

Performance of different timber seedling in agro-ecologically different areas in Bangladesh

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Abstract: A study on seedling growth of three important timber trees viz. *sissoo* (*Dalbergia sissoo*), *arjun* (*Terminalia arjuna*) and *bokain* (*Melia sempervirens*) in three agro ecologically different area was carried out during 2003. Three agro-ecologically different areas are namely Mymensingh (Old Brahmaputra Floodplain, AEZ 09), Bagerhat (Low Ganges River Floodplain, AEZ 12) and Pirojpur district (Ganges Tidal Floodplain, AEZ 13). The aim of the experiment was to investigate the growth behavior of selected timber seedling in different area of Bangladesh and find out the best side (district) where the specific timber seedling grows well. Data collection was started on 20 June, 2003 and completed on 20 July, 2003. Data on height, base diameter, fresh weight and dry weight was taken. Soil and climate of different region influenced the growth of seedlings significantly. The three timber species viz. *sissoo* (*Dalbergia sissoo*), *arjun* (*Terminalia arjuna*), *bokain* (*Melia sempervirens*) seedling showed highest growth performance in Mymensingh district and the medium performance in Pirojpur district. The Seedling of Bagerhat district showed poor growth performance than Mymensingh and Pirojpur district.

Key words: Timber seedlings, Growth, Region.

Introduction

Bangladesh is one of the least developed country in the world having an area of 147570 sq.km with extremely limited resource based. The total forest area stands at 17.8% of the total area of the country. But actual tree cover area represent only 7.6% of the total land which are decreasing at an alarming rate due to severe deforestation of traditional forest. As a result the crisis of timber, fuel wood and other forest product are increased day by day remarkably. The present wood demand of Bangladesh is about 13.2 million cubic meters which occupies 62% for fuel wood, 34% is for log and the remaining is for poles, pulpwood and others (Haque, 1994). To tackle this critical situation we should undertake participatory forestry, agroforestry, farm forestry, small scale private plantation and other forestation program. To make success of these forestation programs, it is essential to produce abundant number of timber seedling with sustainability in different agro ecological region having knowledge on its growth performance. For tree plantation, growth is expressed as a function of age, stand density, site quality, species mixture and management regimes (Malik, 1992). Stand density, stand age, site quality, genetic variation and management regimes are the main factors which affect the growth of trees (Leak 1970; Kozlowski 1971; Khan, 1972). Besides this water quality, moisture, rainfall, sunshine, temperature, and adaptability are also important for the growth of tree. The amounts of these elements are not same in different agro- ecological zone. So the growth of seedlings might be found different in various agro-ecological zone of the country. In view of this fact, the present study has been undertaken to investigate the growth behavior of important timber seedling in different studied area in Bangladesh and find out the best site (district) where specific important timber seedlings grow well.

Materials and Methods

The experiment was conducted at nine nurseries comprising three from each of Trishal upazilla in

Mymensingh district, Morrelgonj upazilla in Bagerhat district and Sarupkathi upazilla in Pirojpur district. The sites were selected on the basis of the availability of nursery. In each nursery of each district, three species of different ages (three months, eight months and twelve months) timber seedlings namely *sissoo* (*Dalbergia sissoo*), *arjun* (*Terminalia arjuna*), *bokain* (*Melia sempervirens*) were selected by random sampling. Data on height, base diameter, fresh weight and dry weight was taken for each selected species. Height and base diameter was measured from standing seedlings in nursery. Then seedling species of different ages were collected from each selected nursery of the respective upazilla and taken fresh weight by balance. The collected samples were dried in sun light over a period of one month and dry weight was taken in the laboratory of Agroforestry Department, Bangladesh Agricultural University, Mymensingh. The time of sowing and age of seedling was recorded from respective nursery owner. Data were collected from 20 June, 2003 to 20 July, 2003. Data on various growth parameters under the study were analyzed statistically by using MSTATC program. The mean differences were evaluated by least significant difference test (LSD). The physical properties of soil of three districts were different. The soil of Mymensingh district except some minor areas of hill in the northern border is formed with recent and sub-recent alluvial sediments. The soil of Trisal upazilla belongs to Mymensingh was same. The soil of Bagerhat district was mainly non calcareous clay, but the working upazilla, Morrelgonj under the same district was highly saline tidal clay. The soil of northern part of the Pirojpur district was non saline, tidal silty clay while the soil of southern part was poorly drained, tidal clay of the old Lower Meghna Tidal Floodplain. The soil of Sarupkathi, the representative upazilla of Pirojpur was non saline, tidal and silty clay. The chemical properties of soil of the three selected sites are given below.

