Growth and yield of recently release wheat varieties under raised bed system in drought prone areas

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Introduction

In Bangladesh, the cereal, pulse and other crops have traditionally been planted after 3-4 ploughing operations followed by laddering which is slow, laborious, time consuming and also costly (Singh *et al.* 2003 and Timsina *et al.* 2001). Added to this is the increasing labor shortage especially in the peak period. Raised bed planting reduce production cost, save labor and water increases input efficiency, increases yields (Witt *et al.*2000). This experiment was undertaken to select the best genotypes bed planting and to determine their growth characteristics under this system.

Materials and Methods

The trial was conducted with six recently released wheat varieties at the Regional Wheat Research Centre, BARI, Rajshahi in 2014-15 and 2015-16. The experiment was laid out in randomized complete block design with three replications. Seeds were sown by bed planter plots25 meter long x 2.4 m wide with 8 rows for six varieties namely Shatabdi, Prodip, Bijoy, BARI Gom 25, 26 and 27. Recommended management practices were followed to raise the crop with irrigation and other practices. Data were recorded on different agronomic parameters as well as phenological and physiological characteristics. At maturity, four rows with 2 m long plot size were harvested to estimate grain yield expressed as tone per hectare. The collected data were analyzed with Crop Stat Model and means were compared by same model.

Results and Discussion

Growth parameters

Raised bed systems significantly influenced on the crop growth duration and as results Shatabdi, Bijoy and BARI Gom 27 varieties were longer crop duration compared to Prodip, BARI Gom 25 and BARI Gom 26 due to their varietal characters. Days to heading, anthesis and physiological maturity were 3-4 days earlier in Prodip, BARI Gom 25 and BARI Gom 26 varieties under raised bed system over Shatabdi, Bijoy and BARI Gom 27 varieties (Table 1).

Total Dry Matter (TDM) and Leaf Area Index (LAI)

TDM increase with increased over time up to grain filling stage among all the varieties under raised bed systems and then slowly decreased (Fig. 1). Maximum dry matter production was higher in Shatabdi, Bijoy and BARI Gom 27 varieties due to their longer growth duration and minimum in BARI Gom 25 and Prodip varieties due to leaf senescence and mutual shading. Govaerts*et al.* (2006) found maximum dry matter in grain filling stage from mutual shading of genotypes under raised bed systems. Leaf area index increase with increased the duration up to booting stage and then decreased up to late grain filling stage. Maximum leaf area index was found from BARIGom27, Shatabdi and Bijoy varieties due to their longer duration and due to leaf senescence and minimum was Prodip and BARI Gom 25 and 26 varieties (Fig 2).

Grain yield and yield components

Average two years were significantly influenced among the varieties. The maximum grain yield was found from BARI Gom 26 (4.71 tha^{-1}), BARI Gom 25(4.37 tha^{-1}), Shatabdi (4.53 tha^{-1}) and Bijoy (4.65 tha^{-1}) variety. The minimum yield (4.02 tha^{-1}) was found from Prodip and BARI Gom 27 variety due to less tillering. Spike m^{-2}, spike length, grains $spike^{-1}$ and TGW were found higher from BARI Gom 26, Shatabdi and Bijoy and lower spike m^{-1}, spike length and grains $spike^{-1}$ were found from Prodip variety.

References

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Table 1. Growth parameters of wheat varieties under raised beds

Varieties	DB	DH	DA	DPM
Shatabdi	65	74	79	113
Bijoy	64	72	77	111
Prodip	63	73	76	105
BARI Gom 25	63	72	76	106
BARI Gom 26	63	74	76	107
BARI Gom 27	65	75	79	112
SE	0.43	0.55	0.51	0.36
LSD (0.05)	1.17	1.74	1.62	1.13

