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In vitro propagation of the endangered medicinal orchid, *Dendrobium lasianthera* J.J.Sm through mature seed culture

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ABSTRACT

Objective: To study asymbiotic seed germination and mass propagation of *Dendrobium lasianthera* which is one of the endangered medicinal orchids using seeds.

Methods: The 14 weeks old hand pollinated seeds were sown on Vacin and Went (VW) solid medium supplemented with various concentrations of peptone (1, 2, 3 g/L) and without peptone which was used as control treatment. At the 4, 8, and 12 weeks after the seeds were sown, seed germination and shoot formation were investigated. To evaluate the role of organic nutrient additives on subsequent shoot development and root formation, particular shoots with about 1 cm length contains 1–2 leaves obtained from the seeds germination was cultured on VW medium additives with different of organic nutrient: 15% coconut water, 2 g/L peptone, 150 g/L banana homogenate, and without organic nutrient was used as control. After 16 weeks of culture, the plantlet height, number of leaves, number of roots, leaf length and root length were recorded.

Results: The supplementation of 2 g/L peptone in VW medium was proven to be suitable concentration for seed germination (100%) and shoot formation with 84.0% the protocorm development to phase 5 (shoot). VW medium containing 15% coconut water was effectively improved the shoot development, with well developed roots and leaves compared to the other treatment and 95% of acclimatized plantlets survived.

Conclusions: This protocol is an efficient way for the *in vitro* mass propagation of this *Dendrobium lasianthera*.

1. Introduction

Dendrobium lasianthera J.J.Sm. (*D. lasianthera*) is an endemic epiphytic orchid species in Papua Island, Indonesia. This species typically grows in lowland areas (0–500 m above sea level) and thrives in temperatures of 16–19 °C at night and 24–32 °C during the day, with a humidity range between 50% and 80% and the degree of acidity natural media (pH) 7–7.5.

This species is a very large plant with nearly 3 m long, cane-like stem. The flowers are about 7 cm across, fascinating and attractive with the combination of red, purple pink, maroon, and white [1]. It is medicinally important for its vegetative organs (roots, stems, and leaves) are toxic and contain anti-cancer of breast T47D with LC50 (µg/mL) = 117 ± 6.35. However, the presence of these orchids in the natural habitat is categorized as susceptible because of inevitable forest exploitation.

The main problems in the development of orchid plants as raw material for medicine are: 1) the mass propagation technique is relatively formidable, 2) the vegetative phase in its life cycle is lengthy (1–2 years) and 3) the genetic stability of the plant. Orchids can be generatively propagated through seed culture and vegetation. Orchids produce seeds in large quantity (2–3 million seeds/capsule), however they do not have functional endosperm. Only 0.2%–0.3% of them is able to germinate seeds in nature, hence the quantity is limited [2]. Vegetative propagation of

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