.2	8.6	8.9	9.4	8.1	8.3	8.6	8.9	9.5

The aroma content of fine rice slightly varied due to the variation of nitrogen levels. The higher level of aroma was found in Aman season than the Boro crop. Among the test genotypes, the Basmati 370, BR5, BRRIdhan34, BRRIdhan 37 and BRRIdhan 38, Kalijira, and Kataribhog contained higher level of aroma irrespective of nitrogen levels (Table 3). Ai *et al.* (1993) also found strong aroma in the Basmati 370 in Pakistan. However, BRRI (1999) reported that about 77 % of the people preferred local aromatic rice for better taste. Efferson (1985) stated that aroma is apparently a result of environment as well as genetic factor. Alam (2002) also stated that traditional rice Kalijira showed the higher aroma than modern aromatic rice BR 5.

Table 3. Effect of nitrogen on the aroma content of fine rice genotypes.

Amylose content										
Genotypes	Aman (2002)					Boro (2001)				
	N_0	N_{25}	N_{50}	N_{75}	N_{100}	N_0	N_{35}	N_{70}	N_{105}	N_{140}
Basmati PNR	mild	mild	mild	mild	mild	mild	mild	mild	mild	mild
Basmati 370	strong	strong	strong	strong	strong	strong	strong	moderate	moderate	mild
Basmati 375	moderate	moderate	moderate	moderate	moderate	moderate	mild	mild	mild	mild
Basmati-D	moderate	moderate	moderate	moderate	moderate	moderate	mild	mild	mild	mild
Kalijira	strong	strong	strong	strong	strong	strong	moderate	moderate	moderate	moderate
Kataribhog	strong	strong	strong	strong	strong	strong	strong	strong	moderate	moderate
Chinigura	moderate	strong	strong	strong	strong	strong	mild	mild	mild	mild
Badshabhog	moderate	moderate	moderate	moderate	moderate	moderate	mild	mild	mild	mild
BR5	strong	strong	strong	strong	strong	strong	moderate	moderate	moderate	moderate
BRRIdhan 34	strong	strong	strong	strong	strong	strong	strong	moderate	moderate	moderate
BRRIdhan 37	strong	strong	strong	strong	strong	strong	moderate	moderate	moderate	moderate
BRRIdhan 38	strong	strong	strong	strong	strong	strong	moderate	moderate	moderate	moderate

Thus, the grain quality was assessed in terms of protein, amylose, and aroma contents. The protein increased with the increase of nitrogen levels and higher level of protein was observed in Basniati PNR. The amylose and aroma content of the test varieties did not sharply vary due to the application of nitrogen although aroma was slightly higher at the lower level of N (below 50 kg N/ha). The Basmati 370, BR5, BRRIdhan34, BRRIdhan37, BRRIdhan38, Kalijira, and Kataribhog contained higher level of aroma.

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