Propagation and Culm Production of *Bambusa vulgaris* and *Bambusa polymorpha* by Node Cutting

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Abstract

This paper presents information on propagation and culm production of *Bambusa vulgaris* and *B. polymorpha* by node cutting method. Five clumps each of *B. vulgaris* and *B. polymorpha* were selected for the study. One culm from each clump of both the species were collected and segmented into one-node cutting of 30 pieces in three sections (upper, middle and lower) with sharp saw. Then propagules were developed from node cuttings in the soil bed nursery during the rainy season (June-July). Node cutting of only middle portion of the culm produced roots and rhizomes. Sixty six percent node cutting of *B. vulgaris* and sixty percent of *B. polymorpha* of the middle portion produced roots. After having rooted and rhizomed successfully, 10 healthy propagules were planted at a spacing of 3.5 m x 3.5 m in the field for their growth performance. Node cuttings of *B. vulgaris* produced 4.28 culms and those of *B. polymorpha* produced 2.12 culms per clump per year. There is significant difference of culm production at 5% level (t = 3.5678). After five years of the planting, the bamboo attained merchantable size and was harvested from the clumps of both the species. This method with no temperature and moisture control facilities and propagation structure was found suitable for the farmer.

সারসংক্ষেপ

আলোচ্য প্রবন্ধে বাইজ্যা (*Bambusa vulgaris*) এবং বেতুয়া (*B. polymorpha*) প্রজাতির বাঁশের এক পর্ব বিশিষ্ট অঙ্গজ প্রজননের মাধ্যমে বনায়ন ও বাঁশের উৎপাদনের উপর আলোকপাত করা হয়। অঙ্গজ প্রজনন পদ্ধতিতে চারা উত্তোলনের জন্য বাইজ্যা এবং বেতুয়া বাঁশের পাঁচটি করে ঝাড় নির্বাচন করা হয়। উভয় প্রজাতির প্রতিটি ঝাড় হইতে একটি করে বাঁশ সংগ্রহ করে ধারাল করাত দিয়ে তিন অংশ (অগ্র, মধ্য ও গোড়া) থেকে মোট ৩০ টি একপর্ব বিশিষ্ট টুকরা করা হয়। বর্ষার সময়ে (জুন-জুলাই) নার্সারীতে এগুলোর চারা উত্তোলন করা হয়। পরীক্ষায় দেখা যায়, শুধু মাত্র মধ্যবর্তী অংশের পর্বেই শিকড় গজায়। শিকড় গজানোর হার মধ্যবর্তী অংশের বাইজ্যা বাশের জন্য ৬৬% এবং বেতুয়া বাশের জন্য ৬০%। বৃদ্ধির সফলতা পর্যবেক্ষণের জন্য উভয় প্রজাতির ১০ টি করে উত্তোলিত চারা ৩.৫ মিটার দূরত্বে মাঠে লাগানো হয়। দেখা যায়, প্রতি বছর গড়ে বাইজ্যা বাশের ঝাড়ে ৪.২৮ টি এবং বেতুয়া বাশের ঝাড়ে ২.১২ টি করে বাঁশ গজায়। উভয় প্রজাতির গড় বাঁশ উৎপাদনে ৫% লেভেলে তাৎপর্যপূর্ণ পার্থক্য পাওয়া যায় (t = ৩.৫৬৭৮)। উভয় প্রজাতির বাঁশের ঝাড় হইতে ৫ম বৎসরে উৎপাদিত বাঁশ বিক্রয় ও আহরণযোগ্য হয়। অঙ্গজ প্রজনন স্থাপনা, তাপ এবং আদ্রতা নিয়ন্ত্রন ছাড়াই সরাসরি জমিতে এই পদ্ধতির মাধ্যমে চারা উত্তোলন ও বনায়ন কৃষকের জন্য গ্রহণযোগ্য বিবেচিত হয়।

Key words: Bamboo propagation, culm emergence, node cutting, plantation, rooting percentage

