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Bamboo *(Bambusa bambos)* resource development in home gardens in Kerala State in India: need for scientific clump management and harvesting techniques

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Abstract—*Bambusa bambos*, the thorny bamboo, is the most common species found in the home gardens in Kerala. A sample survey was conducted to evaluate the current management and harvesting practices of bamboo clumps in home gardens. The survey revealed that most of the clumps were poorly managed and inappropriately harvested. This was due to the ignorance of the farmers on scientific clump management and harvesting techniques. Regeneration was adversely affected in the inappropriately harvested clumps and resulted in the depletion of the resource. Where clumps were well managed and scientifically harvested with a felling cycle of 6 to 8 years, culm production was higher, poles were longer and output was larger. Due to the higher proportion of high graded long poles, well-managed clumps fetched higher price and enhanced farm income. Poor clump management implies that there is considerable opportunity to develop the resource without incurring additional cost. For this, a package of scientific clump management and harvesting techniques is suggested.

Key words: *Bambusa bambos*; home gardens; clump management; harvesting techniques; resource development.

INTRODUCTION

Forests and home gardens are the sources of bamboo supply in Kerala State in India. When forest bamboo is exclusively utilised by the pulp industry within the State, bamboo from home gardens goes for industrial and non-industrial uses within and outside Kerala [1]. The thorny bamboo (*Bambusa bambos*) is the most commonly found species and commercially important bamboo available in the home gardens [2]. Although bamboo from home gardens is used in the household sector itself, most is being traded as poles through the wholesale bamboo depots located

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in Palakkad District in the State [3]. During the last four decades, about 85% of the annual quantity traded through the depots has been moving out of the State where the major use is as banana props. An important substitute of bamboo poles is *Casuarina* poles, which are increasingly available outside the State. However, *B. bambos* poles are preferred to *Casuarina* poles. Higher strength and durability are the reasons reported by the traders for such preference. The demand for poles over decades clearly indicates the prominence of the bamboo from Kerala home gardens [3].

Prior to the last two decades, bamboo was abundantly available in the home gardens in Palakkad District and the traders had been depending on bamboo only from there. Later, they started collection from home gardens in the neighbouring districts of Thrissur, as well as Malappuram and recently even from far away districts, like Kannur and Kasaragod [4]. Dependence for bamboo from far away places indicates its scarcity in Palakkad, Thrissur and Malappuram Districts. It was reported by traders in a census survey of bamboo depots during 2003 that the current supply was insufficient to meet the increasing demand from both within and outside the State. The resource depletion in home gardens has also been reported by many farmers [4]. The increasing trend in the prices of bamboo poles [3] is also an indication of the resource scarcity [5]. In this context it is essential to improve the growing stock in home gardens for ensuring sustainable availability. No study has been reported on the management aspects of any bamboo species in home gardens [6, 7]. In this paper, the current management and harvesting practices of bamboo clumps in home gardens were evaluated. Further, growth performance in well managed and poorly managed clumps was compared and thereby a package of practices for developing the resource has been suggested.

METHODOLOGY

This study was based on the data collected through a statistically designed survey of bamboo-harvesting home gardens in Kerala. The sampling plan adopted was a two-stage random sampling design. There were localities where clumps were proposed to be harvested. Such localities were treated as the first-stage units of sampling. From the list of localities prepared based on the information provided by the traders, 30 localities were randomly selected. The clumps proposed to be harvested within a locality were treated as the second-stage units of sampling. By visiting the farmers in the selected locality, details on last harvesting and level of clump management were collected. Based on the level of management, the clumps were then classified into any one of the following categories: well managed and poorly managed. Well-managed clumps were those which were harvested 6 to 8 years before, the then 1-year-old culms were retained at the time of harvest, culms were cut at above the first internode and thorns were pruned every year since the last harvest. Poorly-managed clumps were those which were unattended for 20 to 25 years, not harvested before and thorns were not at all removed from the clumps.

Those clumps whose level of management was ambiguous were not considered. Two clumps each from the two categories were randomly selected. At the time of harvesting, data on number of culms by diameter classes were recorded when each culm was felled and removed from the clump. Length of each pole cut from the bottom, middle and top portions of the culms were measured. For calculating the clump weight, poles (mature, straight and green pieces of 3 m and above) and residue (bent, split, deformed, as well as dry culms and pieces below 3 m) were separated and weighed at the harvesting site. Current harvesting practices were assessed in the selected locality. Clumps harvested earlier were also visited and examined the status of regeneration and growth. Farmers were also contacted to know the nature of clump management, harvesting practices prevailed, attitude towards growing bamboo and their knowledge on markets for bamboo.