Table 2. Effect of wheat varieties on yield & yield attributes under raised beds

Varieties	Spike m^{-2}	Spike length (cm)	Spikelet $Spike^{-1}$	Grains $Spike^{-1}$	TGW (g)	Av. 2 years yield (tha^{-1})
Shatabdi	353	9.3	19.8	44.3	46.3	4.53
Bijoy	359	10.3	19.7	46.6	46.0	4.65
Prodip	319	9.1	18.3	44.6	47.6	4.02
BARIGom 25	335	10.0	18.6	44.0	46.3	4.37
BARIGom 26	348	10.3	18.9	44.3	50.3	4.71
BARIGom 27	357	10.6	20.3	47.3	43.6	4.31
SE	23.15	0.84	1.09	2.54	2.61	0.21
LSD (0.05)	73	2.65	3.44	8.00	2.22	0.51

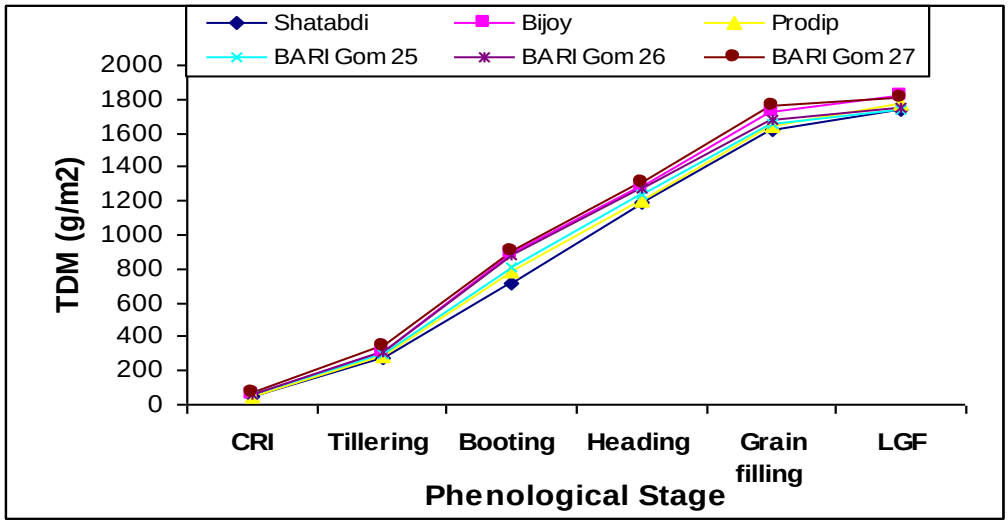

Figure 1. Total dry matter (TDM) of wheat varieties under raised bed

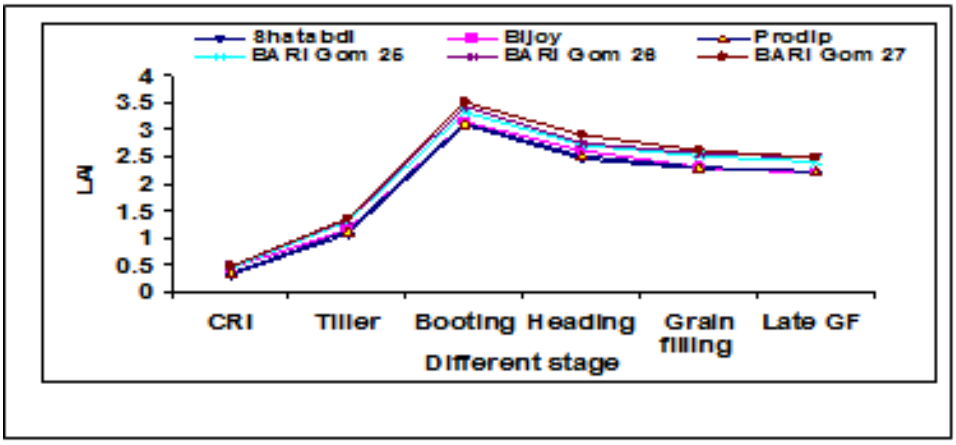

Figure 2. LAI of wheat varieties under raised beds