Table 1. The soil properties of three districts

District	pH	Organic matter (%)	N (%)	P (ppm)	K (ppm)	S (ppm)
Mymensingh	5.54	2.31	0.115	24.0	194	20
Bagerhat	7.98	0.95	0.048	2.0	226	18
Pirojpur	7.76	1.25	0.063	17.0	80	15

Results and Discussion

Sissoo (*Dalbergia sissoo*): The growth of different aged *sissoo* (*Dalbergia sissoo*) seedlings were significantly influenced by the region described in below

Height

Three, eight and twelve months aged seedling height found highest in Mymensingh region which were 71 cm, 105 cm and 180.30 cm respectively followed by Pirojpur region which were 67 cm, 94 cm and 175 cm. The three, eight and twelve month aged *sissoo* seedling gave lowest height in Bagerhat region which were 62 cm, 78 cm and 154 cm respectively (Fig. 1).

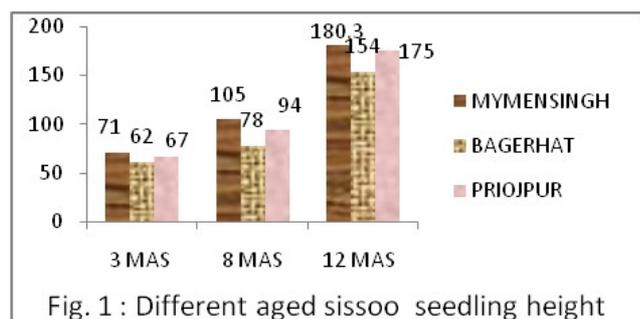


Fig. 1 : Different aged *sissoo* seedling height

Base diameter: Three month aged seedling showed higher (1.64 cm) base diameter in Mymensingh region and statistically similar diameter (1.42 cm) was recorded from Pirojpur region. The lowest base diameter (1.00 cm) was observed in Bagerhat region. Eight and twelve month aged seedling gave the highest diameter in Mymensingh region which were 5.41 cm and 6.60 cm respectively, statistically similar result was observed in Pirojpur district and these were 4.6 cm and 6.30 cm. Eight and twelve months aged seedling gave the lowest base diameter in Bagerhat region which were 4.0 cm and 4.70 cm respectively (Table 2).

Fresh weight: The highest fresh weight (19.50g) of three month aged seedling was recorded in Mymensingh region followed by Pirojpur region (15.33 g) and the lowest fresh weight (12.00 g) was observed in Bagerhat region. Eight months aged seedling gave the highest (73.00g) fresh weight in Mymensingh region, second highest weight (58.30 g) was found from Pirojpur region and the lowest fresh weight (39.00 g) found in Bagerhat region. The twelve month aged seedling gave highest fresh weight (139.00 g) in Mymensingh region followed by Pirojpur region (114.00 g) and the lowest weight (94.00 g) was found in Bagerhat region (Table 2).

Table 2. Growth performance of different aged *sissoo* seedlings in different region

Region	Base diameter (cm)			Fresh weight (g)			Dry weight (g)		
	3 MAS	8 MAS	12 MAS	3 MAS	8 MAS	12 MAS	3 MAS	8 MAS	12 MAS
Mymensingh	1.64	5.41	6.60	19.50	73.00	139.00	6.68	21.00	42.00
Bagerhat	1.00	4.00	4.70	12.00	39.00	94.00	4.26	11.00	32.00
Pirojpur	1.42	4.60	6.30	15.33	58.30	114.00	6.58	14.00	35.00
CV (%)	12.63	9.69	6.60	6.21	2.34	3.27	8.77	9.69	7.28
LSD (0.05)	0.38	1.02	0.87	2.18	3.00	8.58	1.16	3.46	5.99

MAS=Month Aged Seedling

Dry weight: The dry weight of three months aged seedling found highest (6.68 g) in Mymensingh region which was statistically similar in Pirojpur region (6.58 g) and the lowest dry weight (4.26 g) recorded from Bagerhat region. Eight months aged seedling gave the highest dry weight (21.00 g) in Mymensingh region followed by Pirojpur (14.00 g) and Bagerhat (11.00 g). The dry weight of twelve months aged seedling found highest (42.00 g) in Mymensingh region followed by Pirojpur region (35.00 g) which was statistically similar of Bagerhat region (32.00 g) (Table 2). From the above results, it reflected that all the growth parameters showed the best performance in Mymensingh region. It might be due to the favourable soil and climatic condition of Mymensingh region for growth of *Sissoo* seedlings. But the growth of *sissoo* seedlings showed the poorest performance in Bagerhat region for its high soil salinity and saline water which hampered the growth of *sissoo* seedlings. Nath *et al* (1991) mentioned that *Dalbergia sissoo* showed slow growth performance in the coastal area of West Bengal of India. The results are in the conformation with the findings obtained by the experiment. Vimla and Tyag (1993) reported that *Dalbergia sissoo* can grow fast on well drained and alluvial soil of pH range 5.5 to 7.5.

