Print : ISSN 0970-7662
Online : ISSN 2455-7129

Journal of Tree Sciences
online available at www.ists.in

Volume 36 No. 2 December, 2017

Growth Evaluation of Long Internode Bamboo Species in South Gujarat

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DOI: 10.5958/2455-7129.2017.00022.X

ABSTRACT

The present investigation was carried out at Bambusetum in Single Khanch, Ukai, District Tapi, Gujarat in the year of 2014-15. Five different bamboo species *viz*., T_1: *Bambusa polymorpha,* T_2: *Schizostachyum pergracile*, T_3: *Melocanna bambusoides*, T_4: *Bambusa jantiana* and T_5: *Schizostachyum dullooa* of seven year age were selected to evaluate the growth of some long internode species. The results revealed that the maximum culm diameter (5.45 cm), culm height (11.40 m), internodal length (86.25 cm), clump height (11.83 m), fresh and dry weight of leaves and branches (1.94 and 0.79 kg, respectively), fresh and dry weight of culm without leaves and branches (9.76 and 3.91 kg, respectively) and fresh and dry weight of total culms (11.70 and 4.70 kg, respectively) were found in *Bambusa polymorpha*. Whereas, highest culm/clump (105) and maximum clump girth (10.80 m) was found in *Schizostachyum dullooa* and *Melocanna bambusoides*, respectively. It can be concluded that the *Bambusa polymorpha*shown faster growth than other long internode bamboo species and hence can be suggested for the large scale plantation for kite industry as well as mitigation of atmospheric carbon.

Key Words:

Bamboo, Carbon, Growth, Long Internode.

INTRODUCTION

Bamboo's fast growth is one of its many attributes which make it a useful resource for mankind. Due to its multiple use and benefits, it is also known as green gold. The demand of bamboo is increasing day by day. It is also commonly seen as an indication of a high ability to capture and sequester atmospheric carbon and consequently mitigate climate change.

In Gujarat, two species viz., *Bambusa arundinacea* (katas or thorny bamboo) and *Dendrocalamus strictus* (manvel or solid bamboo) are commonly found in the dry deciduous and moist deciduous forests over a large part of the state. Gujarat is famous for kite festival and due to kite festival there is huge demand of long internode Bamboo by kite industries, which they are importing from other states. Keeping the demand of long sticks for kite

the present study was conducted to evaluate growth of different long internode bamboo species in South Gujarat.

MATERIAL AND METHODS

The investigation was carried out at at Bambusetum in Single Khanch, Ukai, Dist. Tapi, Gujarat. The climate of Singalkhanch (ukai) is tropical characterized by fairly hot weather, moderately cold winter with humid and warm monsoon coupled with moderately heavy rainfall. Most of the precipitation received from the South-West monsoon during July and August. The average annual rainfall was 1055 mm.

Bambusetum with 28 species was established in the year 2005 at Singalkhanch (ukai), Rajpipla by State Forest Department. Out of these five long internode species were selected for the present study. Each bamboo species treated as a different treatment hence it consisted of five treatments *viz*., T_1: *Bambusa polymorpha*, T_2: *Schizostachym pergeasile*, T_3: *Melocanna bambusoides*, T_4: *Bambusa jantiana* and T_5: *Schizostachyum dullooa* with three replications. Seven year old bamboo clumps of different species were selected. In each clump, three year culms were selected to evaluate the growth performance of long internode species.

Culm diameter was measured at breast height (1.37 m from the ground level) up to nearest center meter (cm) with the help of digital vernier caliper. Culm height was measured from ground level to the tip of the culm with the help of (measuring tape), Internodal length (cm) was measured with the help of wooden scale, Number of culms/clump was recorded by counting of total number of culms available in clump, Clump girth was measured at breast height with the help of measuring tape, Clump height of tallest plant was measured from ground level to the tip of the clump with the help of Ravi Altimeter, Fresh weight of leaves and branches was taken with the help of digital weighing balance and its average was obtained. Dry weight of leaves and branches was estimated after determining moisture content. Total fresh and dry weight of culm was derived by summing up of respective weight of leaves, braches and culm and its average was obtained. Dry weight of clump was multiplied by total number of culms per clump and average for each replication was obtained.

RESULT AND DISCUSSION

Growth Parameters

The mean data pertaining to growth parameters of long internode bamboo species are presented in Table 1. It is evident that significantly highest culm diameter, culm height, internodal length and clump height of long internode bamboos were found in the T_1 – *B. polymorpha* (5.45 cm, 11.40 m, 86.25 cm and 11.83 m, respectively). Whereas, culm diameter (3.64 cm) was followed by the T_2: *S. pergracile*,culm height and clump height were followed by T_4: *B. jantiana* (8.24 cm and 8.47 cm, respectively) and internodal length (69.79 cm)was followed by T_5: S*. dullooa*. The significantly maximum number of culm/clump (105) of long internode bamboos were found in the T_5: S*. dullooa*which was at par with T_3: *M. bambusoides* (100.67). The significantly highest clump girth (10.80 m)of long internode bamboos were found in the T_3: *M. bambusoides* which was followed by the T_5: S*. dullooa* and T_4: *B. jantiana* (5.14 m and 4.73 m, respectively). The observations with respect to various growth parameters *viz*., culm diameter, culm height, internodal length and clump height were significantly maximum recorded in the T_1 : *B. polymorpha*, as *B. polymorpha* is thick bamboo species and others are thin bamboo species, while maximum number of culm/clump and clump girth were recorded in the T_5: S*. dullooa* and T_3: *M. bambusoides*, respectively which may be due to thin wall of S*chizostachyum dullooa* which is good clumper and mix sympodial character of *M. bambusoides* which has long neck. The probable reasons for the growth variation might be due to the genetic make-up of the species or due to the

