Progressive Agriculture 28 (2): 109-113, 2017 ISSN: 1017 - 8139

Progressive Agriculture
Journal homepage:http://www.banglajol.info/index.php/PA

Growth and yield performance of local *T Aman* genotypes in southern region of Bangladesh

MHK Howlader*, M Rasel, MS Ahmed, MM Hasan, LA Banu

Department of Agricultural Botany, Patuakhali Science and Technology University, Dumki, Patuakhali, Bangladesh

Abstract

The present experiment was conducted at the Research Field Laboratory of the Department of Agricultural Botany, Patuakhali Science and Technology University (PSTU), Patuakhali during the period from July to December 2013 to evaluate among the local *T Aman* rice genotypes for obtaining the most productive genotype regarding growth and yield performance under southern region. Four local *T Aman* rice genotypes namely *Lalchicon, Lalmota, Moulata* and *Mothamota* were used as planting materials and laid out in RCBD with three replications. The genotype *Moulata* was produced significantly the tallest plant (155.0 cm) and number of total tillers per hill (11.80); statistically higher LAI (2.133) and TDM (16.80 g hill^{-1}) at vegetative stage (60 DAT). Similarly, number of maximum effective and minimum non-effective tillers per hill (10.80 and 1.333), total and filled grains panicle^{-1}(128.50 and 115.80), minimum unfilled grains panicle (12.67), thousand grain weight (25.35 g), grain, straw and biological yield (3.657, 6.000 and 9.657 t ha^{-1} respectively) and HI (37.86%)also higher in *Moulata* at harvest. So, *Moulata* was the most productive genotype among the studied local *T Aman* rice genotypes under the southern region.

Key words: *T Aman* rice, growth, yield, southern part of Bangladesh

 ***Corresponding Author:** howladercbt@yahoo.com

Introduction

In Bangladesh, rice covered an area of 28.5 thousand acres with a production of 33.5 million metric tons while the average yield of rice is around 1.2 thousand tons per acres whereas the transplant aman rice covers the largest area of 13951 acres (48.97%) with a production of 12792 thousand M. tons rice grain (38.14%) and the average yield is about 971 kg ha^{-1} in Bangladesh during 2010–11 (BBS, 2012) among three growing seasons (aus, aman and boro) aman rice occupies the highest area coverage (34%of gross cropped area). Fifty lakh acres of agricultural land decreased during last 20 years also. Like as the above fact, the food deficit has been increasing in Bangladesh at an alarming rate due to increase in population growth and low yield of food crops achieved per unit area. In Bangladesh, local rice cultivated more than modern rice varieties. So, it is necessary to increase per hectare yield of local rice and have to give more attention on the improvement of *T Aman* local rice varieties to increase rice production in order into satisfy our increasing need of food. Local *T Aman* rice tolerates water logged condition, less cultural practices prefer to HYV rice. Many researchers' works with local *TAman* rice genotypes and finds a considerable result in growth and yield e.g. *Mothamota* and *Lalchicon* (Uddin, 2011). Considering the above facts, to find out the most potential genotype among the selected *T Aman* genotypes concerning various growth and yield contributing characters under the southern region.

Materials and Methods

The experimental field belongs to the Research Farm of Patuakhali Science and Technology University, Dumki, Patuakhali and covered by the Ganges Tidal Flood Plains under the AEZ–13. The experimental field was medium high in nature and silty clay loam soil having pH value of 6.8. The four local *TAman* rice genotypes *viz.Lalchicon, Lalmota, Moulata* and *Mothamota* as planting material were used and laid out Randomized Complete Block Design (RCBD) with three replications and plot size was 4.0 × 2.5 m where block to block and plot to plot distance was 1.0 and 0.5 m. The fertilizer were applied such as Gypsum, MOP, TSP, urea and $ZnSO_4$ at the rate of 65, 75, 130, 190 and 10 kg per hactare at the time of final land preparation and different vegetative growth stages. The seedlings were transplanted maintaining spacing 20cm X 20cm and different intercultural operations were done properly. Five plants were randomly selected from each plot for measures plant height and number of leaves. To get leaf area index (LAI), randomly collected six leaves per hill get five hills of each plot and leaf area were measured by an automatic leaf area meter and finally LAI was calculated with the formula as follows- LA/P. To get effective and non effective tillers per hill, tillers were counted from each sample and average of five hills of each plot was recorded. Number of total grains per panicle was noted through sum of number of filled grains and number of unfilled grains. One thousand cleaned dried seeds were counted randomly from each sample and weighed in gram as 12% moisture basis. The grain and straw yield harvest of the kg per 1 m^2 per plot and converted to ton per ha. The biological yield and harvest index were calculated also. Collected data were statistically analyzed through ANOVA technique and evaluated with the help of Duncan's Multiple Range Test (Gomez and Gomez, 1984).

