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Performance of Photosensitive Modern Rice Varieties in the Medium Highland Phase-2 After Boro Rice

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Abstract: The experiment was conducted to evaluate the modern photosensitive rice varieties, BR22, BR23, Binasail and an advanced line BR5226-6-3-3 and widely cultivated local variety Telosh for increasing the productivity of medium high land phase-2. BR5226-6-3-3 gave the highest grain yield of 4.14 t ha^{-1} followed by BR23 (3.96 t ha^{-1}). The higher grain yields of BR5226-6-3-3 and BR23 were associated with higher number of filled grains panicle^{-1} and heavier grain weight. Economic analysis indicated that cultivation of BR5226-6-3-3 and BR23 after Boro rice gave about 36 and 31% additional gross margins than the existing local variety, Telosh.

Key words: Photosensitive rice variety, productivity, medium highland (phase-2), boro rice

Introduction

Medium highland is normally flooded up to 90 cm deep during the flood season. This type of land is divided into two phases, 1 and 2. Medium highland phase-2 is normally flooded between 30 to 90cm deep during the flood season (Anonymous, 1988). The area under this land type is 5.06 m ha^{-1} of which 0.9 m ha^{-1} is under phase-2 (Anonymous, 1988; Elahi and Khan, 2001). Boro-Fallow-t. aman cropping pattern covered the highest area in the medium highland (Elahi *et al.*, 2001). However, planting of the aman crop is delayed or sometimes failed in the medium highland phase-2 due to late recession of floodwater. So delayed transplanting can not be avoided in this land type. On the other hand, grain yield of t. aman rice decreased with delayed planting for demand of proper growth duration and yield reduction varied from variety to variety (Mannan and Siddique, 1991).

Diagnostic survey report of the study area reveals that about three percent land of Farming Systems Research and Development (FSR and D) site, Kapasia under Gazipur district belongs to medium highland phase-2. Farmers at FSR and D site, Kapasia reported that only Boro rice is cultivated in this land type and in some extent low yielding local aman rice is grown in late September (Quddus *et al.*, 1998). Due to cultivation of single rice or low yielding t. aman local varieties after Boro rice, the productivity of the said land type is lower. The productivity of this land type might be increased by shifting single rice to double rice with the modern variety. In Boro season, farmers usually grow modern variety of rice. Late planted t. aman modern variety(ies) might be fitted after Boro rice in this situation. However, not all the t. aman varieties were suitable for late sowing (Ali *et al.*, 1993). Therefore, the present study was undertaken to identify the late-planted Aman varieties for good fit into the existing cropping system for maximizing the production of ecotype.

Materials and Methods

The experiment was conducted at the farmer's field of Bangladesh Rice Research Institute, Farming Systems Research and Development site, Kapasia during November 2000 to January 2002. The soil was clay loam in texture under medium high land, phase 2 belonging to the Madhupur tract soils of agro-ecological zone 28.

The experiment included four modern photosensitive varieties and line, BR22, BR23, Binasail and BR5226-6-3-3 along with a widely cultivated local variety, Telosh. The study was laid out in a randomized complete block design with three disperse replications at farmer's field.

In Boro season, widely cultivated BRRIdhan28 was transplanted on January 7, 2000 with the seedling age of 45 days following 2-3 seedlings hill^{-1}. In transplanted aman season, crops were transplanted on September 24, 2001 with the seedling of 35 days of age following 3-4 hill^{-1}. Other intercultural operations were done as required. Crops were harvested at maturity during May 24-25 in Boro season and late December to first week of January. Data on individual plant and yield contributing characters were recorded from the eight randomly selected hills per plot, whereas grain, straw and total dry matter yield from the harvested area of 10 m^2 per plot and these were converted into per unit basis. The grain yield was expressed in ton per ha^{-1} at 14% moisture level. Data were analyzed statistically and mean comparison was done by Duncan's new multiple range test (DMRT). Economic analysis was done based on prevailing market price of all input and output costs.

Results and Discussion

Yield components: Yield components varied among the varieties (Table 1). Significant variation in yield components was also reported by Ahmed *et al.* (1998). The varieties, Binasail and Telosh produced significantly the taller plants (115.3 and 114.7 cm, respectively) than other varieties. This is the inherent character of Binasail and Telosh. The highest number of panicles m^{-2} was produced by BR22 than all other varieties. Except BR22, all other varieties produced similar number of panicles m^{-2}. In case of filled grains panicle^{-1}, BR23, Binasail and BR5226-6-3-3 were found to produce comparable filled grains panicle^{-1}. The varieties having higher number of panicles m^{-2} produced less number of filled grains panicle^{-1}. The results supported the findings of Hossain *et al.* (1987). Varieties BR5226-6-3-3, Telosh and BR23 produced the grain of heavier weight and the lowest individual grain weight was found in Binasail. Significant variation was found in field duration. Telosh took more days to mature than all other varieties. All the modern varieties matured 5 to 20 days earlier than the local variety, Telosh (Table 1).

Grain, straw and total dry matter yield: Grain, straw and total dry matter yield varied significantly among the varieties (Fig. 1-3). The highest grain yield of 4.14 t ha^{-1} was obtained from BR5226-6-3-3 followed by BR23, which gave an average yield of 3.96 t ha^{-1}. Binasail and Telosh were found to produce the lower grain yield (Fig. 1). Significant variation in grain yield in photosensitive rice varieties was also reported by Ahmed *et al.* (1998) and Ali *et al.* (1992). The higher grain yields were associated with higher filled grains panicle^{-1} and heavier grain weight. The findings are in agreement with the finding of Hossain *et al.* (1987). The higher straw and total dry matter (TDM) yields were also obtained from BR5226-6-3-3 and BR23 (Fig. 2 and 3). The higher TDM production of these varieties attributed to higher grain and straw yield ha^{-1}.