Introduction

Bamboo is the most commercially important and fast growing multipurpose plant in Bangladesh. Three years (1992-93 to 1995-96) record of Bangladesh Bureau of Statistics (2002) shows that bamboo production in the forest is gradually declining (1,19,206 thousand to 65,760 thousand). The declining of the standing volume of bamboo in the forest may be the lower rate of the growth than that of rate of assumed for the felling purpose. Moreover, the increasing price also indicates that supply of bamboo from forest and homestead is low. It is due to tremendous demand of manifold use of bamboo in the country. The increasing demand of bamboo could be met up through large-scale plantation in the rural area. *Bambusa vulgaris* Schard. and *B. polymorpha* Munro. are the two most commonly cultivated bamboo species in the rural areas. The offset and rhizome planting is the conventional method of bamboo propagation (Watanabe 1986). For large-scale plantation of bamboos, bulky offset and rhizome (4-30 kg) planting is not economic as the cost of transportation and transplantation is high (Banik 1984). Moreover, Liese (1985) observed a high degree of failure of rhizome planting in some bamboo species. McClure (1966) described different methods of vegetative propagation for various species of bamboos. Therefore, vegetative propagation methods need to be explored for a particular species.

Bamboo generally flowers occasionally and produces seeds. Moreover, supply of seeds is limited because most of the bamboo species flower once in their life and die soon thereafter (Hasan 1973). Both *B. vulgaris* and *B. polymorpha* flowers but they do not produce seeds (Banik 1979, Banik and Alam 1987). Rural people do not have any idea for producing propagules from bamboo seeds.

Propagules from vegetative propagation often require the development of leafy axis and roots. But a bamboo propagule needs three morphological structure *viz.* leafy axis, root and rhizome. Bamboo propagule without any of these morphological structure will not survive in the field (Banik 1980). Earlier workers like White (1947), McClure and Durand (1951), Abeels (1961) and Hasan (1977) successfully propagated bamboo with branch cuttings. To produce of propagules from branch cutting method, rooting media (gravels), propagation structure (sprinkler with mist chamber) and intensive care (in order to maintain control temperature and moisture) are usually required. In rural areas these facilities are not available due to lack of power supply and modern propagation equipment. Moreover, this method is not easy and economic for large-scale plantation of bamboo in rural areas.

The present study was undertaken to assess the success of culm cuttings in the field condition without rooting media (gravels), propagation structure (sprinkler with mist chamber) and intensive care (control of temperature and moisture) to produce bamboo propagules and also to determine the time period required for attaining merchantable culms after plantation.

Materials and methods

The two bamboo species, *Bambusa vulgaris* and *B. polymorpha*, were chosen for the study. From each species five healthy clumps were selected. Two years old culms were selected for the study from each clump. The selected culm was segmented into 30 (10 from top, 10 from middle and 10 from bottom of the culm) one-node cuttings with a sharp saw. They were directly planted in the soil bed (as rooting medium) nursery in the rainy season (June – July). The experimental beds were irrigated whenever necessary. The rooting success of the culm cuttings was recorded. In the month of August the rooted and rhizomed culm nodes were carefully uprooted. Then 10 healthy rooted and rhizomed propagules of each species were planted at a spacing of 3.5 m x 3.5 m in Bambusetum, Bangladesh Forest Research Institute, Chittagong. Data were recorded on culm emergence and their growth.

Results and discussions

The node cuttings only from middle portion of the culm rooted and rhizomed (Table 1). The rooting percentage (in middle portion) in *B. vulgaris*

was 66% and that in *B. polymorpha* was 60%. Node cuttings from apical and basal portion of the culm did not produce root and developed rhizome. The basal portion of these bamboos did not bear any branches, and each branch bud generally was in dormant condition. The diameter of the apical portion of the culm with thin branches gradually decreased narrower. But the middle portion of the culm with healthy branch in each node was uniform in diameter. Prange (1974) also found that culm-cuttings taken from the middle portion of a bamboo rooted well. But he did not maintain the time required for the culm maturity. The average culm production increased in successive years as shown in fig. 1. *Bambusa vulgaris* produced 4.28 culms per clump per year and *Bambusa polymorpha* produced only 2.12 culms per clump per year. The difference in average culm production in both the species are statistically found significant (t=3.5678) at 5% level. Fig. 2 shows the average culm height of *Bambusa vulgaris* and *Bambusa polymorpha*.