Results and Discussion

Performance of growth characters at vegetative stage

Plant height: Plant height is a growth character of rice which contribution is more efficient to enhancing the straw yield incase of the tallest plant produce the higher yield of straw. From the Figure 1, local *Moulata* registered the tallest plant (63.47, 93.60, 136.60 and 155.00 cm) followed by *Lalchicon* (57.49, 87.02, 127.50 and 147.50 cm) at 30, 45, 60 DAT and at harvest (140 DAT), respectively.

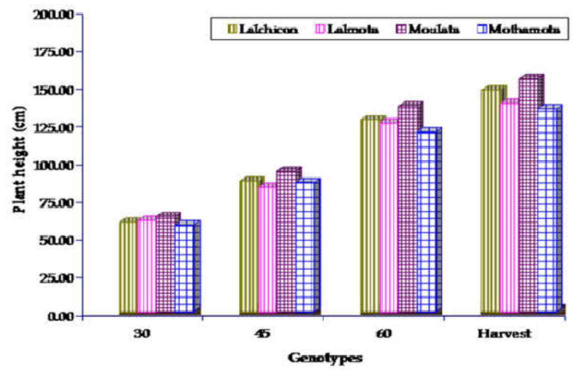

Figure 1. Effect of *T Aman* rice genotypes on plant height at different days after transplanting

Hossain *et al*. (2014b) found that, the variation in plant height was observed due to the variation in genetic variability and adaptability in studied area.

Number of total tillers per hill: From the Table 1, *Moulata* produced maximum total tillers $hill^{-1}$ (7.10, 10.30, and 11.80) at 30, 45 and 60 DAT respectively while *Lalchicon* showed significantly the minimum tillers $hill^{-1}$ (4.33, 7.27 and 10.07) at those stages respectively while *Lalmota* produced statistically similar tillers $hill^{-1}$ at 45 DAT (7.37) and 60 DAT (10.23). Mahamud *et al*. (2013) showed that rice cultivars differed significantly in all growth characters especially tillers number.

Leaf area index (LAI): From the Table 1, it was observed that *Moulata* produced highest LAI (0.8033) at 30 DAT. *Moulata* (1.950 and 2.133) and *Lalmota* (1.943 and 2.100) were produced statistically identical LAI at 45 and 60 DAT respectively. On the other hand, *Lalchicon* registered the lowest LAI (0.640, 1.677 and

1.953) at 30, 45 and 60 DAT respectively which is also statistically identical to *Mothamota* at 60 DAT (1.990) and statistically close at 45 DAT (1.740). Mondal *et al.* (2005) who stated that the variation in LAI could be attributed due to the changes in number of leaves and the rate of leaf expansion and abscission.

***Total dry matter (TDM)*: From the Table 1, it was found that *Moulata* produced statistically higher TDM hill^{-1} at 30 and 45 DAT (5.053 g and 9.117 g respectively) and statistically close higher TDM hill^{-1} at 60 DAT (16.80 g). *Mothamota* also produced statistically higher TDM hill^{-1} at 45 DAT (8.917 g). Similarly, *Lalchicon* produced significantly the lowest TDM hill^{-1} (4.12, 7.96 and 15.02 g) at 30, 45 and 60 DAT, respectively while *Lalmota* were the statistically similar lower TDM producer at 45 and 60 DAT (8.30 and 15.31 g). Razzaque *et al*. (2009) who reported that TDM increased with increasing plant age up to physiological maturity and high yielding varieties always maintained higher TDM.

Table 1. Effect of *T Aman* rice genotypes on No. of total tillers per hill, LAI and TDM at different DAT

Genotypes	Number of total tillers hill^{-1} at different DAT			LAI at different DAT			TDM (g hill^{-1}) at different DAT		
	30	45	60	30	45	60	30	45	60
Lalchicon	4.333 d	7.267 c	10.07 b	0.6400 d	1.677 b	1.953 b	4.117 d	7.963 b	15.02 c
Lalmota	6.067 b	7.367 c	10.23 b	0.7033 b	1.943 a	2.100 a	4.403 c	8.303 b	15.31 c
Moulata	7.100 a	10.30 a	11.80 a	0.8033 a	1.950 a	2.133 a	5.053 a	9.117 a	16.80 ab
Mothamota	5.033 c	8.867 b	10.70 b	0.7500 bc	1.740 ab	1.990 b	4.750 b	8.917 a	16.06 bc
CV (%)	**4.06**	**6.28**	**4.63**	**1.68**	**6.16**	**2.33**	**1.89**	**3.53**	**4.35**

In a column, the means having same letter (s) do not differ significantly but dissimilar letters differ significantly as per DMRT 5% level of significance.

