Indian Journal of Natural Rubber Research, 13(1&2) : 114-117, 2000

PROPAGATION OF THE COVER CROP *MUCUNA BRACTEATA* BY MODIFIED COMPOUND LAYERING

Cover crops are established and maintained in rubber plantations for the purpose of conserving the soil, improving or maintaining the soil structure, fertility, water holding capacity and other soil physical properties (Soong and Yap, 1976; Krishnakumar, 1989; Samarappuli, 1992; Philip *et al.*, 1996, Rubber Board, 1999). Leguminous ground cover, besides contributing much to the nitrogen requirement (Shorrocks, 1965), helps in better growth of rubber plants during immature phase and aids in attaining higher yield (Watson *et al.*, 1964; Yogaratnam *et al.*, 1984).

Mucuna bracteata, a wild legume from Tripura has been observed to be drought resistant, shade tolerant, profusely growing and capable of fixing a good quantity of atmospheric nitrogen (Kothandaraman *et al.*, 1987; 1989). Besides suppressing the growth of weeds, this cover crop has the advantage of non-palatability to cattle. Even though there is vigorous vegetative growth, unlike in North East India flowering and seed production in *Mucuna* is rare in the traditional rubber growing regions in South India. Even if flowering occurs, seed set does not follow. Fruit set could not be achieved even after hand pollination and growth regulator treatment. Hence this plant is propagated through cuttings, with only limited success (Kothandaraman *et al.*, 1987; Rubber Board, 1999). Hence efforts were made to standardize a suitable technique to propagate *Mucuna* sp. by modified compound layering.

Compound (multiple) layering or sepentine layering has been practised as a common technique to propagate a number of plant species (Hartman and Kester, 1972; Macdonald, 1986). In the traditional method of compound layering, flexible stems are covered with soil in several places, preferably the nodal portions, so that they are alternatively covered and exposed over their entire length. When the roots are fully developed near the nodes, portions of the stem are severed from the mother plant and each allowed to grow as a separate plant.

An attempt was initiated at the Rubber Research Institute of India, Kottayam during the monsoon season of 1995 to propagate *Mucuna bracteata* by modified compound layering. Flexible creeping stems of field grown *Mucuna bracteata* were used for the experiment. Instead of covering the nodes with soil, 100 points each of either successive or alternative nodes of flexible stems were compound layered in small polybags filled with soil, well decomposed cow dung and sand mixture (6:3:1). The root system developed fully in 30-45 days after layering. The rooted layers were severed from the mother plant for further establishment. The experiment was repeated two times during the subsequent monsoon seasons. In another experiment compound layering (50 points) was carried out during the summer months of April-May by providing irrigation and shade.

A high success rate of 90 per cent establishment in polybag was observed

Table 1. Rooting success in *Mucuna bracteata* raised through modified compound layering

Season	Number of nodes layered		Rooting success (%)	
	Alternate nodes	Successive nodes	Alternate nodes	Successive nodes
Monsoon season*	100	100	90	10
Summer season**	50	50	40	0

* Average values for three years; ** Value for one year

when alternate nodes were compound layered (Table 1, Plate 1). The root system was fully developed and profuse (Plate 2). Similar rates of success were also observed in the experiments carried out during the subsequent monsoon seasons. Compound layering of alternate nodes carried out during summer season showed only 40 per cent success (Table 1).

Though rooting could be observed when compound layering was done in successive nodes, the success was very poor (Table 1, Plate 3a). Retention of leaves on the detached plant was found to be a pre-requisite for successful propagation and establishment (Plate 3b).

Since the roots were developed on the stem while attached to the parent plant, flow of natural auxins and carbohydrates induced initiation and formation of roots at the nodes. The continuous supply of food reserves like soluble sugars and growth hormones unlike in stem cuttings might have enabled production of a balanced and well developed root system at the nodes covered with soil (Nanda and Anand, 1970). In layering, there could have been no change in the photosynthetic rate, since the stem was not severed till the roots were fully developed. The role of leaves in the regeneration of roots has long been emphasised. Leaves are the primary organs of photosynthesis containing high level of sugars and they supply nutrients, rooting factors and co-factors which enhance root regenerating ability (Bose *et al.*, 1986). Hence, retention of leaves in layers raised from alternate nodes, unlike in successive nodes has enabled a steady supply of food reserve leading to better establishment.