The height and diameter of the emerged culm is gradually increased in the successive years in both the species. Up to 3rd year, the average height of *B. vulgaris* was 7.9 m and that of *B. polymorpha* was

Table 1. Number of culm cutting rooted in *Bambusa vulgaris* and *Bambusa polymorpha* in the nursery.

Species	Culm No.	Upper portion		Middle portion		Lower portion	
		Inserted	Rooted	Inserted	Rooted	Inserted	Rooted
Bambusa vulgaris	1	10	0	10	6	10	0
	2	10	0	10	7	10	0
	3	10	0	10	8	10	0
	4	10	0	10	5	10	0
	5	10	0	10	7	10	0
Bambusa polymorpha	1	10	0	10	7	10	0
	2	10	0	10	5	10	0
	3	10	0	10	6	10	0
	4	10	0	10	6	10	0
	5	10	0	10	6	10	0

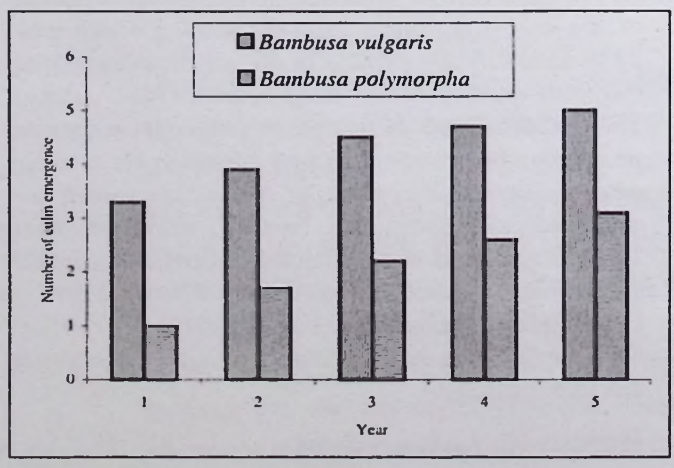

Figure 1. Average number of culm emergence of *Bambusa vulgaris* and *B. polymorpha* in successive years.

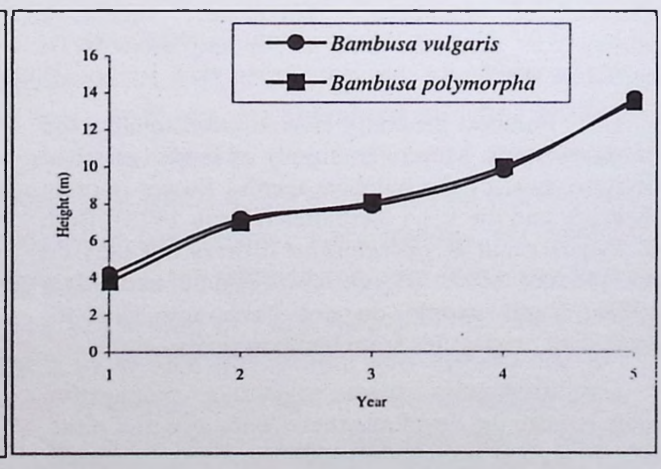

Figure 2. Average culm height of *Bambusa vulgaris* and *Bambusa polymorpha.*

8.1 m, which were not the exploitable size. Due to this reason, the diameters of the culms of both the species were not recorded. But in the 4th and 5th year, the average height became 13.7 m for *B. vulgaris* and 13.5 m for *B. polymorpha* and the average diameter became 6.41 cm for *B. vulgaris* and 7.09 cm for *B. polymorpha* reaching an exploitable size.

Soil as a rooting medium of culm cutting is readily available for the farmers. Without maintaining controlled temperature and moisture these method is suitable for the farmers. In ordinary field condition, farmers can easily apply this technique for raising small-scale village grove bamboo plantation. Bamboo plantation raised from culm cuttings is a very easy method and from the 5th year of the plantation merchantable bamboo could be harvested.

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