DEVELOPMENT OF NURSERY PROCEDURE OF THREE CANE SPECIES

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An attempt was made to develop a nursery procedure of *Calamus guruba* Buch-Ham. (Jait bet), *C. tenuis* Roxb. (Bandhari bet) and *C. latifolius* Roxb. (Korak bet) involving seed collection, pre-sowing seed treatment, media preparation, seed germination and seedling care. The plant percents obtained in *C. guruba, C. tenuis* and *C. latifolius* were 56, 58 and 62 respectively showing a good prospect for artificial regeneration of Canes.

INTRODUCTION

With the increase of human population and multiple use of Cane, the natural stands of Cane species are being used up rapidly. The faster rate of conversion of forest land for agriculture and the accessibility of human beings to further forested areas throughout the tropical forests have destroyed the natural growth of this resource to a great extent. Reforestation with some selected timber species in the high forests also causes it to diminish further.

Artificial regeneration of this valuable resource in the young plantations of different timber species and also in village groves can be considered as an effective step in conserving and replenishing the stock of this most affected resource, and at the same time to increase the opportunity cost of soil. To develop a scientific technique of artificial regeneration of Canes, the incorporation of inputs from silvicultural research on the available Cane species of the country is of considerable importance. The present paper is, however, an output of an attempt to develop a nursery procedure of *Calamus guruba, C. tenuis* and *C. latifolius* involving seed collection, presowing seed treatment, media preparation, seed germination and seedling care.

MATERIALS AND METHODS

Collection and Extraction of Seeds : Ripe fruits of *C. guruba* were collected from the natural stands of Chittagong in the last week of April. The ripe fruits of *C. tenuis* and *C. latifolius* were collected from

Chittagong Hill Tracts in the second week of May and first week of June respectively.

The fruits were opened by hand to separate the scaly layers. They were then soaked for 24 hours in a can filled with water to induce the fleshy layer of the fruit to ferment. The seeds were then separated from the fleshy layers. The clean seeds were allowed to settle at the bottom of the can and the fruit coverings to float over the settled seeds. The extracted clean seeds were then put in a basket and stored under room condition. The seeds were kept wet by watering until sowing.

Preparation of seed-bed and sowing of seeds : A seed-bed, 6.0 x 1.2 m, was prepared east to west in the nursery. The soil of the bed was worked to a depth of 30 cm. Then, 18 kg of decomposed cowdung and 9 kg of compost were thoroughly mixed with the soil.

Seeds were sown in the bed 5 cm apart in case of *C. tenuis* and 10 cm apart in case of *C. guruba* by dibbling each one just below the soil surface.

Seeds of *C. latifolius* were sown directly in the polyethylene bags of 13 x 8 cm dimension. The bags were filled up with soil mixed with decomposed cowdung at the proportion of 3 : 1 by volume.

Shading and watering : Seed-bed and sown polyethylene pots were shaded by mats made up of locally available thatch grass. Watering was done whenever necessary using a water sprinkler so as not to disturb the soil and seeds.

Pricking out and repotting of seedlings : When the seedlings of *C. guruba* and *C. tenuis* were of 2–3 leaved stage (about 3 months old), they were transferred to polyethylene bags of 29 x 15 cm size. Each seedling was planted upto root-collar region. Watering was done immediately after pricking out so as not to allow the seedling to desiccate. The potted seedlings were kept under full shade for one week and then were exposed partially to the sun.

Only the seedlings of *C. latifolius* were repotted in the polyethelene bags of 20 x 15 cm size. Repotting was done after 9 months of first germination.

Climatic condition of nursery : Throughout the period of experiment, the mean maximum temperature was 30°C and the mean minimum was 21°C. The average relative humidity was 78% and the average total rainfall was 291 cm.

OBSERVATIONS AND RESULTS

In *C. guruba,* flowering starts in August and the fruits begin to ripen in April. The fruits of *C. tenuis* and *C. latifolius* start to ripen by the first part of May and June respectively. The fruits are one-seeded and globose to oblong in shape. They remain covered with thin limbricating deplexed polished scales. Each fruit has a thin juicy pulp, the *Sarcotesta* lying over the seed. The pericarp consists of scaly epicarp with a thin layer within, and lies over the *sarcotesta.* The size of the fruit and seed, and the thickness of *sarcotesta* usually vary from species to species.

Sarcotesta of ripe fruit is fleshy and has a sweet sour taste. The thin layer of pericarp of ripe fruit dries up and the scales become easily separable. The seeds become dark in colour and hard on maturity. They are of mottled appearance, and the mottling pattern varies with the species.

