SEED GERMINATION AND OPTIMUM TIME OF TRANSFER OF SEEDLINGS OF *CALAMUS* SPP. FROM SEED BED TO POLYETHYLENE BAG

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ABSTRACT

Seed germination and optimum time of transfer of seedlings of *Calamus* spp. from seed bed to polyethylene bag were studied. Seeds of *C. latifolius* Roxb. (Bhudum-bet) and *C. guruba* Buch.-Ham. (Jali-bet) sown under higher temperature (27–35°C) and humidity (90–95%) showed 42 and 71% germination within 12–31 weeks and 4–9 weeks respectively. Germination of *C. latifolius* seeds increased on removing the scaly epicarp and fleshy sarcotesta manually with ash. Seedlings of *C. guruba* of one to five weeks age when transferred from seed bed to polyethylene bag, showed significantly higher height growth up to five months compared to those transferred sub-sequently.

INTRODUCTION

In Bangladesh, natural resources add a considerable amount of revenue and thus have a direct effect on socio-economic condition of the country. *Calamus* spp. (Cane) are among those natural resources, the demand of which are increasing gradually both in home and abroad. The species are used as raw-materials for furniture industry, binding materials and other novelty items. So far very little attention was given for proper management of the species. Due to over exploitation, this valuable resource is now almost threatened. It grows sporadically in the forest areas of Sylhet, Chittagong, Chittagong Hill Tracts, Cox's Bazar and in the village groves in general. The present deteriorating condition of the genus demands immediate attention to save it from extinction.

Seeds of *Calamus* species take one to six months for germination (Dransfield 1974)

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Germination period of *C. manan* and *C. pallidulus* Becc. were 1–3 and 6–8 months, respectively (Manokaran 1978). Manokaran and Wong (1983) determined that optimum germination rate was obtained in a closed chamber containing moistened paper, sawdust or fine sand. The seedlings were transferred from seed bed to polyethylene bag as early as possible. The seedlings were allowed to strengthen by keeping them in polyethylene bags for one year. The present experiment was, therefore, carried out on seed germination of *Calamus latifolius* Roxb. (Bhudum-bet) and *C. guruba* Buch-Ham. (Jali-bet) Optimum time for transfer of seedlings of *C. guruba* from seed bed to polyethylene bag was also determined.

MATERIALS AND METHOD

Ripened fruits of *C. latifolius* and *C. guruba* were collected from Bandarbans Forest and Hathazari village groves respectively. The former were divided into three lots. The scaly epicarp and fleshy sarcotesta of the fruits of one lot were removed manually on treating with ash (T_1), those of the second lot on treating with fine sand (T_2) and the rest were only decoated (T_3). The epicarp and sarcotesta of *C. guruba* fruits were removed manually only with ash (T_1). The T_1 seeds of *C. latifolius* and *C. guruba* were sown in (a) nursery beds (MNB) comprising of 2 : 1 : 1 of forest top-soil, fine sand and mosit sawdust and (b) in trays (MT) having 1 : 1 of fine sand and moist sawdust. The T^2 and T_3 seeds of *C. latifolius* were sown in the nnrsery beds only. In case of *C. latifolius* three replications of 50 seeds in each were given, whereas for *C. guruba* 100 seeds comprised each of three replications. The nursery beds were covered with bamboo mats where air temperature varied from 20–28°C. The trays were kept in a Fibre Glass Tent (FGT) in shade where relative humidity varied from 90–95% and air temperature ranged from 27–35°C.

Germination percentage of cane seeds are generally poor and takes time. Thus, to economise the use of polyethylene bag, seeds were first germinated either in tray or in nursery bed and then transferred to polyethylene bag for subsequent growth. Fifty sprouted seedlings, with single shoot, were transferred in polyethylene bags (23 cm x 15 cm) from the nursery bed after seven days of sprouting (A). The bags were filled with nursery soil and cow-dung (3:1). This process was repeated five times at an interval of 15 days. The seedlings from 2nd to 5th transfers were denoted as B to E respectively. The poleythylene bags were kept in open nursery after each transfer. The seedlings were measured three times during the period of observation for height growths.

RESULTS

The effect of epicarp and sarcotesta removal treatment, germinating media and conditions of incubation on seed germination of *C. latifolius* and *C. guruba* are shown in Table 1.