Performance of yield and yield contributing characters at harvest

***Number of effective tillers per hill*:** The maximum number of effective tillers hill^{-1} (10.80) was recorded in *Moulata* and minimum (7.53) in *Lalchicon* (Figure 2). Similarly, significant variation among the rice varieties regarding tillers hill^{-1} was also found by Islam *et al.* (2013).

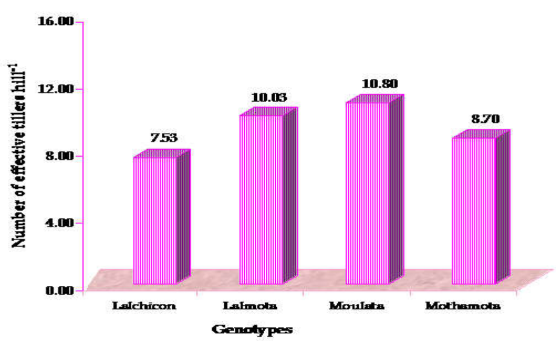

Figure 2: Effect of *T. aman* rice genotypes on number of effective tillers hill^{-1} at harvest

***Number of non–effective tillers per hill*:** The minimum number of non-effective tillers hill^{-1} (1.333) was recorded in *Moulata* and maximum (3.067) in *Lalchicon* (Figure 3). The variation in production of non effective tillers was found due to its genetic variation and also the different types of tiller mortality possibility at harvest.

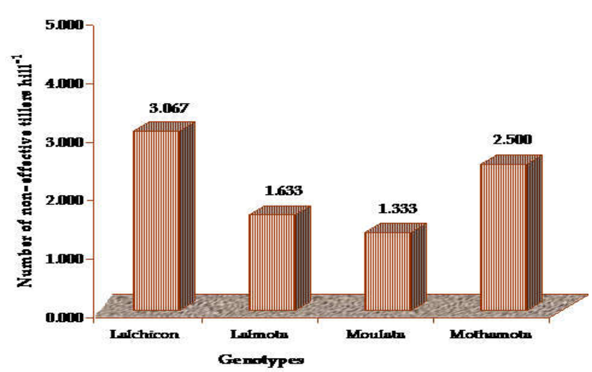

Figure 3. Effect of *T Aman* rice genotypes on number of non-effective tillers hill^{-1} at harvest

Number of total grains per panicle: From the Table 2, it was found that the total grains panicle^{-1} varied from 77.80 to 128.50. Among the genotypes, *Moulata* had maximum (128.50) while *Lalchicon* was the minimum (77.80) in respect of total grains panicle^{-1}.

Number of filled grains per panicle: Among the genotypes (from table 2), *Moulata* produced maximum (115.8) number of filled grains per panicle while *Lalchicon* was produced the minimum (59.40). Mahamud *et al*. (2013) reported that the variation in filled grains panicle^{-1} was recorded due to genotypic differences of varieties.

Number of unfilled grains per panicle: From the Table 2, it was found that *Moulata* had minimum (12.67) number of unfilled grains per panicle while *Lalchicon* was the maximum (18.40). The maximum unfilled grains decreased the final yield as well as minimum unfilled grains increase the grain yield.

Table 2. Effect of *T Aman* rice genotypes on various yield contributing characters

Genotypes	Number of grains panicle^{-1}	Number of filled grains panicle^{-1}	Number of unfilled grains panicle^{-1}	Thousand–grain weight (g)	Grain yield (t ha^{-1})	Straw yield (t ha^{-1})	Biological yield (t ha^{-1})
Lalchicon	77.80^{d}	59.40^{d}	18.40^{a}	21.93^{b}	1.967^{d}	5.570^{b}	7.537^{c}
Lalmota	89.03^{c}	71.50^{c}	17.53^{b}	22.45^{b}	2.053^{c}	5.697^{b}	7.750^{bc}
Moulata	128.5^{a}	115.8^{a}	12.67^{d}	25.35^{a}	3.657^{a}	6.000^{a}	9.657^{a}
Mothamota	118.0^{b}	103.0^{b}	15.07^{c}	23.29^{b}	2.447^{b}	5.617^{b}	8.063^{b}
CV (%)	**4.11**	**3.33**	**2.43**	**3.65**	**0.8**	**1.75**	**2.16**

In a column, the means having same letter (s) do not differ significantly but dissimilar letters differ significantly as per DMRT 5% level of significance.

Thousand–grain weight: *Moulata* produced ignorantly the higher weight of 1000-grain (25.35 g) due to large sizes grain compare to other genotypes (Table 2). On the other hand, *Lalchicon* registered the lower weight of 1000–grains (21.93 g) due to small sizes grain which was also numerically or statistically identical to *Lalmota* (22.45 g) and *Mothamota* (23.29 g). Islam *et al*. (2013) stated that significant variation in 1000–grain weight due to the variation in genetic makeup of the variety.