RESULTS AND DISCUSSION

The survey revealed that bamboo clumps in home gardens were not generally considered as a crop by most of the farmers who were unaware of the management and harvesting practices of clumps. Most of the clumps were poorly managed (83% of the total surveyed), except in a few home gardens with enterprising farmers. No inputs or expenditures were incurred for growing bamboo. Clumps were left unattended for years, so that culms became twisted or wrapped in thorny branches and, thus, were very difficult to harvest. Many culms were found dry or decayed in older clumps. Congestion would not have been occurred if the clumps were managed in the beginning. Most of the clumps were clear felled by the traders and culms were cut at the same level of the ground so as to get maximum length for the poles. Clear felling will result in its degeneration into a bushy form, resulting in a gap of 5–6 years to produce extractable culms [8], depressed the rate of recovery of culms and adversely affected regeneration. It was also observed that retaining youngest culms or new shoots were not insisted by the farmers. If all the culms and new shoots are removed, more years are necessary to obtain full sized culms. When old culms are left standing and evenly distributed, full-sized culms will appear. In some cases, only the new shoots were retained considering the request of the farmers. This practice increased the risk of damage of new culms and reduced the capacity of regeneration as well as overall clump vigour. While harvesting, retaining young, as well as new culms helps to increase the capacity of regeneration and the new culms will have the same or more girth than the existing ones. Farmer's ignorance on scientific clump management and harvesting techniques was found to be the important reason of poor management.

Labour required for harvesting culms in poorly-managed older clumps was more than that in well-managed clumps (Table 1). This is an indication of the extent of congestion in the clump and, thus, the difficulties in harvesting of very old clumps. The mean annual culm production was 5.4 over a time span of 6–8 years in well-managed clumps and 2.8 over a time span of 20–25 years in poorly-managed older

Table 1.
Mean labour used for harvest and mean number of culms per clump

Type of clump harvested	Labour used (man-days/clump)	Number of culms produced per annum per clump
Well managed	3.4	5.4
Poorly managed	7.3	2.8

The means are statistically significant at 1% probability level. 1 man-day is 8 h work.

Table 2.
Percentage distribution of mean number of culms per clump according to diameter

Type of clump harvested	Culm diameter (cm) at the middle of the second internode				
	<5.0	5.0–7.5	7.5–10.0	>10.0	Total
Well managed	2.9	15.1	50.0	32.0	100.0
Poorly managed	5.1	29.0	55.6	10.3	100.0

Table 3.
Percentage distribution of mean number of poles per clump

Type of clump harvested	Percentage number of poles by portion and length (m)									
	Bottom portion				Middle portion			Top portion		
	3.0–4.8	5.4–6.0	6.6–7.2	Total	3.0–4.8	5.4–7.2	Total	<3.0	⩾3.0	Total
Well managed	45.6	43.6	10.8	100.0	23.9	76.1	100.0	9.9	90.1	100.0
Poorly managed	82.9	17.1	0.0	100.0	75.3	24.7	100.0	10.1	89.9	100.0

Means of poles from the bottom and middle portions are statistically significant at 1% and those pertaining to top portion are not significant.

clumps (Table 1). Culms above 7.5 cm in diameter accounted for 82% of the number of culms per clump in well-managed and 66% in poorly-managed clumps, whereas culms above 10 cm diameter accounted for 32% in the former and only 10% in the latter (Table 2). Large diameter culms have more market demand and fetch higher price. Above 6.6 m (22 foot) long poles from the bottom portion accounted for 11% in well-managed clumps over a time span of 6–8 years and none in poorly-managed old clumps over a time span of 20–25 years; above 5.4 m (18 foot) long poles from bottom portion accounted for 54% in the former and only 17% in the latter; above 5.4 m (18 foot) long poles from middle portion accounted for 76% in the former and only 25% in the latter (Table 3). Average weight of a well managed clump was 1507 metric tonnes over a time span of 6–8 years and that of a poorly managed clump was 1240 metric tonne over a time span of 20 to 25 years (Table 4). The mean weights per annum were 0.215 and 0.055 metric tonne per clump, respectively, in well- and poorly-managed clumps. The percentage weight of poles to clump weight was 92% in well-managed and 77% in poorly-managed clumps. As the farm price of poles