During dry conditions, excessive water loss may cause desiccation before the roots are formed. High temperatures are unfavourable for rooting, as they tend to

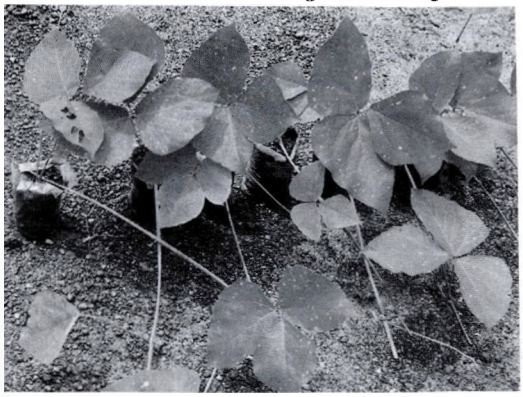

Fig. 1. Well established *Mucuna bracteata* plants raised through modified compound layering of alternate nodes

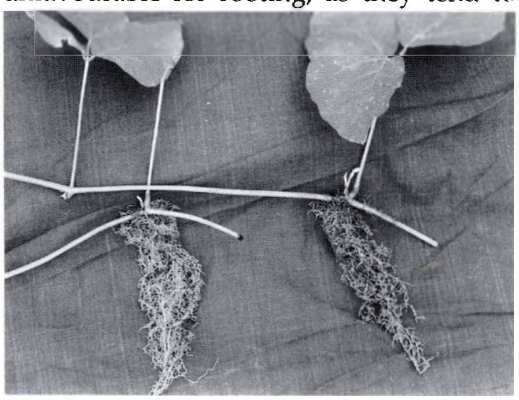

Fig.2. Root system of *Mucuna bracteata* plants raised through modified compound layering of alternate nodes

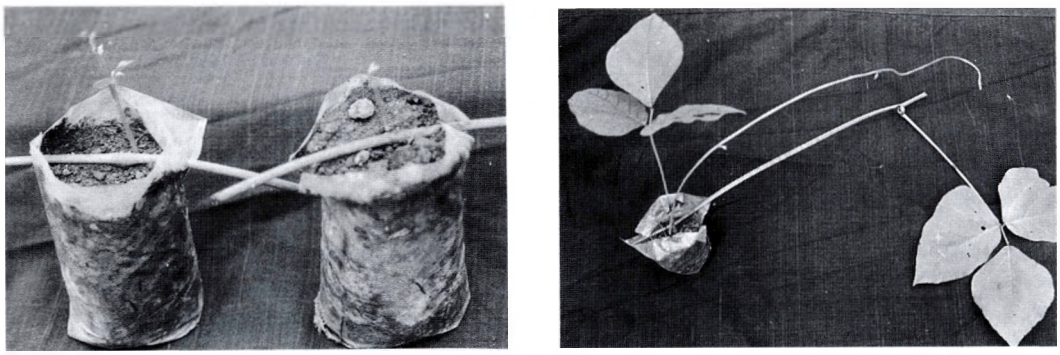

Fig. 3. *Mucuna bracteata* plants raised through modified compound layering of (a) successive nodes (b) alternate nodes (with retained leaves)

increase the rate of respiration (Bose *et al.*, 1986). Enhanced rate of respiration during dry weather can lead to sub-optimal supply of nutrients and rooting co-factors. This might be the plausible reason for the lower rooting success in summer season, observed in the present study. Excluding light at each covered portion of alternate nodes, decreases the amount of material deposited in the cell wall and increases the number of parenchyma cells in the treated portion of the stem, thus assisting in the initiation and development of roots (Mac Donald, 1986).

The present study showed that compound layering in polybags is a good method for propagation of *Mucuna bracteata*.

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