The three treatments of seeds of *C. latifolius* had no significant impact on the germination period. A slightly higher percentage of seeds of this species germinated in the ash treated ones. This may probably due to higher microbial activities on seed coat because of higher carbon content of

ash. Ash treated seeds of *C. latifolius*, when incubated on tray in a fibre Glass Tent (FGT) showed 42% germination in contrast to 28% in nursery bed. The germination period in FGT was 12–31 weeks in contrast to 18–33 weeks in nursery bed. In *C. guruba*, germination period was only 4–9 weeks and percentage of germination varied from 59-71. In general, earlier and higher percentage of germination of seeds of both the species took place in FGT. Higher temperature and relative humidity of the FGT might cause these effects.

It is evident from the Table 2 that significantly higher height growth of *C. guruba* took place when the seedlings were transferred within five weeks of sprouting in the nursery bed. Transferring seedlings thereafter affected the growth up to five months, but subsequently the difference gradually reduced. The survival percentage were comparable in the five transferes.

Table 1. Effect of epicarp and sarcotesta removal treatment, germinating media and conditions of incubation on seed germination of *Calamus latifolius* and *C. guruba*

Species	Treatment	Replication	Total no. of seeds	Medium	Germination period (weeks)	Germination (%)
C. guruba	T_1	3	300	MNB	5–9	59
		3	300	MT	4–9	71
C. latifolius	T_1	3	150	MNB	18–33	28
		3	150	MT	12–31	42
	T_2	3	150	MNB	18–33	18
	T_3	3	150	MNB	20–35	17

T_1—treated with ash ; T_2—treated with fine sand ; T_3—Only decoated
MNB : Medium in nursery bed ; MT : Medium in tray.

Table 2. Effect of age of transfer of *Calamus guruba* seedlings from nursery bed on survivality and growth (out of 50 seedlings in each treatment)

Days of transfer after sprouting	Mean Survival (%)	Mean height (cm)		
		After 5 months of transfer	After 10 months of transfer	After 12 months of transfer
7	92	25.0	35.6	37.6
22	95	22.1	35.6	41.0
37	97	19.1	41.6	44.5
52	93	13.2	32.7	34.2
67	100	13.2	32.7	34.2

DISCUSSION

Calamus spp. like other members of the family *Palmae* need maximum time for germination. It takes one to six months to germinate (Dransfield 1974). It was observed that the germination of *Calamus latifolius* and *C. guruba* started within three to five months and one month respectively and was completed within seven to nine months and two months respectively (Table 1). Manokaran (1978) studied the germination behaviour of 12 *Calamus* spp. and found that the germination periods of *C. manan* and *C. pallidulus* were 4–12 and 24–32 weeks respectively. Banik and Nabi (1979) reported that the germination period of *C. viminalis* Willdo var. *fasciculatus* Becc. was 9–18 weeks. From the present study it was found that the initial and final germination of *C. guruba* was earlier than that of *C. latifolius* and the species reported above. The decoated seeds of *C. latifolius* showed no germination during five months (Table 1). This is in agreement with the findings of Mori *et al* (1980) who reported that the seeds of *C. manan* with sarcotesta showed no germination in three months. The maximum germination percentage of *C. latifolius* and *C. guruba* were 42 and 71% respectively in a medium consisting of equal amount of moistened sawdust and fine sand in a Fibre Glass Tent with high humidity and temperature (Table 1). Mori *et al* (1980) also obtained higher percentage of germination for *C. manan* (90–100%) in humid closed, internally moistened petridishes used as the germinating chamber. Optimum germination rate was also obtained in a closed chamber containing moistened paper, sawdust or fine sand by Manokaran and Wong (1983). Seedlings of *C. guruba* of one to five weeks age with two-leaf stage were found as standard for transfer to polyethylene bag for better survivality and growth. Work of Manokaran and Wong (1983) also support the findings.

CONCLUSIONS

Seeds of *C. latifolius* and *C. guruba* sown in moistened medium (fine sand and moist sawdust in proportion of 1 : 1 by volume) where temperature (27–35°C) and relative humidity (90–95%) were higher showed earlier (12–31 and 4–9 weeks respectively) and maximum percentage of germination (42 and 71% respectively). Ash treated seeds of *C. latifolius* also showed better germination. Seedlings of *C. guruba* transferred within five weeks of sprouting showed better growth up to five months over those transferred thereafter.

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