Productivity of the ecotype: Considering the cropping systems, the highest total grain yield of 10.42 t ha^{-1} was obtained from BRRIdhan28-Fallow-BR5226-6-3-3 followed by BRRIdhan28-Fallow-BR23 (10.23 t ha^{-1}). These were due to higher grain yield of the varieties, BR5226-6-3-3 and BR23. Growing improved photosensitive lines and varieties, BR5226-6-3-3, BR23 and BR22

Table 1: Yield components of photosensitive rice varieties

Varieties	Plant height (cm)	Panicles m^{-2} (no.)	Filled grains $panicle^{-1}$ (no.)	1000 grains weight (g)	Field duration (days)
BR22	90.5bc	284a	67.67b	19.48b	83d
BR23	85.8c	217b	93.00a	21.25a	90c
Binasail	115.3a	228b	90.60a	17.05c	98b
BR5226-6-3-3	94.7b	212b	84.67a	22.21a	90c
Telosh	114.7a	224b	76.37b	21.47a	103a
CV (%)	3.2	8.1	6.7	2.7	1.3

In a column, means followed by a common letter are not different at 5 % level by DMRT

Table 2: Agro-economic productivity of Boro-Fallow-t. Aman cropping system in the medium highland –2

Cropping systems	Total production (t ha^{-1})	Production increase over check (t ha^{-1})	Total variable cost ('000' Tk^{-1})	Total gross margin ('000' Tk^{-1})	Increase in gross margin ('000' Tk^{-1})
BRRIdhan28-F-BR22	9.89 c	0.41	35.42	23.92	4,060
BRRIdhan28-F-BR23	10.23 b	0.75	35.42	25.96	6,100
BRRIdhan28-F-Binasail	9.61 d	0.13	35.42	22.24	2,380
BRRIdhan28-F-BR5226-6-3-3	10.42 a	0.94	35.42	27.10	7,240
BRRIdhan28-F-Telosh	9.48 d	-	35.42	19.86	-

F= Fallow, Price of rough rice kg^{-1}: Modern Tk. 6 and local Tk. 5.5

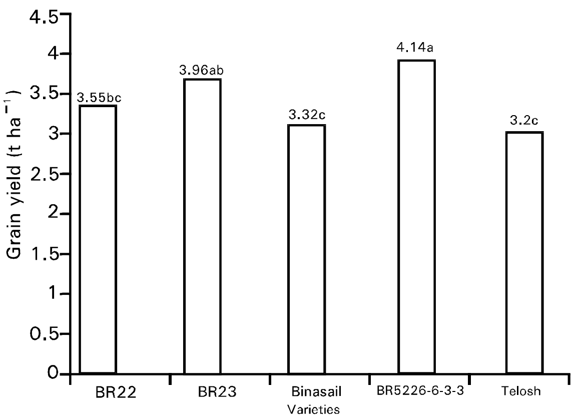

Fig. 1: Grain yield of photosensitive rice varieties

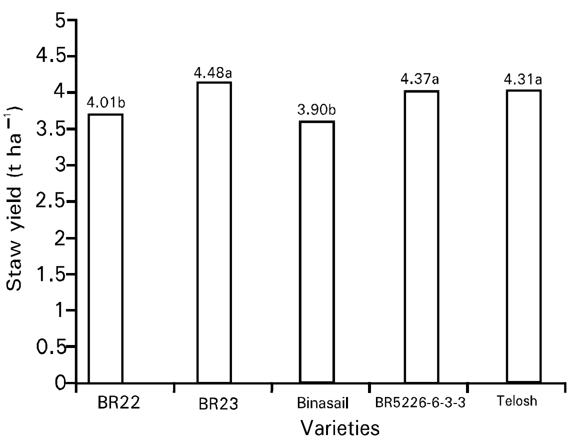

Fig. 2 Straw yield of photosensitive rice varieties

following BRRIdhan28 gave an average yield advantages of 0.94, 0.75 and 0.41 t ha^{-1}, respectively which contributed to additional gross margins of 36, 31 and 20%, respectively. In terms of profitability the systems, BRRIdhan28-Fallow-BR5226-6-3-3, BRRIdhan28-Fallow-BR23 and BRRIdhan28-Fallow-BR22 performed better than BRRIdhan28-Fallow- Binasail.

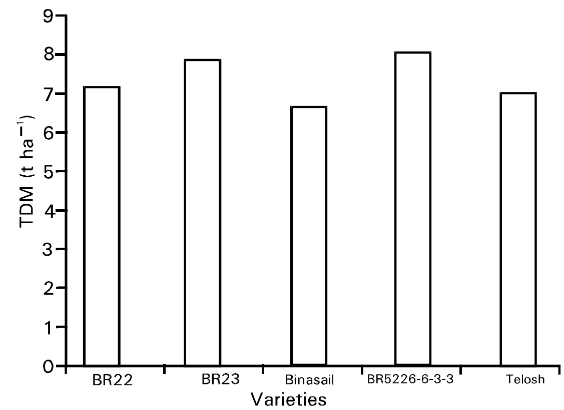

Fig. 3: Total dry matter (TDM) production of photosensitive rice varieties

From the results, it can be concluded that growing improved photosensitive line and variety, BR5226-6-3-3 and BR23 after Boro increased the productivity of the ecotype, medium highland phase-2 and might be promoted in the extrapolation area.

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