wide range of rainfall, temperature, altitude, soil type in relation to the habitat. These results are closely line with the earlier findings of Annapurna et al. (2015), Tewari et al. (2014), Zhang et al. (2014), Nath and Das (2011), Kumar (2008), Nath et al. (2007), Oli and Kandel (2005), Kumar et al. (2005), Singh and Singh (1999), Kochar et al. (1994), Tienern et al. (1985) and Suri and Chauhan (1984).

Table 1. Mean variations in various growth parameters of long internode bamboo species.

Treatments	1 CD (cm)	2 CH (m)	3 IL (cm)	4 No. C/Cl	5 Cl. G (m)	6 Cl. H (m)
Bambusa polymorpha	5.45	11.40	86.25	35.33	2.98	11.83
Schizostachym pergracile	3.64	7.92	51.94	26.33	3.35	8.33
Melocanna bambusoides	2.98	6.06	32.85	100.67	10.80	6.65
Bambusa jantiana	2.50	8.24	38.35	54.67	4.73	8.47
Schizostachyum dullooa	2.47	7.41	69.79	105.00	5.14	7.63
S. EM $\pm$	0.243	0.570	1.789	3.116	0.409	0.590
C.D. @ 5 %	0.80	1.88	5.93	10.32	1.35	1.95
C.V.%	12.36	12.02	5.55	8.38	13.13	11.90

1: Culm Diameter; 2: Culm Height; 3. Internodal Length; 4: number of Culm/Clump; 5: Clump Girth; 6: Clump Height.

Biomass Parameters

The mean data regarding to biomass parameter are presented in Table 2 which showed that significantly maximum fresh weight and dry weight of different components in T_1: *B. polymorpha* (1.94 kg, 0.79 kg, 9.76 kg, 3.91 kg, 11.70 kg and 4.70 kg, respectively.) which was followed by the T_2: *S. pergracile* (1.28 kg, 0.52 kg, 2.59 kg, 1.06 kg, 3.87 kg and 1.58 kg, respectively). The data pertaining to the various biomass parameters were found maximum with respect to fresh weight of leaves and branches, dry weight of leaves and branches, fresh weight of culm without leaves and branches, dry weight of culm without leaves and branches, fresh weight of total culm and dry weight of total culm were recorded in the T_1: *B. polymorpha* which was overall followed by T_2: *S.pergracile*. As *B. polymorpha* is thick bamboo species and others are thin bamboo species. The reason behind the variation might due to the positive relation and adaptability of the species with the rainfall, temperature, altitude, soil type in relation to the habitat. Similar results were also reported by Zhang et al. (2014), Kumar (2008), Oli and Kandel (2005), Kumar et al. (2005), Singh and Singh (1999), Kochar et al. (1994), Rao and Nagarjaih (1991) and Tienern et al. (1985).

Table 2. Mean variations in various biomass of long internode bamboo species.

Treatments	7 FW, L & B (kg)	8 DW, L & B (kg)	9 FWC, (kg)	10 DWC, (kg)	11 FWTC (kg)	12 DWTC (kg)
Bambusa polymorpha	1.94	0.79	9.76	3.91	11.70	4.70
Schizostachym pergracile	1.28	0.52	2.59	1.06	3.87	1.58
Melocanna bambusoides	0.68	0.24	0.81	0.31	1.49	0.55
Bambusa jantiana	1.28	0.54	2.54	1.02	3.82	1.56
Schizostachyum dullooa	0.60	0.24	1.22	0.50	1.82	0.74
S. EM $\pm$	0.068	0.030	0.225	0.043	0.213	0.060
C.D. @ 5 %	0.22	0.10	0.74	0.14	0.70	0.20
C.V.%	10.23	11.20	11.51	5.46	8.11	5.73

7: Fresh Weight of Leaves and Branches; 8: Dry Weight of Leaves and Branches; 9: Fresh Weight of Culm; 10: Dry Weight of Culm; 11: Fresh Weight of Total Culm and 12: Dry Weight of Total Culm.

CONCLUSION

Maximum culm diameter, culm height, internodal length, clump height, fresh weight of leaves and branches, dry weight of leaves and branches, fresh weight of culm without leaves and branches, dry weight of culm without leaves and branches, fresh weight of total culm and dry weight of total culm was recorded in *Bambusa polymorpha*. Whereas, number of culm/clump and clump girth was reported in *S. dullooa* and *M. bambusoides*, respectively. However, most of parameters were followed by *S. pergracile*. Hence, it is concluded that the *B. polymorpha* and *S. pergracile* has faster growth than the other long internode bamboo species in South Gujarat condition and are thus suggested for the large scale plantation to support kite industry as well as mitigation of carbon from atmosphere.

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