Arjun (*Terminalia arjuna*): The growth of different aged *arjun* (*Terminalia arjuna*) seedlings were significantly influenced by the region described in below:

Height: The three months aged *arjun* seedling showed statistically similar height in Mymensingh, Bagerhat and Pirojpur region which were 63.90 cm, 60.33 cm and 56.00 cm (Fig. 2) respectively but the eight months aged seedling gave highest (100.00 cm) height in Mymensingh region followed by Bagerhat region (89.00 cm). The twelve months aged seedling gave the highest height (168.8 cm) in Mymensingh region and the lowest height (140.0 cm) found in Bagerhat region which was statistically similar of Pirojpur region (148.30 cm)

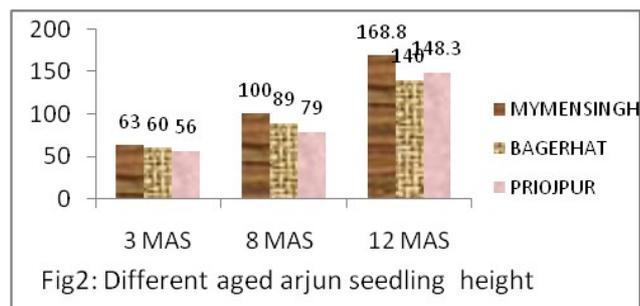


Fig. 2: Different aged *arjun* seedling height

Base diameter: The base diameter of three months aged seedling observed statistically similar in Mymensingh,

Bagerhat and Pirojpur region and it were 2.25 cm, 1.83cm and 2.25 cm (Table 3) respectively but the eight month aged seedling showed highest base diameter (4.41 cm) in Pirojpur region statistically similar result (4.02 cm) was found in Mymensingh region and the lowest base diameter (3.00 cm) was found in Bagerhat region.

Fresh weight: The fresh weight of three months aged arjun seedling found highest (35.50 g) in Mymensingh region and the lowest fresh weight (19.33 g) was observed

in Bagerhat region (Table 3). Eight month aged seedling gave the highest fresh weight (142.00 g) in Mymensingh region followed by Pirojpur region (114.30 g) and the lowest fresh weight (101.00 g) was found from the seedling of Bagerhat region. The fresh weight of twelve months aged arjun seedling found highest (204.00 g) in Mymensingh region and lowest (142.00 g) in Bagerhat region which was statistically similar of Pirojpur region (149.00 g).

Table 3. Growth performance of different aged arjun seedlings in different region

Region	Diameter (cm)			Fresh weight (g)			Dry weight (g)		
	3 MAS	8 MAS	12 MAS	3 MAS	8 MAS	12 MAS	3 MAS	8 MSA	12 MAS
Mymensingh	2.25	4.02	4.83	35.50	142.00	204.00	8.19	40.00	66.66
Bagerhat	1.83	3.00	3.38	19.33	101.00	142.00	6.23	32.33	46.00
Pirojpur	2.25	4.41	4.75	21.50	114.30	149.00	8.59	36.00	58.33
CV (%)	17.61	13.74	9.46	5.82	3.13	3.07	8.25	5.50	8.18
LSD (0.05)	0.84	1.18	0.92	3.35	8.43	11.51	1.43	4.50	10.57

MAS=Month Aged Seedling

Dry weight: Dry weight of three months aged arjun seedling found highest (8.19 g) in Pirojpur region and statistically similar dry weight (8.59 g) was obtained from the seedling of Mymensingh region and the lowest (6.23 g) was recorded in Bagerhat region (Table 3). Eight months aged seedling gave the highest dry weight (40.00 g) in Mymensingh region followed by Pirojpur region (36.00 g) and the lowest weight (32.33 g) was observed in Bagerhat region. Dry weight of twelve months aged seedling found highest (66.66 g) in Mymensingh region followed by Pirojpur region which was 58.33 g and the lowest weight (46.00 g) was found in Bagerhat region.

From the above result it raveled that the arjun seedling gave better growth in Mymensingh region than seedling of Pirojpur and Bagerhat region but the seedling of Bagerhat region showed the poorest performance among the three regions.

