

RESEARCH ARTICLE

In vitro propagation of *Santalum album* L.

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Abstract: *Santalum album* L. (sandalwood) is a valuable tropical plant species that belongs to the family Santalaceae. Santalol - the active compound in *S. album*, which is commonly known as sandalwood oil is highly valued in the perfumery industry due to its sweet persistent aroma. Sandalwood plants are over-exploited for harvesting their wood. Although the species is naturally regenerated by seeds the success rate is as low as 20 %. Due to the hemi-parasitic nature of *S. album*, the survival of seedlings is low making the species rare in Sri Lanka. There is a high demand for sandalwood plants for commercial scale plantations. Therefore in the present study, plantlet regeneration through somatic embryogenesis was studied in order to produce a large number of healthy plants to be used in establishing commercial scale plantations.

Mature and immature seeds, leaf discs and nodal segments were used as explants for embryonic callus induction. Nodal segments found to be the best explants for embryonic callus production. Murashige and Skoog medium (MS) supplemented with 2.5 mg/L 2,4-dichloro phenoxy acetic acid (2,4-D) and 3.0 mg/L kinetin (kin) induced callus with a mean diameter of 3.22 ± 0.1 cm after 8 weeks of incubation. Somatic embryo induction was optimized by the addition of 0.5 mg/L benzyl amino purine (BAP), 1.0 mg/L indole-3-acetic acid (IAA) and 0.5 mg/L kin to MS medium, which resulted about 10 somatic embryos per 1.0 cm² of callus. Somatic embryos germinated best in MS medium supplemented with 2.0 mg/L gibberellic acid (GA₃). The highest percentage of plantlet regeneration was observed when the germinated embryos were transferred into MS medium supplemented with 0.4 mg/L BAP and 0.2 mg/L IAA.

Keywords: Plantlet regeneration, *Santalum album*, somatic embryogenesis.

INTRODUCTION

Santalum album (sandalwood) is a valuable tropical plant species, which belongs to the family Santalaceae (Rai, 1990). It is native to the Indian sub-continent. *S. album* has been a part of the Sri Lankan culture since ancient times and has been synonymous with ancient Indian culture and heritage (Mujib, 2005). Sri Lanka is reported as one of the exporters of sandalwood to various countries (Srinivasan *et al.*, 1992). Santalol - the active compound in *S. album* - is known as sandalwood oil and is highly valued in the perfumery industry due to its sweet, persistent aroma and the fixative property (Jain *et al.*, 2003). The plants that grow naturally are over-exploited for harvesting wood to obtain santalol and also for other purposes such as to use in wood carving industries and indigenous medicine. These activities contribute towards the destruction of *S. album* plants in Sri Lanka.

In nature, sandalwood is propagated by seeds. However, the success rate of seed germination is very low (Viswanath *et al.*, 2009). The viability of seeds is lost within six to nine months of storage. Therefore, developing an *in vitro* protocol for mass propagation of this valuable species is important to produce high yielding homozygous clones for establishing sandalwood plantations.

Regeneration of *S. album* via somatic embryogenesis has been achieved from hypocotyl, nodal and endosperm explants with low success rates (less than 5 %) (Lakshmi *et al.*, 1979; Rao & Bapat, 1992). However, the

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