Grain yield: *Moulata* produced the highest grain yield (3.657 tha^{-1}) than other genotypes while *Lalchicon* had the lower yielder (1.967 t ha^{-1}) (Table 2). Islam *et al.* (2013) reported that the varieties which produced higher number of effective tillers hill^{-1} and higher number of filled grains panicle^{-1} also showed higher grain yield ha^{-1}.

Straw yield: Among the local *T Aman* genotypes (Table 2), the genotype *Moulata* produced significantly the highest straw yield (6.00 t ha^{-1}) compare to other studied genotypes. Among other genotypes, *Lalchicon* had the lowest straw yield (5.57 t ha^{-1}) which was also statistically or numerically similar to *Lalmota* (5.697 t ha^{-1}) and *Mothamota* (5.617 t ha^{-1}). Mahamud *et al*. (2013) found that significant variation in straw yield due to the variation in genetic make up.

Biological yield: Among the genotypes (Table 2), *Moulata* showed the highest biological yield (9.657 t ha^{-1}). However, *Lalmota* (7.75 t ha^{-1}) showed the statistically close biological yield to *Lalchicon* (7.537 t ha^{-1}). Hossain *et al*. (2014b) found that, the variation in biological yield was also found due to the variation in grain and straw yield.

***Harvest index (HI)*: *Moulata* showed significantly the highest HI (37.86%) followed by other genotypes (Figure 4). However, *Lalchicon* (26.08%) and *Lalmota* (26.48%) were produced statistically identical harvest index. Uddin *et al*. (2011) reported that the harvest index differed significantly among the varieties due to its genetic variability.

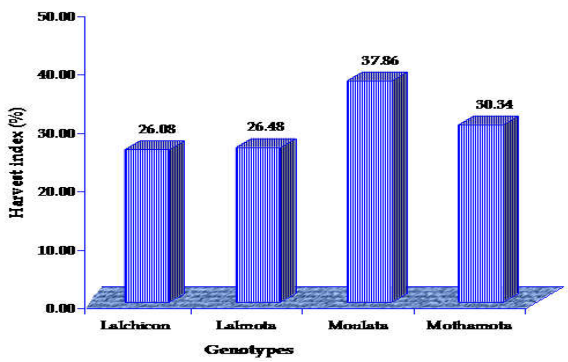

Figure 4. Effect of *T Aman* rice genotypes on harvest index

Conclusion

So, four local *TAman* rice genotypes namely *Lalchicon, Lalmota, Moulata* and *Mothamota*; *Moulata* was produced significantly the tallest plant (155.0 cm) and number of total tillers per hill (11.80); statistically higher LAI (2.133) and TDM (16.80 g $hill^{-1}$) at vegetative stage (60 DAT). Similarly, number of maximum effective and minimum non-effective tillers per hill (10.80 and 1.333), total and filled grains $panicle^{-1}$(128.50 and 115.80), minimum unfilled grains panicle (12.67), thousand grain weight (25.35 g), grain, straw and biological yield (3.657, 6.000 and 9.657 t ha^{-1} respectively) and HI (37.86%) also higher in *Moulata* at harvest. So, it was confimed that *Moulata* was the most productive genotype among the studied local *T Aman* rice genotypes under the southern region.

References

Gomez KA and Gomez AA (1984). Statistical Procedure for Agricultural Research. 2nd ed. John Wiley and Sons. New York. p 64.

Hossain MT, Ahmed KU, Haque MM, Islam MM, Bari ASMF and Mahmud JA (2014b). Performance of hybrid rice (*Oryza sativa* l.) varieties at different transplanting dates in Aus season. App. Sci. Report., 1(1): 1–4.

Islam N, Kabir MY, Adhikary SK and Jahan MS (2013). Yield performance of six local aromatic rice cultivars. J. Agric. Vet. Sci., 6(3): 58–62.

Mahamud JA, Haque MM and Hasanuzzaman M(2013). Growth, dry matter production and yield performance of transplanted aman rice varieties influenced by seedling densities per hill. Intl. J. Sust. Agric., 5(1): 16–24.

Mondal MMA, Islam AFM and Siddique MA (2005). Performance of 17 modern transplant aman cultivar in the northern region of Bangladesh. Bangladesh J. Crop Sci.,16: 23–29.

Razzaque MA, Talukder NM, Islam MS, Bhadra AK and Dutta RK (2009). The effect of salinity on morphological characteristics of seven rice (Oryza sativa) genotypes differing in salt tolerance. Pak. J. Biol. Sci., 12(5): 406–412.

Uddin MJ, Ahmed S, Harun–or–Rashid M, Hasan MA and Asaduzzaman M(2011). Effect of spacing on the yield and yield attributes of transplanted aman rice cultivars in medium lowland ecosystem of Bangladesh. J. Agric. Res., 49(4): 465–476.