Indian Journal of Ecology (2023) 50(5) (SI): 1716-1718
DOI: https://doi.org/10.55362/IJE/2023/4123

Manuscript Number: 4123
NAAS Rating: 5.79

Productivity of Bamboo under Different Felling Intensities in Northern Transitional Zone, Karnataka

Divya Soman, Raju L. Chavan, T.M. Akhilraj and Arsha Riyaz

Department of Silviculture and Agroforestry, College of Forestry, Sirsi, Uttara Kannada-581401, India
E-mail: devusoman94@gmail.com

***Abstract*:** Bamboo is an extremely versatile plant capable of providing ecological, economic and livelihood security to the people. Less work has systematically been done on productivity of bamboos based on different felling intensities. Four different species of bamboo (*Bambusa balcooa*, *Dendrocalamus stocksii*, *Dendrocalamus asper, Bambusa vulgaris*) were present in the main agricultural research station, Dharwad. Felling is done based on the selection of culms of three-year-old and above by the Horse-shoe felling method, out of the total culms available within the clump. Four intensity felling's planned to carried out (0, 10, 20 and 30 per cent). The felling intensity of 20 per cent resulted in a greater proliferation of shoots across all four bamboo species when compared to the remaining treatments. Among the recorded instances of shoot emergence, the utmost count of shoots emerged was 9, specifically within *B. balcooa* subject to a felling intensity of 20 per cent. The new shoots of both *D. stocksii* and *B. balcooa* emerged not solely along the peripheries of the clumps, but also within the clumps themselves. The emergence of new culms primarily occurs at the onset of the monsoon and varies based on bamboo species, harvesting techniques, climate conditions etc.

***Keywords*:** Bamboo species, Culm emergence, Felling intensities, Productivity

Agroforestry with bamboos has the potential to dramatically improve output, sustainability, and resource protection (Dev et al 2016). Many thorn less bamboo species are appropriate for agroforestry and can survive alongside trees, herbs, and crops in the same ecological area. Bamboos offer several advantages over trees, including rapid growth rate, short rotation, wide adaptability, low maintenance practises, diverse uses, carbon sequestration potential, soil and water conservation. Bamboo is an exceptionally adaptable plant that can provide people with ecological, economic, and livelihood security. Bamboo reaches structural maturity in three years, and the mean annual increment of medium or large sized bamboos is comparable to or greater than that of several other rapidly growing tree species (Banerjee et al 2009). Bamboo thrives in a variety of habitats, including tropical, subtropical, and temperate regions with annual rainfall ranging from 1,200 to 4,000 mm with temperature changes ranging from 16°C to 38°C. Less work has systematically been done so far on productivity of bamboos based on different felling intensities. The implementation of various bamboo culm felling intensities contributes significantly to augmenting the emergence of new bamboo shoots. This phenomenon, in turn, exerts a favourable influence on the production of bamboo shoots. As a result, the proposed bamboo treatments, particularly those incorporating intensive felling processes, hold substantial potential to assist silviculturists, departmental personnel, and managers engaged in bamboo cultivation aimed at future shoot production. Moreover, the stimulation of new shoot growth through felling intensity treatments can effectively enhance the economic prospects of entrepreneurs and farmers, particularly in the context of large-scale bamboo plantations focused on shoot production. This correlation between bamboo species productivity and the emergence of new shoots underscores the significance of the objective of study.

MATERIAL AND METHODS

The investigation of the present study on productivity of bamboo under different felling intensities in Northern Transitional Zone, Karnataka was conducted in an existing Bamboo plantation (Established in November 20, 2017) at UAS, Dharwad, Karnataka during 2021-2022. Four different species of bamboo (*Bambusa balcooa*, *Dendrocalamus stocksii*, *Dendrocalamus asper, Bambusa vulgaris*) were present in the field. 6m x 3m was the spacing adopted between bamboo clumps. The experiment was laid out in two factor Randomized complete block design where, different bamboo species (T) and different intensity felling's (F.I) are treated as two factors with six replications. Felling is done based on the selection of culms of three-year-old and above by the Horse-shoe felling method, out of the total culms available within the clump. New culms are generally formed along the clump's periphery and immature culms (< 3 years

old) are not strong and durable, hence they have limited demand and are particularly susceptible to pests and illnesses. As a result, aged or matured culms (> 3 years old) are harvested whereas less than 3-year-old culms are left in the clump. In horse shoe felling method, a 50-90 cm wide path has to be created inside the clump so that one can enter into the middle part of the clump to start harvesting and dragging out the culms which are three years old and above. Four intensity felling's planned to carried out (0, 10, 20 and 30 per cent). A felling intensity of twenty per cent means 20 per cent of the total mature culms in each clump in the assigned plot were felled. New shoots was observed to determine the frequency of the shoots emerged. The distribution pattern of the shoots emerging within the clump area is also observed.

