

# Performance of selected local *T. aman* rice varieties in Patuakhali region

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**Abstract:** An experiment was conducted at the Research Farm of Patuakhali Science and Technology University (PSTU), Dumki, Patuakhali during the period from July to December 2013 to determine the growth and yield performance of the selected *T. aman* rice varieties as influenced by various seedling ages under the Patuakhali region. Two local *T. aman* rice varieties namely *Moulata* and *Dudkalam* and three different ages of seedling such as 30, 45 and 60 days were used and laid out RCBD with three replications. In the interaction effect of seedling age on variety, most of the studied characters were significantly affected where 45 days age seedlings of *Dudkalam* showed significant than other ages of seedlings and *Moulata*. The tallest plant (165.5 cm) at harvest, higher number of leaves (67.3), higher TDM (18.65 g hill<sup>-1</sup>), higher LAI (2.787), maximum effective tillers hill<sup>-1</sup> (12.44), minimum non-effective tillers hill<sup>-1</sup> (0.953), longest panicle (26.89 cm), maximum total grains panicle<sup>-1</sup> (106.50), higher weight of 1000-grain (27.88g), greater yield of grain and straw (3.890 and 6.257 t ha<sup>-1</sup>, respectively) were obtained in 45 days age seedlings of *Dudkalam*. So, variety *Dudkalam* would be the most productive variety than *Moulata* and 45 days age seedling would be the optimum for obtaining the greater production of *T. aman* rice under the Patuakhali region.

**Key words:** *T. aman* rice, seedling age, growth, yield.

## Introduction

Better crop stand establishment is mostly indispensable for achieving desired level of rice production. Presently, rice covered an area of 28.5 thousand acres in Bangladesh. As the agricultural land is decreasing day by day, the area under rice cultivation is also decreasing. Again, the cultivation of modern rice varieties are expanding fast to cope with the increasing demand of the country. Still there are some regions of the country where local rice cultivars are cultivated during aman season due to its suitability in the locality. Patuakhali is one of the such region where some local aman rice cultivars are popularly grown although the poor yield of these varieties. The reasons for low yield of local rice are lack of use of quality seed, adopting plant protection measures, optimum seedling age and optimum number of seedling per hill, seedling raising technique etc. Among these seedling age can play important roles on the tillers production, grain formation and other yield contributing. But farmers do not give due attention to the age of seedlings at transplanting and use over aged seedling. For that general performance of crop and the yield of the crop reduces drastically, as the farmers are not aware of this factor for rice production.

For optimum yield, age of seedlings at transplanting of a particular variety at a particular season may not be suitable for other varieties at other season. It is, therefore, important to find out the optimum age of seedling of a particular variety for a particular season. Considering the above facts, the present piece of research was undertaken to find out the most suitable age of transplanting seedling concerning various growth characters, yield and yield contributing traits and also find out growth and yield performance of the selected *Moulata* and *Dudkalam* variety while it will ensure the most productive variety between them under the Patuakhali region.

## Materials and Methods

The experimental area belongs to the Research Farm of Patuakhali Science and Technology University (PSTU), Dumki, Patuakhali and covered by the Ganges Tidal Flood Plains under the Agro-ecological zone of AEZ-13. The experimental field was medium high in nature and silty clay loam soil having pH value of 6.8. Two local *T. aman*

rice varieties viz., *Moulata* and *Dudkalam* and three different age seedlings 30, 45 and 60 days were used. The experiment was 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, respectively. The fertilizer were applied such as urea, TSP, MOP, Gypsum and ZnSO<sub>4</sub> @ 200, 125, 70, 60 and 10 kg per ha respectively 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. Randomly selected five plants in each plot for measures plant height and plant parts such as leaves, stems, roots sample were taken and counted and oven dry for total dry matter. To get leaf area index (LAI), randomly collected six leaves per hill get five hills of each plot and leaf area was measured by an automatic leaf area meter and finally LAI was calculated with the formula (Radford 1967; Hunt 1978) as follows- LA/P, Where, LA = leaf area (cm<sup>2</sup>), P = ground area (cm<sup>2</sup> plant<sup>-1</sup>). 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. Panicle length was measured randomly selected five hills of each plot and average and converted into cm. Number of total grains per panicle were found 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 14% moisture basis. The grain and straw yield harvest of the kg per 1 m<sup>2</sup> per plot and converted to ton per ha. Collected data were statistically analyzed through ANOVA technique and evaluated with the help of Duncan's Multiple Range Test (DMRT) test at 5% level of probability (Gomez and Gomez, 1984).