Table 4.
Mean weight of poles and residue per clump

Type of clump harvested	Mean weight (metric tonne) per clump		
	Poles	Residue	Total
Well managed	1.384	0.123	1.507
Poorly managed	0.995	0.295	1.240

The means are statistically significant at 1% probability level.

was US$ 32.1 per metric tonne (1 US$ = Indian Rs 48.42) during 2002–2003 and that of residue US$ 9.5 per tonne [3], a farm price of US$ 45.6 per well-managed clump over a time span of 6–8 years was realized. The farm price per poorly-managed clump was US$ 34.7 over a time span of 20–25 years, revealing that well-managed clumps had a higher farm price. Thus the advantage of maintaining well-managed clumps, without involving an additional cost other than the knowledge on scientific clump management and harvesting techniques, is obvious. Intensive management like soil working around the clump, fertilizer application and irrigation can further improve the culm production [8] and thereby additional income.

Bamboo becomes an economic crop in home gardens due to the marketing system dominated by a few wholesale bamboo depots in the State [2]. Bulk purchasers from other States are being attracted to Kerala only because of the existence of the depots. This market situation implies that there is considerable opportunity for increasing the resource in home gardens [3]. By exploiting such marketing advantage, the farmers can enhance their farm income through resource development by adopting scientific clump management and harvesting techniques. For this, a package of practices needs to be popularized among farmers. The package should consist of (i) preferring *B. bamboos* species for further planting, (ii) pruning the thorn annually for proper growth of the clump without congestion, (iii) protecting the newly emerged shoots, (iv) removing the dry, as well as decayed culms to facilitate proper growth of new shoots, (v) avoiding the harvest during the growth phase of new shoots which is generally in monsoon season, (vi) adopting a harvesting cycle of 6 to 8 years, (vii) felling the mature culms as low as possible leaving only one internode above the ground, (viii) retaining at the time of harvest at least the 1-year-old culms to assure proper growth of the new shoots and (ix) covering the rhizomes with soil and litter after the harvest. This package will help to develop the resource, improve the proportion of quality poles in the clump, reduce harvesting cost and make the produce attractive to traders and thereby enhance farm income.

CONCLUSIONS

Bamboo clumps in home gardens are poorly managed and not considered as a crop by most of the farmers. In most home gardens, clumps are inappropriately harvested, resulting in the depletion of the resource. This is due to the farmer's

ignorance on clump management and harvesting practices. There is considerable opportunity to develop the resource in home gardens through scientific clump management and harvesting techniques. For this, a package of practices needs to be popularized among farmers. If bamboo clumps are scientifically managed, bamboo grows well, even without any inputs, and fetches good returns. Adoption of scientific harvesting techniques increases the regeneration in the clumps and improves the growing stock. Intensive management like soil working around the clump, fertilizer application and irrigation can further enhance productivity and thereby farm income. More attention to pruning, timely and scientific harvesting of bamboo clumps can develop the resource, improve the returns and aesthetics.

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REFERENCES

1. C. N. Krishnankutty, *Socio-economic and Ecological Aspects of Developing Bamboo Resources in Homesteads of Kerala — Part II*: *Economic and Management Aspects*, *KFRI Research Report No. 125*. Kerala Forest Research Institute, Peechi (1998).
2. C. N. Krishnankutty, Benefit–cost analysis of bamboo in comparison with other crops in mixed cropping home gardens in Kerala State, India, *Journal of Bamboo and Rattan* **3** (2), 99–106 (2004).
3. C. N. Krishnankutty, Marketing of bamboo (*Bambusa bambos*) in South India, *Journal of Bamboo and Rattan* **3** (3), 203–215 (2004).
4. C. N. Krishnankutty, Rural bamboo trade in Kerala and retail market, *Indian Forester* **127** (6), 671–667 (2003).
5. H. J. Barnet and C. Morse, *Scarcity and Growth, the Economics of Natural Resource Availability.* John Hopkins Press, Baltimore, MD (1963).
6. N. Sarojam, *An Annotated Bibliography of Bamboos of the World*, *KFRI Handbook No. 20*. Kerala Forest Research Institute, Peechi (2003).
7. K. K. Seethalakshmi and M. Kumar*, Bamboos of India: A Compendium*. Kerala Forest Research Institute, Peechi, and International Network of Bamboo and Rattan, Beijing (1998).
8. R. C. Pandalai, K. K. Seethalekshmi and C. Mohanan, *Nursery and Silvicultural Techniques for Bamboos*, *KFRI Handbook No. 18*. Kerala Forest Research Institute, Peechi (2002).