

**BG 251 AS A DROUGHT TOLERANT, SHORT AGE RICE VARIETY FOR
MOISTURE-STRESSED RAINFED AREAS ***

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INTRODUCTION

As a result of erratic rainfall pattern and the frequent dry spells in major rice growing areas, rainfed rice cultivation was more prone to drought over the last three years. In *Yala* 2012, the total drought affected extent of rice was around 35,800 ha (AgStat, 2012) and it was 11,723 ha in 2014 (AgStat, 2014). The total rice production declined by 41% to 1.13 million mt in *Yala* 2012 (CBSL, 2012) while it was also declined by around 35.5% to 1.14 million mt in *Yala* 2014 (CBSL, 2014). In 2013, about 35% of rainfed rice farmers in both the Dry and Intermediate zones abundant their cultivation during the *Yala* season compared to the *Maha* mostly due to insufficient water availability (Agstat, 2014). This reduction in the cultivated extent and crop loss in *Yala* directly affect the national rice production and food security of the country.

To overcome this situation, introducing drought tolerant lines, on time cultivation and efficient water use techniques are identified. Short age drought tolerant varieties are more adaptable to moisture-stressed rainfed areas as the yield loss of such varieties is low. Bg 250, a 2½ month age variety covers less than 1% of the total rice cultivation. However, with the increase in moisture stress affected area under rice, the demand for short duration moisture stress tolerant varieties to escape drought would be increased. Hence, it is essential to introduce short age drought tolerant varieties to increase average yields in rainfed areas, cultivated extent and the annual production. Based on this national requirement, the objective of this study was to evaluate the potential of rice line Bg 10-9028 for rainfed

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moisture stressed conditions under the research level and rainfed farmer field and under the irrigated condition.

MATERIALS AND METHODS

A 2 ½ month age rice line Bg 10-9028 which was selected among 31 drought tolerant inbred rice lines with drought tolerant genes (Piyasiri *et al.*, 2012) received from IRRI through the “Green Super Rice” project was evaluated under moisture-stressed rainfed condition in both *Yala* 2010 and *Yala* 2011 at the Rice Research and Development Institute (RRDI), Batalagoda with the standard variety of Bg 250. Trial was conducted in RCBD with three replicates and the plot size of 3 m² to minimize the moisture variation within the plot. A 45 cm deep drench was made around the experiment to minimize the lateral. Piesometers of 50 cm depth were fixed in each plot in *Yala* 2010. Soil samples up to 40 cm depth of each plot throughout the season were taken at regular intervals in *Yala* 2011 to measure gravimetric water content. The depth of the water table /gravimetric soil moisture content, number of days to maturity and the final grain yield of each replicate in rainfed trial were recorded.

Bg 10-9028 was also parallelly evaluated with the Bg 250 during *Yala* 2011 in 17 rainfed fields having high probability of water stressed condition in the IL₁ in Kurunegala district. Seeds were sown in to 10 m² plot with two replicates in each location. Replicated yield data were analysed for the adaptability using combined analysis of variance (Abeyesiriwardena, 2005) and the adaptability was determined by the parameters of mean varietal deviations and variance in varietal deviation derived from this method.

This line was also evaluated at 9 locations in the Dry and Intermediate zones and 2 locations in the Wet zone in *Maha* 2011/2012 and 5 locations in the Dry and Intermediate zones and one location in the Wet zone in *Yala* 2012. Yield performance of all locations and grain quality characteristics, some morphological characters, resistance for pest and disease were evaluated during NCRVT of *Maha* 2011/12 and *Yala* 2012 at RRDI, Batalagoda.

RESULTS AND DISCUSSION

The results revealed that under severe stressed conditions, Bg 10-9028 tend to give higher yield compared to the Bg 250 while under less stress Bg 250 performs higher yield compared to Bg 10-9028.

The average yield of Bg 10-9028 and Bg 250 tested in moisture stressed rainfed fields in the Kurunegala district in *Yala* 2011 showed variation in yield among locations. Out of 17 locations, in 11 locations yield of Bg 10-9028 was comparatively higher than that of Bg 250 while in other locations it was similar or yield of Bg 250 was slightly greater. The highest yield recorded for Bg 10-9028 was 6 t/ha while 5.8 t/ha was the highest for Bg 250. Average yield in rainfed moisture stressed fields for Bg 10-9028 was 3.25 ± 0.37 t/ha while it was 2.81 ± 0.32 t/ha for Bg 250.

The adaptability parameters of mean varietal deviation (D) and variance in varietal deviation (V^2) are non significant at 5% probability level and V^2 of Bg 10-9028 was considerably lower than that of the V^2 of Bg 250. The lower D value and lower V^2 value of Bg 10-9028 compared to the Bg 250 indicates the greater potential for moisture stressed tolerance of Bg 10-9028 than that of the Bg 250 under rainfed moisture stressed conditions. The NCRVT experiments results revealed that there is no significant yield advantage of Bg 10-9028 over the Bg 250 under irrigated condition. Further, Bg 10-9028 can withstand lodging due to its shorter height. It facilitates the mechanical harvesting. Grain length of both varieties is same but there is a little difference in grain width.

Therefore, Bg 250 considered as Intermediate Bold type while Bg 10-9028 considered as Long Medium type. The filled grain percentage of Bg 10-9028 is higher compared to the Bg 250. But the paddy of Bg 250 is heavier than that of the Bg 10-9028 as the weight of thousand grains of Bg 250 is higher than that of the Bg 10-9028. Both, Bg 250 and Bg 10-9028 are resistant or moderately resistant to gall midge and blast while moderately resistant to brown plant hopper. Although Bg 250 is susceptible to the bacterial leaf blight disease, Bg 10-9028 showed moderate susceptibility.

The socio-economic survey revealed that about 78% of the evaluated farmers agreed with cultivation this line under water shortage condition and 85%

experienced this line was better suited for the rainfed cultivation due to its drought tolerance ability (Walisinghe *et al.*, 2014).

CONCLUSIONS

On the basis of the potential in adaptability in rainfed moisture stressed environments and disease resistance and farmer acceptance, the line Bg 10-9028 was released as Bg 251 for moisture stressed rainfed areas of Sri Lanka.

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