



Original Article



Harvesting Techniques: A key to promote management practices of Bamboo

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INTRODUCTION:

Bamboo, an evergreen woody perennial and one of the world's fastest-growing plants, serves as the backbone of the rural people's economy, generating increased interest within farming communities in the modern era (Seethalakshmi et al., 1998). In natural bamboo forests in India, the average yield per hectare typically ranges from 2.5 to 4.0 tonnes/hectare. If the crop is handled correctly, one can anticipate roughly 6-7.5 tonnes/hectare from artificially propagated woods (Sharma 1980). Extensive research into various disciplines involved in bamboo production has led to its management in homesteads and agroforestry. To ensure optimal nutrition for healthy shoots, weak shoots must be trimmed during both the early and late stages of shooting (Maoyi and Banik 1995). Most bamboo species reach their maximal static bending and compression strength, making them ready for harvest after three to four years (Huang et al. 1993; Espiloy 1994; Banik 2015). Bamboo plantations commonly follow a harvesting cycle of 3 to 4 years, leaving a few old culms and all first-year culms, with the harvesting season typically spanning from November to January (Upreti and Sundriyal 2001). Culm harvesting is traditionally conducted during the dry winter season to mitigate borer damage. Investigation on the management of *D. strictus*, which is a close relative of *D. hamiltonii*, revealed that sustainable harvesting depends on felling intensity, cutting methods, and felling cycle. (Darabant et al. 2016a). The two main justifications for Yogyakarta's custom of falling bamboo during the old season are to prevent powder post-attack from insect attacks and to end the bamboo clumps' shooting period (Suthoni 1995).

METHODS OF HARVESTING:

1. Selective cutting

Selective cutting, described as the removal of shoots and culms with a low intensity (25% each), aims to prevent clump congestion and subsequent deterioration caused by the death of shoots near the clump's periphery (Troup 1921; Franklin 2008).

2. Horseshoe harvesting method

The horseshoe cut method (Tewari, 1992) was incorporated as a labour-intensive substitute that requires expertise in the correct spatial arrangement of the culms to be removed. Harvesting schedules appropriate for situation have been developed in India for *D. strictus*. The horseshoe method is extensively utilized in India and Nepal, where the convex arch of the shoe is oriented uphill to prevent dirt accumulation in the arch. With this strategy, new shoots are primarily generated on the horseshoe's outer arch, and clumps are projected to develop uphill (Bradshaw 1997). Using the horseshoe method, 75% intensity was employed to gather both shoots and culms. Horseshoe cutting, by preventing clump congestion, enhances clump vigor, leading to an increase in shoot production (Malab et al., 2006; Franklin 2008).

3. Clear cut method

The clear-cut method is identified as the most readily and safely executable option in unmanaged, dense clumps of *D. halimiltonii* (Nath and Das 2011). The clear-cut treatment involved the removal of 50% of new shoots and all culms older than two years. Culms were taken above the second node, resulting in a stump height of around 10-25 cm (Darabant et al. 2016b). The clear-cut method includes the elimination of dead stumps and culms, collecting culms at the base while preserving two internodes, and harvesting shoots from the inside out.

4. Clear-Felling

In situations where culms are not harvested for a number of years, they tend to grow clogged, making clumps more vulnerable to infections and damage. Clear-felling of culms becomes beneficial for maintaining appropriate clump development and morphology, promoting clump health. Farmers in Uttarakhand (Kalinagar, Dineshpur, and Gadarpur), Bihar (Pusa), and West Bengal (Bankura) occasionally practice clear-felling in dense clumps of *B. bambos*, *B. balcooa*, and *D. strictus*. According to a study conducted in the Shahdol district (Prasad 1987), clearing congested clumps and enabling new shoots to emerge is more helpful than the common method of working the congested clumps.

Challenges Encountered in Forest Bamboo Harvesting

1. Workers often cut more bamboo in easy-to-reach places and from young bamboo plants, ignoring the rules about how much to cut. This happens because they are paid based on how much they cut. They are tempted to collect bamboo from places that are easy to get to, like the sides of streams that always have water. This leads to using up too much bamboo in those easy-to-reach areas, and the bamboo there becomes less healthy and smaller. On the other hand, bamboo on steep slopes or in hard-to-reach parts of the forest is rarely taken, so those areas have too much bamboo that isn't being used, and the bamboo plants there are crowded and not growing well. Bamboos are typically not collected from inaccessible regions due to the mountainous terrain and difficulties in cutting and transportation. As a result, huge parts of northeast India and Myanmar, as well as other forests, have been left unexploited and

underutilized for years. National highways and district roads, particularly narrow roads on hills, should be maintained and developed for better transportation of bamboo resources.

2. Bamboos are frequently cut 1.0-1.5 m above ground level and the upper narrow segment 1.5-2.0 m is chopped off, leaving only the mid-portion. The lower 1.0-1.5 m is heavier and has more biomass, whereas the top half of the culm has longer fiber length, which is desirable for pulp manufacturing. In most cases, these sections are left in the forest (which provides valuable raw materials to pulp and paper mills) and are not harvested. It is believed that around half of the entire length of harvested bamboo remains on the forest floor.
3. When clumps are cultivated on homesteads and farms in communities, old stumps and rhizomes must be removed every two years. Cutting the top parts should be avoided because it makes the culm very fragile and is bad for pulping.

CONCLUSION

harvesting techniques play a pivotal role in promoting sustainable management practices of bamboo, a versatile and renewable resource. These ways are needed to make sure bamboo lasts a long time, keeps nature in balance, and brings a lot of money from using bamboo. When we use good ways to collect bamboo, it helps bamboo be a valuable plant, helping the people who live nearby and making industries like building, furniture, and crafts that use bamboo grow. We need to be careful not to collect more bamboo than can grow naturally, so the environment stays healthy, and we always have bamboo to use.

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