During the process of germination a short plug of tissue emerges from the seed. From this plug roots emerge at the beginning and eventually an upright cylindrical outgrowth or ligule is developed. The blade of cotyledon remains within the seed as an absorptive organ, which absorbs nutrients from the endosperm. Through the ligule the first leaves emerge. Within few months several leaves develop forming a rosette structure of seedling.

All the three species tested required quite long time to start germination. The requirement of time varied with the species. The seeds of *C. guruba* started germination earlier than those of *C. tenuis*. *C. latifolius* needed longer time to start germination of its seeds in comparison to *C. tenuis*. The mortality of seedlings after germination was common in all the three species (Table 1).

DISCUSSION

Like other members of the family Palmae the species of *Calamus* need long time to start germination. Generalao (1980) reports that Cane seeds take two weeks to six months to germinate depending on the species and method of treatment. Conducting an experinment on the germination behaviour of seeds of *Calamus viminalis* var. *fasciculatus*, Banik (1979) records that the seeds sown with sarcotesta intact, require two or three months to start germination and give poor germination percentage (10–26% only). Removal of the sarcotesta is a necessary pre-treatment in order to shorten the germination period and obtain good levels of success (Manokaran and Wong 1981). The slow rate of germination in all the three species (Table 1) might be due to slow development of embryo and not due to any inherent dormancy (Mori *et al* 1980). The hard endocarp might also be a mechanical barrier for the emergence of growing embyo (Banik 1979).

Germination started after 5 to 12 weeks of sowing and the period varied from species to species (Table 1). In case of *C. latifolius*, germination started after 11 weeks and

Table 1. Germination of seeds, mortality of seedlings and plant percent of three *Calamus* species

Species	Seed sown		Days of first germination	Germination (%)		Mortality (%)			Plant (%)
	Number	Days after harvest		30 days of first germination	180 days of first germination	upto pricking out	after pricking out	upto repotting	
C. guruba	800	6	34	61	–	4.7	3.6	–	56
C. tenuis	360	5	48	63	–	4.4	2.8	–	58
C. latifolius	250	4	83	16	66	–	–	5.4	62

continued for more than 39 weeks. These findings corroborate with that of Manokaram (1978) who recorded the differential germination periods within the species as well as between different samples of the same species *of Calamus*. The variability in the rate of germination might be due to the genetic differences. The degree of ripeness of fruits might also be related with the variation of germination period. The seeds which did not germinate at all might be the unripened ones. Physiogenetical factors might also be responsible for the failure of seeds to germinate.

Sufficient moisture is likely to be important for seed germination. The process of germination starts long before the emergence of shoot above the soil surface. Drying of seed appears to stop the process and kills the germinating seeds. Direct sunlight also retards the process of germination (Generalao 1980).

The reasons of mortality of seedlings after germination might be more than one including damage to roots during weeding operation in seed-beds before pricking out and in polyethelene pots after pricking out. The mortality percentage of seedlings of *C. guruba* as well as *C. tenuis* before pricking out was found higher than that after pricking out.

CONCLUSION

The nursery procedure adapted has an important bearing in obtaining good levels of success in respect of germination of seeds and survival of seedlings. Regular watering and shading of seed-beds against direct sunlight may be considered as essential practices to obtain higher germination percentage of seeds. The mortality of seedlings, though not so high, may be further lowered by careful nursery operations particularly at the time of weeding and pricking out of seedlings so as to disturb neither the root system nor the shoot portion of the tender seedlings. The plant percent obtained in all the three species may be considered promising enough to undertake large scale plantation of these Cane species in young plantations of timber species and also in the village groves of the country. Further research to shorten the time required for starting germination and the period of germination is, of course, needed to improve the overall nursery technique of Canes.

REFERENCES

Banik R. L. 1979. A note on the flowering periodicity and the germination in Bara bet. Bano Biggyan Patrika, 8(1&2) : 52–56

Generalao, M. L. 1980. How to grow Rattan. FOR HOW-To Series No. 1. Pub. For. Res. Inst. College, Laguna Philippines. 24 pp

Manokaran N. 1970. Germination of fresh seeds of Malayasian Rattans. Malay. Forester 41 : 319–324

——— and K. M. Wong. 1981. The Silviculture of Rattans-an overview with emphasis on experience from Malaysia. Bano Biggyan Patrika, 10(1&2) : 1–10

Mori, T., Zoilfatah bin Abd. Rahman and C. H. Tan 1980: Germination and storage of Rattan manau (*Calamus manan*) seeds, Malay. Forester 43 : 44–45

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