RESULTS AND DISCUSSION

There was a substantial variance in the number of shoots that emerged across the various treatments. The felling intensity of 20 per cent resulted in a greater proliferation of shoots across all four bamboo species when compared to the control, as well as felling intensities of 10 per cent and 30 per cent (Table 1). Among the recorded instances of shoot sprouting, the utmost count of shoots emerged was 9, specifically within *Bambusa balcooa* subject to a felling intensity of 20 per cent. Conversely, the remaining felling intensities viz., the control, 10 per cent and 30 per cent exhibited comparable results. In the case of *Dendrocalamus stocksii*, a felling intensity of 20 per cent yielded a significantly higher count of shoots (4.00), followed closely by a felling intensity of 10 per cent, which was statistically equivalent to the control (2.67). *Dendrocalamus asper* displayed elevated count of shoots (8.33) at a felling intensity of 20 per cent, whereas the other thinning percentages (0 per cent, 10 per cent, and 30 per cent) demonstrated parallel outcomes. Among interactions, *B. balcooa* with 20 per cent intensity felling resulted in statistically higher culm emergence (9.33 culms). Mohamed et al (2007) observed that 30 per cent felling intensity exhibited a favourable impact on shoot emergence throughout the study period. Nevertheless, 60 per cent felling intensity was comparable to the control. After the initial felling at the planned intensities of 0, 30, and 60 per cent, new shoots of *Gigantochloa ligulata* emerged along clump peripheries and within the clumps.

Among all the examined species, *Bambusa balcooa* (9.33) and *D. asper* (8.33) exhibited higher number of newly sprouted shoots. Newly emerged shoots were higher at a felling intensity of 20 per cent for *Bambusa vulgaris*, surpassing other felling intensities. Among all four felling intensities, *B. balcooa* exhibited significantly greater newly sprouted shoots. The emergence of new culms primarily occurs at the onset of the monsoon season, typically in May or June, and extends over 4 to 5 months until October or November. Shoots sprouting at the start of the growing season (March-April) are limited. Subsequently, a rapid increase is observed during June to July, followed by a gradual decline in the subsequent months. It's advised not to harvest culms from bamboo clumps during the culm sprouting period (May to November).

The number of new culms arising from a bamboo clump varies based on bamboo species, harvesting techniques, soil and climate conditions, clump size, overhead coverage, etc. The timing and distribution of monsoon rains significantly impact new culm emergence; timely and even rainfall fosters positive outcomes, while untimely rains or breaks after showers hinder culm emergence. The availability of reserve nutrients also plays a pivotal role in influencing bamboo culm and rhizome emergence. The highest reserve starch levels in one-year-old culms are just before sprouting, decreasing during sprout growth and then increasing after growth completion. The Figures 1 to 4 depict the original clumps,

Table 1. Influence of different felling intensities on new bamboo shoot emergence in different thorn less bamboo species

Treatment	New shoot emergence as influenced by different felling intensities				
	0% (Control)	10%	20%	30%	Mean
Bambusa balcooa (T1)	5.67	6.00	9.33	6.00	6.75
Dendrocalamus stocksii (T2)	2.67	3.33	4.00	2.33	3.08
Dendrocalamus asper (T3)	6.00	6.00	8.33	6.00	6.58
Bambusa vulgaris (T4)	2.67	3.00	4.33	3.00	3.25
Mean	4.25	4.58	6.50	4.33	
For comparing the means of				CD (p=0.05)	
Treatments (T)				0.50	
Felling intensity (F.I)				0.50	
Interaction (T X F.I)				0.99	

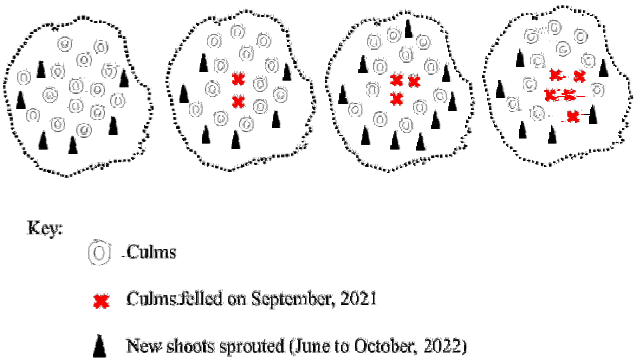

Fig. 1. Dispersion map of *Bambusa balcooa* showing pattern of new shoot recruitments under different felling intensities

