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Enhancement of seed germination through proper pre-sowing treatment in *Calophyllum inophyllum*, an important forest resource of the western ghats

Calophyllum inophyllum is an important timber and oil yielding tree species of the coastal region (Anon, 1950). Reddish brown wood is strong and durable even under salt water, hence regularly used in ship/fishing boat building. Kernels yield about 70 per cent of crude oil, used in soap industry. Apart form these usage, different parts of the plant can be used in medicine (Chopra, 1933). Generally, species is fruiting during April-May and fruit fall coincided with pre-monsoon season. The best season of seed collection is end of the May month. The seed germination in *C. inophyllum* is sporadic and takes longer duration to achieve maximum germination. This could be due to hard pericarp or presence of seed dormancy. The necessary information on this line for the species is sparse. Hence, the present study was undertaken to evaluate different pre-sowing treatment to hasten seed germination in *C. inophyllum.*

The present study was undertaken at the College of Forestry, Sirsi, Karnataka during August, 2005. Fruits were collected from various trees located at Kumta forest of Honnavar Forest Division, Uttara Kannada district of Karnataka. Fruits collected from all the individuals were thoroughly mixed and seed lots were drawn randomly. Seeds were extracted and shade dried for a day. Matured seeds were selected and used for the germination study. In order to enhance seed germination in *C. inophyllum,* seeds were exposed to different pre-sowing treatments including control. Details of pre-sowing treatments used are as follows:

Pre-sowing treatments

T1 : Intact seed coat (Control)

T2 : Seeds without hard coat

T3 : Alternate wetting and drying of seeds in cow dung slurry for six days (every alternate day soaking and drying)

T4 : Seeds soaked in cold water for 24 hrs

T5 : Scarification (Mechanical damage to seed coat by beating)

Germination study consisting of five replications of 100 seeds each was sown in sand bed covered with polythene sheet for about 10 days following completely randomized block design. Regular watering was done. Here, sand bed was covered with polythene sheet in order to increase temperature and relative humidity during rainy season. Observation on daily seed germination was recorded upto 45 days from the date of sowing.

There was a significant variation among five pre-sowing treatments including control for seed germination in *C. inophyllum* (Table 1). All the treatments (T2 to T5) have shown positive response on seed germination. Treatment 2 has recorded highest seed germination of 95.8 per cent, followed by T5, T3 and it was least in T4 as well as in control (T1; Table 1). Results showed that delay of germination in control (T1) could be due to hard seed coat that impermeability to water or oxygen or both that prevents seed from germination. Besides, it might be due to the fact that seeds need to soften the coat and required much time, which reduced germinating energy. As a result, lower germination percentage was found in seeds having hard coat.

Seeds without pericarp (seed coat: T2) and seeds with mechanical scarification (T5) have recorded quicker germination than those of treatments T1 (control) and T4 (seeds soaked in cold water for 24 hrs; Fig. 1). The early germination of scarified seeds (T2 and T5) over other treatments is probably due to water and gases entering the embryo early through the cracks and causing a series of enzymatic breakdown resulted in the transformation of the embryo into a seedling early enough than other seed treatments (Odunfa 1989). Other treatments, T3 and T4 have also shown slightly better and hasten seed germination than those of control (Table 1 and Fig. 1). This could be, perhaps, overnight soaking allowed the seeds to imbibe water easily as a result of which the seed coats were softened, thus allowing enzymatic activities to take place resulting in early seed germination. Similar results of poor germination percentage were also reported in tree species (Bryndum, 1966; Bonner, 1974; Nowag, 1998; Vengamudi *et al.,* 1998 and Kozlowski, 2004). It is suggested to use treatment 2 for small-scale nursery programme, because removal of pericarp (hard seed coat) it self is a cumbersome work and required more laborers. Hence, it is

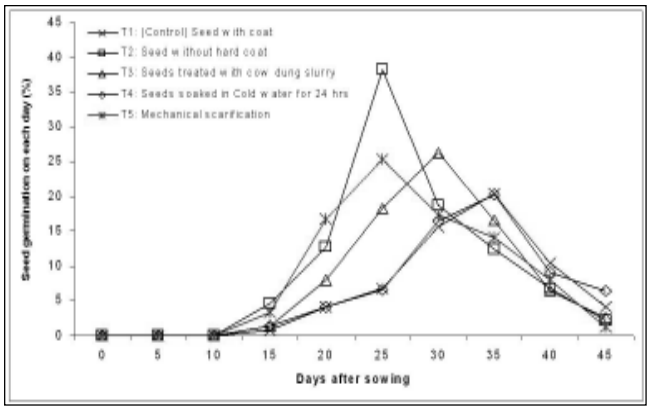

Fig. 1: Dormancy release pattern among different pre-sowing treatments imposed to seeds of *C. inophyllum*

Table 1. Influence of various pre-sowing treatments on enhancement of seed germination in *C. inophyllum*

Pre-sowing treatments	Seed germination (%) Mean ± SD	
With seed coat (Control)	62.4 ± 8.88	(52.3 ± 5.21)
Seeds without hard coat	95.8 ± 4.44	(79.2 ± 5.56)
Alternate wetting and drying in cow dung slurry	79.4 ± 9.15	(63.5 ± 6.59)
Seeds soaked in cold water for 24 hrs	64.2 ± 5.31	(53.3 ± 3.18)
Mechanical scarification	86.4 ± 4.39	(68.6 ± 3.69)
CD @ 5%	7.79	
CV (%)	7.90	

Values in the parenthesis are arcsine transformation

recommended to use pre-sowing treatments such as scarification (T5= mechanical damage to seed coat by beating) and alternate wetting and drying in cow dung slurry (T3) for raising of this species in large-scale.

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