J. Bamboo and Rattan, Vol.10, Nos. 1&2, pp. 1-4 (2011)

Occurrence of albino seedlings in *Dendrocalamus asper* (Schultes f.) Backer ex Heyne

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Abstract*:* The occurrence of albino seedlings is reported in the exotic bamboo *Dendrocalamus asper* (Schultes f.) Backer ex Heyne., which is the first record in this species. The progenies of a single clump resulted in about 8.2 percent albino seedlings which could not survive beyond 35 days. The possible use and significance of albino seedlings in breeding of *D. asper* is briefly discussed.

Keywords: *Dendrocalamus asper*, albino seedlings, selfing, breeding

Dendrocalamus asper is an exotic bamboo (in India) planted throughout tropical Asia. Its origin is thought to be somewhere in south east Asia. Culms of *D. asper* have thick walls and are very strong and durable. They are used as structural timber for heavy construction (houses and bridges) by rural communities. The young and tender shoots (rebung) are sweet and consumed as a delicious vegetable. *D. asper* has been planted in botanical, experimental and private gardens.

In nature, this sympodial gregarious flowering bamboo is known to show clump to culm type of flowering patterns and has a long intermast period of 60-100 years (Anantchote, 1988). There was a single clump of *D. asper* in the bambusetum at Forest Research Institute campus in Dehradun which flowered gregariously in March 2011. The seeds were collected, processed and cleaned. To test the seed quality and for producing the seedlings, the seeds were plated on moist germination papers in petri plates and incubated in a germinator at 29±1°C. Germination initiated on the 4th day and completed in 12 days. Out of 800 seeds plated for germination, 571 seeds germinated yielding 71.4% germination. Out of these seedlings 524 were normal green seedlings while remaining 47 were albino seedlings which were white in colour (leaves as well as stem). All the seedlings were transferred into polybags (22 × 17.5 cm) filled with garden soil, sand and Farm Yard Manure (FYM) in 1:1:1 ratio and

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maintained under adequate sunlight in the nursery. All the green seedlings grew normally (length of leaves 17.83 ± 3.62 mm) while the albino seedlings had small leaves (12.32 ± 1.56 mm). Although they continued to grow slowly but eventually all of them died between 26-35 days after potting, when the food reserve was presumably exhausted.

Occurrence of albino seedlings have been reported in many bamboo species like *Bambusa arundinacea* (Indira and Koshy, 1986), *Dendrocalamus strictus* (Kumar *et al.,* 1993), *Dendrocalamus giganteus* (Dhiman and Sharma, 1997), *Melocanna baccifera* (Dakshindas, 1995) *Ochlandra travancorica (*Abdul Kader *et al.,* 2001*)* and other tropical forest tree species like *Bombax ceiba* (Venkatesh and Emmanuel, 1976), *Pinus roxburghii* (Venkatesh and Thapliyal, 1977), *Pterocarpus santalinus* (Vakshasya, 1981) *Populus* (Rajora and Zsuffa, 1986), *Elaeis guineensis* (Kushairi *et al.,* 1992), *Salvadora oleoides* (Mertia and Kumhamu, 2000), *Gmelina arborea* (Venkatesh *et al*., 1978; Karoshi *et al.,* 2001), etc.

Most studies conducted to find the inheritance of albinism have found that it is recessive trait governed by one or two genes with two alleles (Maya Kumari *et al.,* 2009) and the trait is expressed only when it is in homozygous recessive condition which may be the result of inbreeding or by mating of two albino carriers. Generally the albino seedlings occur in very low frequency but sometimes when the seeds are collected from such a stand where plants heterozygous for this trait do exist in the population of a given species and when there is selfing or mating of heterozygous genotypes, the frequency of such albino seedlings is quite high, as happened in the case of *D. asper* where it was 8.23%. The albino seedlings produced so by mating or selfing of heterozygous genotypes are the results of recombination of genes for lethal recessive homozygous conditions resulting from the parent or parents with a pre-existing mutated gene for this character sometimes back in their history and thus cannot be termed as mutant (Vakshasya, 1981).

In any effective tree improvement programme, the knowledge of breeding behaviour of a species assumes great importance (Dhiman and Sharma, 1997). Such albino seedlings themselves have no practical value however they may be used as genetic markers for estimation of natural selfing in a species as has been done in Slash pine (Squillace and Kraus, 1963), *Eucalyptus tereticornis* (Venkatesh and Sharma, 1974) and *Bambusa bambos* (Kumar *et al*., 1995). Gabriel (1962) reported segregations of 31:4 and 25:4, normal vs. albino (lethal), for selfed progenies of two sugar maple trees; Demerec (1923) studied the inheritance of white seedlings in maize which was determined by many genetically different factors including existence of seven different genes for albino seedlings. In the present report the progeny of selfed *D. asper* culms segregated into a 11:1 ratio which may be due to the genes producing albinos in double recessive condition. As bamboos are polyploids, genes in double recessive

condition might be the reason for getting such a ratio. Generally the 9: 1 or 11: 1 ratio could be a modified 15: 1 ratio which may be due to linkage of duplicate genes (Demerec, 1923). Occurrence of albino seedlings in *D. asper* is a new report and these may be important material for functional studies which may lead to gene discovery.

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