Bokain (*Melia sempervirens*): The growth of different aged Bokain (*Melia sempervirens*) seedlings was significantly influenced by the region described in bellow

Height: The three months aged bokain seedling height was found highest (62.30cm) in Mymensingh region followed by Pirojpur and Bagerhat region which were 37.33 cm and 35.33 cm respectively (Fig 3).

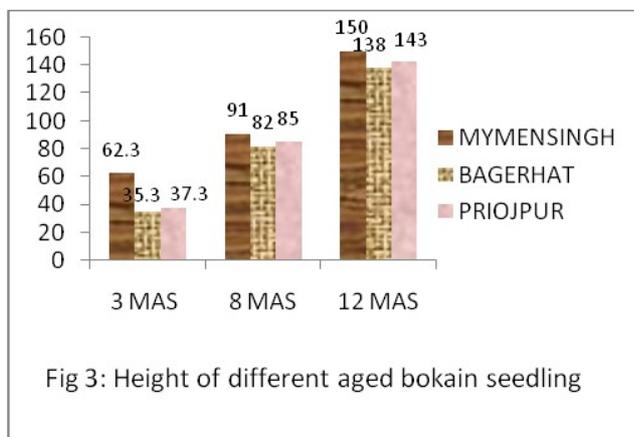


Fig 3: Height of different aged bokain seedling

The height of eight month aged seedling found highest (91.00 cm) in Mymensingh region and the second height (85.00 cm) was observed in Pirojpur region and the lowest height (82.00 cm) was found in Bagerhat region. Twelve month aged seedling height found highest (150.00 cm) in Mymensingh region followed by Pirojpur region (143.00 cm) and the lowest (138.00 cm) height was found from the seedling of Bagerhat region.

Base diameter: The base diameter of three months aged seedling found similar in Mymensingh, Bagerhat and Pirojpur region which were 2.25 cm, 1.70 cm and 1.75 cm respectively. Base diameter of eight month aged seedling found highest (2.75 cm) in Mymensingh region and it was statistically similar of the seedling of Pirojpur region (2.60 cm) and the lowest diameter (2.00 cm) was recorded from Bagerhat region (Table 4). The diameter of twelve months aged diameter found similar in Mymensingh, Bagerhat and Pirojpur region which were 4.41cm, 3.56cm and 4.33cm respectively.

Fresh weight: The fresh weight of three months aged seedling found highest (15.66 g) in Mymensingh region and identically similar weight (15.33 g) was recorded in Pirojpur region and the lowest weight (12.33 g) was found in Bagerhat region. The eight months aged seedling weight recorded highest (27.93 g) in Mymensingh region followed by Pirojpur and Bagerhat region which were 20.66 g and 17.27 g respectively. The twelve months aged seedling's fresh weight found identically similar in three regions (Table 4).

Dry weight: The dry weight of three months aged seedling found similar in Mymensingh, Bagerhat and Pirojpur region which were 5.00 g, 4.70 g and 5.00 g respectively. The dry weight of eight month aged seedling found highest (8.33 g) in Mymensingh region followed by Bagerhat region (7.50) and the lowest (6.66 g) was recorded from Pirojpur region. Twelve months aged seedling dry weight observed highest (16.00 g) in Pirojpur region, statistically similar result was recorded from Mymensingh region (14.66 g) and the lowest dry weight (8.16 g) was recorded from Bagerhat region (Table 4).

From the above result it was cleared that different aged bokain seedling showed best growth in Mymensingh region and lower growth found in Bagerhat region. The seedling of Pirojpur region showed lower growth than Mymensingh region but it was better than the seedling

growth of Bagerhat region. The growth rate of bokain seedlings depend on the quality of soil where it is grown and it is fairly increase up to 5 years then slow down (Ahmed and Puzari,1991).

Table 4. Growth performance of different aged bokain seedlings in different region

Region	Diameter (cm)			Fresh weight (g)			Dry weight (g)		
	3 MAS	8 MAS	12 MAS	3 MAS	8 MAS	12 MAS	3 MAS	8 MAS	12 MAS
Mymensingh	2.25	2.75	4.41	15.66	27.93	31.66	5.00	8.33	14.66
Bagerhat	1.70	2.00	3.56	12.33	17.27	30.00	4.70	7.50	8.16
Pirojpur	1.75	2.60	4.33	15.33	20.66	33.00	5.00	6.66	16.00
CV (%)	15.61	6.87	12.07	6.10	7.87	10.07	13.84	7.94	7.93
LSD (0.05)	0.67	0.37	1.12	1.98	3.91	7.45	1.53	1.34	2.32

MAS=Month Aged Seedling

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