## Results and Discussion

### Performance of seedling age with variety in growth and growth components

**Plant height:** Analysis of variance data on plant height at harvest (140 DAT) had highly significant due interaction effect of varieties and seedling age where it was varied from 160.10 cm to 165.50 cm (Table 1). Among the treatment combinations, 45 days ages seedlings of

*Dudkalam* had significantly taller (165.50 cm). Thirty days seedlings of *Moulata* showed the shortest plant (160.10 cm) while 60 days ages seedling of the similar variety also produced statistically identical shortest plant (160.6 cm) closely followed by 60 days seedlings of *Dudkalam* (161.70 cm). Similarly, Khusrul Amin and Aminul Haque (2009) reported that middle age older seedling gave the highest plant height than others.

**Number of leaves per plant:** Forty five days old seedlings of *Dudkalam* noted the maximum leaves per plant (67.30) than *Moulata* at 45 DAT (Table 1). On the other hand, 30 and 60 days ages seedlings of *Moulata* and *Dudkalam* produced statistically similar no. of leaves at same DAT. Mamuna *et al.* (2013) also found significant variation in leaf production due to seedling age.

**Table 1.** Performance of seedling age with variety on plant height at harvest and TDM, No. of leaves per plant, LAI at 45 DAT

| Varieties       | Seedling age (days) | Plant height (cm) at harvest | No. of leaves plant <sup>-1</sup> at 45 DAT | TDM (g hill <sup>-1</sup> ) at 45 DAT | LAI at 45 DAT |
|-----------------|---------------------|------------------------------|---|---------------------------------------|---------------|
| <i>Moulata</i>  | 30                  | 160.1 c                      | 60.26 d                                     | 15.05 d                               | 2.270 d       |
|                 | 45                  | 163.2 b                      | 65.07 b                                     | 18.07 b                               | 2.680 b       |
|                 | 60                  | 160.6 c                      | 61.53 d                                     | 15.74 c                               | 2.547 c       |
| <i>Dudkalam</i> | 30                  | 163.1 b                      | 63.53 c                                     | 15.03 d                               | 2.313 d       |
|                 | 45                  | 165.5 a                      | 67.3 a                                      | 18.65 a                               | 2.787 a       |
|                 | 60                  | 161.7 bc                     | 62.73 c                                     | 15.81 c                               | 2.727 b       |
| CV (%)          |                     | 0.75                         | 0.96  | 0.26                                  | 0.67          |

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.

**Total dry matter per hill:** From the Table 1, it was found that the higher TDM (18.65 g hill<sup>-1</sup>) was found from the 45 days ages seedlings of *Dudkalam* than *Moulata* at 45 DAT, while 30 and 60 days old seedlings of both *Moulata* (15.05 and 15.74 g hill<sup>-1</sup>) and *Dudkalam* (15.03 and 15.81 g hill<sup>-1</sup>) also produced statistically similar TDM at same DAT. Subedi (2013) reported that dry matter produced per unit area was higher in older seedlings which were due to taller plant height that influences dry matter production.

**Leaf Area Index:** At 45 DAT, 45 days old seedlings of *Dudkalam* produced higher LAI (2.787) than *Moulata* while 30 days *Moulata* and *Dudkalam* produced statistically similar lower LAI (2.270 and 2.313) respectively (Table 1). Khusrul Amin and Aminul Haque (2009) also found that the highest LAI was found middle age seedling due to higher longer and more leaves were produced.

**Performance of seedling age with variety in yield and yield components**

**Number of effective tillers per hill:** Production of effective tillers hill<sup>-1</sup> had highly significant due to

interaction effect between varieties and seedling age (Table 2). The maximum number of effective tillers hill<sup>-1</sup> (12.44) was obtained in 45 days old seedlings of *Dudkalam* while statistically similar higher effective tillers hill<sup>-1</sup> (12.41) was found from the 30 days ages seedlings of similar variety. Which was followed by 45 days ages seedling of *Moulata* (12.32) and 60 days ages seedling of *Dudkalam* (12.00). On the other hand, 60 days ages seedlings of *Moulata* showed the minimum effective tillers hill<sup>-1</sup> (11.80). Patra and Haque (2011) also found that significant variation in effective tiller production due to seedling age.

**Number of non-effective tillers per hill:** Non-effective tillers hill<sup>-1</sup> had also significant due to interaction effect of variety and seedling age (Table 2). Among the interaction treatments, non-effective tillers hill<sup>-1</sup> had maximum (1.290) in younger ages seedlings (30 days) of *Moulata* closely followed by the 60 days ages seedlings of *Dudkalam* while it was minimum (0.953) in 45 days ages seedlings of *Dudkalam*. Sarkar *et al.* (2011) also found variation with seedling age.