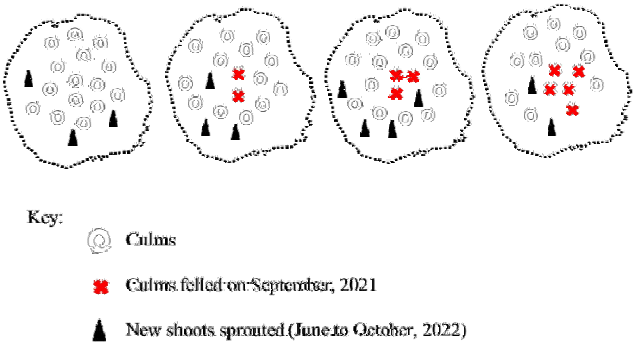

Fig. 2. Dispersion map of *D. stocksii* showing pattern of new shoot recruitments under different felling intensities

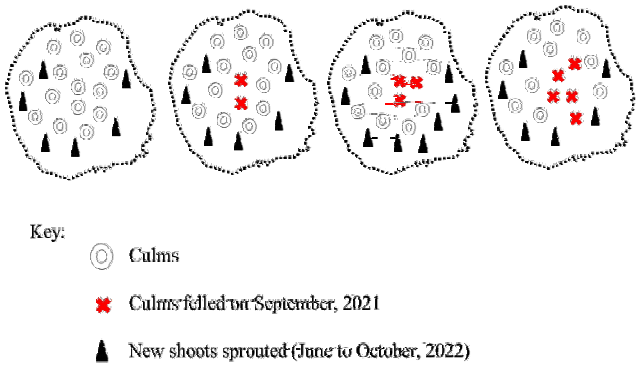

Fig. 3. Dispersion map of *D. asper* showing pattern of new shoot recruitments under different felling intensities

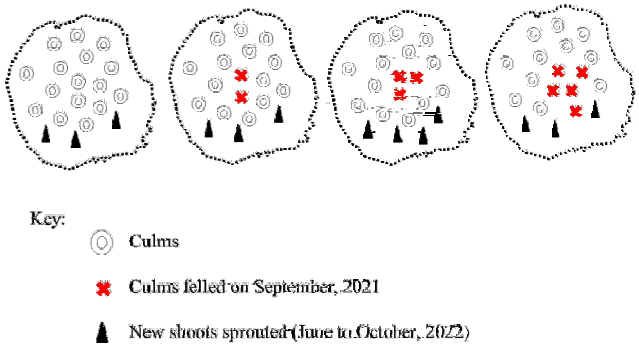

Fig. 4. Dispersion map of *B. vulgaris* showing pattern of new shoot recruitments under different felling intensities

illustrating the distribution of all initial available culms prior to felling. These figures also showcase the quantities of culms felled corresponding to different felling intensities, along with the subsequent emergence of new shoots in the following year. The new shoots of both *Dendrocalamus stocksii* and *Bambusa balcooa* emerged not solely along the peripheries of the clumps, but also within the clumps themselves. Conversely, the remaining two bamboo clumps displayed newly emerged shoots exclusively along their peripheries.

CONCLUSION

The highest count of newly sprouted culms was observed at a felling intensity of 20 per cent. The other three felling intensities, viz., 0 per cent (control), 10 per cent and 30 per cent, exhibited on par values for all the species of bamboo. In case of *Dendrocalamus stocksii* and *B. balcooa*, the newly sprouted culms appeared not only around the periphery of the clumps but also within them. However, for the other two bamboo species, newly emerged culms were exclusively present along the periphery of the clumps.

Received 29 August, 2023; Accepted 04 November, 2023

REFERENCES

Banerjee H, Dhara PK and Mazumdar D 2009. Bamboo (*Bambusa* spp.) based agroforestry systems under rainfed upland ecosystem. *Journal of Crop and Weed* **5**(1): 286-290.

Dev I, Ahlawat SP, Palsaniya DR, Ram A, Newaj R, Tewari RK and Yadav RS 2016. A sustainable livelihood option for farmers' of semi-arid region: Bamboo+ Chickpea based Agroforestry model. *Indian Journal of Agroforestry* **18** (1): 84-89.

Mohamed AH, Hall JB, Sulaiman O, Wahab R and Rashidah WAW 2007. Quality management of the bamboo resource and its contribution to environmental conservation in Malaysia. *Management of Environmental Quality: An International Journal* **18**(6): 643-656.