

NOTES

A NOTE ON GERMINATION CHARACTERISTICS OF *CALAMUS MANAN* AND *CALAMUS TUMIDUS* UNDER LABORATORY AND NURSERY CONDITIONS

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Germination characteristics of species are very useful to nursery managers in planning and managing seedlings in the nursery. Although there have been studies on the germination of *Calamus manan* (Mori *et al.* 1980, Darus & Aminah 1985), studies on *Calamus tumidus* have not been documented.

In this study, the germination characteristics of both species are examined. Although previous workers have studied *C. manan* (Mori *et al.* 1980, Darus & Aminah 1985) under laboratory and nursery conditions, we studied the performance of *C. manan* under both nursery and laboratory conditions simultaneously. Due to seed shortage, *C. tumidus* could only be tested under nursery condition.

Two hundred cleaned *C. manan* seeds cleaned as per standard nursery practise (Johari & Che Aziz 1981) were sown in forest top soil in germination boxes, and lightly covered with a thin layer of sawdust to retain moisture. One batch of 100 seeds was later placed in the laboratory (room temperature about 27°C) and another under 'attap' roofing [about 10 - 20% relative light intensity (RLI), ambient temperature about 31°C] in the nursery.

Continuous moist condition was maintained by regular watering.

A 100-seed batch of *C. tumidus* seeds was similarly sown and maintained under 'attap' roofing.

Daily observation and record of germination were made. This entailed pricking out and recovering every seed. A seed was considered to have germinated when the radical and/or conical shoot becomes visible.

The calculated parameters used were cumulative germination percentage (CGP), germination capacity (GC) and energy period (EP). The definition for GC, GE and EP are as in Aminuddin and Siti Hasnah (personal communication).

During germination, the embryo swelled out through a germination pore, pushing out a thin tissue covering the pore (pore cover). This is a white columnar plug that emerged. This type of germination is characteristic of germinating rattan seeds (Dransfield 1979). The radical emerged from the centre of the plug about one week after pore cover had fallen off followed by a conical shoot appearing from one side of the plug.

CGP of *C. manan* under laboratory and nursery conditions were 76 and 74% (Table 1). Germination in the laboratory commenced on day 22 and completed on day 52. Germination percentage was 76% and germination period between three to nine weeks. Period for 50% germination was about seven weeks and for 75% germination about nine weeks.

Under nursery condition, the germination period for *C. manan* between four to 11 weeks. The period for 50% germination was nine weeks (Table 1). For *C. tumidus* seeds, the germination period was longer between six to 31 weeks. CGP was also lower, recording about 43% (Table 1).

The CGP, GP, GC, GE and EP for the two species under various conditions are given in Table 1.

Table 1. Germination parameters for *Calamus manan* under laboratory and nursery condition and *Calamus tumidus* under nursery condition

Parameter	Laboratory	Nursery	
	<i>C. manan</i>	<i>C. manan</i>	<i>C. tumidus</i>
Cumulative germination percentage (%)	76	74	43
Germination period (wk)	3 - 7	4 - 11	6 - 31
Germination capacity (%)	86	88	58
Germination energy (%)	34	24	16
Energy period (wk)	4	7	18

C. manan under laboratory condition performed slightly better than under nursery condition except for GC. It was 86 and 88% in the laboratory and nursery, respectively. The EP was shorter in laboratory (four weeks) as compared to seven weeks in nursery. Between *C. manan* and *C. tumidus* under nursery conditions ("at-tap" roofing with 10 - 20% RLI), *C. manan* germinated faster than *C. tumidus*. *C. manan* had a higher CGP and a shorter germination period.

The germination process for *C. manan* and *C. tumidus* can be described as "adjacent ligular" according to Tomlinson's (1960) definition. Germination of cleaned *C. manan* seeds under laboratory condition generally subtends a period of between three to 11 weeks. The germination can therefore be considered as 'rapid' according to Ng's (1973) classification. Similar observations were made by Manokaran (1978) and Mori *et al.* (1980). *C. tumidus* on the other hand, can be classified as having 'intermediate' germination since the germination period was between six to 31 weeks, thus subtending 12 weeks boundary. No previous work has been conducted for comparison.

As interest in planting of rattans is increasing, nursery managers throughout Malaysia are looking for ways and means to hasten seed germination. Before this can be done, germination characteristics of the species need further research. It will

be desirable to know the environment suitable for seed germination in order to reduce germination period which is necessary in nursery management.

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