**Table 2.** Performance of seedling age with variety on various yield and yield contributing characters at harvest

| Varieties       | Seedling age (days) | No. of effective tillers hill <sup>-1</sup> | No. of non-effective tillers hill <sup>-1</sup> | Length of panicle (cm) | Number of total grains panicle <sup>-1</sup> | Weight of 1000-grain (g) | Grain yield (t ha <sup>-1</sup> ) | Straw yield (t ha <sup>-1</sup> ) |
|-----------------|---------------------|---|---|------------------------|--|--------------------------|-----------------------------------|-----------------------------------|
| <i>Moulata</i>  | 30                  | 11.96 bc                                    | 1.290 a   | 25.67 e                | 102.8 b                                      | 26.54 cd                 | 3.623 d                           | 5.830 c                           |
|                 | 45                  | 12.32 ab                                    | 1.063 c   | 26.59 b                | 104.8 ab                                     | 27.35 b                  | 3.707 c                           | 6.127 b                           |
|                 | 60                  | 11.80 c                                     | 1.007 cd  | 25.43 f                | 99.86 c                                      | 26.12 d                  | 3.410 e                           | 5.563 d                           |
| <i>Dudkalam</i> | 30                  | 12.41 a                                     | 1.150 b   | 26.17 c                | 105.2 ab                                     | 27.41 b                  | 3.783 b                           | 6.053 b                           |
|                 | 45                  | 12.44 a                                     | 0.953 d   | 26.89 a                | 106.5 a                                      | 27.88 a                  | 3.890 a                           | 6.257 a                           |
|                 | 60                  | 12.00 abc                                   | 1.207 ab  | 25.84 d                | 98.87 c                                      | 26.78 c                  | 3.610 d                           | 5.767 c                           |
| CV (%)          |                     | 1.85  | 4.11  | 0.21                   | 1.51   | 0.89                     | 0.49                              | 0.94                              |

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.

**Panicle length:** From the Table 2, it was found that the panicle length varied from 25.43 to 26.89 cm where the longest panicle was found in 45 days ages seedling of *Dudkalam* followed by similar ages seedlings of *Moulata*

(26.59 cm) while shortest panicle was obtained in 60 days ages seedling of *Moulata*. The experiment was conducted by Sarkar *et al.* (2011) to observe that panicle length and

grains were decreased with the increase of age of tiller seedlings.

**Number of total grains per panicle:** Number of grains panicle<sup>-1</sup> was significantly influenced by interaction where it was varied from 98.87 to 106.5 (Table 2). The maximum total grains panicle<sup>-1</sup> (106.5) was found in 45 days old seedling of *Dudkalam* closely followed by 30 days ages seedlings of similar variety (105.20) and 45 days ages seedlings of *Moulata* (104.80). On the other hand, 60 days ages seedlings of *Moulata* showed the minimum grains panicle<sup>-1</sup> (98.87) while similar age's seedlings of *Dudkalam* also produced statistically identical lower total grains panicle<sup>-1</sup> (99.86). Subedi (2013) studied that younger seedlings produced significantly higher filled grains per panicle than older seedlings.

**1000-grain weight:** A significant variation was found due to the interaction effect between varieties and seedling age (Table 2) where the highest weight of 1000-grain (27.88 g) was found in 45 days ages seedling of *Dudkalam* followed by 30 days ages seedlings of similar variety (27.41 g) while it was lowest (26.12 g) in 60 days ages seedlings of *Moulata*. Similar result also reported Rahimpour *et al.* (2013).

**Grain yield:** Interaction effect between varieties and seedling age was significantly influenced on grain yield where grain yield varied from 3.410 to 3.890 t ha<sup>-1</sup> (Table 2). Among the interaction treatments, grain yield had higher in 45 days ages seedlings of *Dudkalam* (3.890 t ha<sup>-1</sup>) followed by 30 days ages seedling of similar variety (3.783 t ha<sup>-1</sup>). On the other hand, grain yield had lower in 60 days ages seedlings of *Moulata* (3.410 t ha<sup>-1</sup>). Adhikari *et al.* (2013) also found that older seedlings produced higher grain yield than younger plant and more older are gradually decreased yield.

**Straw yield:** Among the interaction effect between seedling age and varieties (Table 2), 45 days old seedlings of *Dudkalam* registered the higher straw yield (6.257 t ha<sup>-1</sup>) followed by the similar ages seedlings of *Moulata* (6.127 t ha<sup>-1</sup>) while straw yield had lowest (5.563 t ha<sup>-1</sup>) in 60 days old seedlings of *Moulata*. Faruk *et al.* (2009) evaluate the seedling age at transplanting of older seedling produced higher straw yield and younger seedling produced lower and more older are gradually decreased yield.

From the above outcome (growth, yield and yield components) it could be make sure that the variety *Dudkalam* exposed the superior performance to *Moulata* while seedlings age of 45 days also carry out better among the whole studied attributes. So, it could be come to an end that the variety *Dudkalam* would be most productive variety than *Moulata* and seedlings age of 45 days would be utmost convenient for obtaining the greater production under the studied region.

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