

# Induction of shoot buds multiplication of *Eusideroxylon zwageri* tesym. & binned (Borneo ironwood) by using nodal explants

## Abstract

*Eusideroxylon zwageri* is a tree of the tropical rainforest which belongs to a family of Lauraceae. This species is one of the hardest timber species in Southeast Asia and unfortunately endangered in some part of Southeast Asia. The objective of this study was to determine the optimal culture medium for the induction of shoot buds from nodal explants of *E. zwageri*. Different concentrations and combinations of BAP (1.0, 2.0, 3.0, 4.0, 5.0 and 6.0mg/L) alone or either in combination with NAA (0.5mg/L) or IBA (0.5mg/L) were used in order to induce multiple shoot buds of this species. The nodal explants were collected from the healthy lateral branches of two to three years old of *E. zwageri* sapling. The finding in this multiple shoot buds study showed that MS medium which have been supplemented with 5.0mg/L of BAP alone or in combination with either 0.5mg/L of NAA or IBA had induced the highest mean number of shoots buds and mean number of leaves respectively. It can be recommended that studies on plantlet regeneration of this species should be conducted and field performance should be carried out on this regenerated species.

**Keywords:** borneo ironwood, micropropagation, eusiderin, recalcitrant seed, wood

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Gibson E,<sup>1</sup> Rebicca E<sup>2</sup>

<sup>1</sup>Department of Plant Science and Environmental Ecology, Malaysia

<sup>2</sup>Faculty of Resource Science and Technology, Malaysia

**Correspondence:** Gibson E, Department of Plant Science and Environmental Ecology, Universiti Malaysia Sarawak - 94300 Kota Samarahan, Sarawak, Malaysia, Email gjb5181@gmail.com

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## Introduction

*Eusideroxylon zwageri* is a tree of the tropical rainforest zone which belongs to a family of Lauraceae and is economically vital for a source of hardwood timber in Southeast Asia. This species is commonly known as Belian (Sabah and Sarawak), Tulian or Ulin (Indonesia), Borneo Ironwood (European Union) and Biliran, Sakilan or Tambulian (The Philippines). In Southeast Asia, *E. zwageri* is popularly known as the most durable timber and crucial for building material such as for power line poles, roof shingles, and furniture due to its strong physical characteristics in which it is not vulnerable to termites, fungus and tropical wood eating insects. As a result, many cutters are appealed to *E. zwageri* and this cause exploitation and destruction of this species. According to Peluso,<sup>1</sup> the introduction of chainsaws and extensive road systems by the timber companies and the alteration of forest to oil palm and timber estates has increases the exploitation of *E. zwageri*. The decline number of this species was first reported in 1955 in the regions such as Kalimantan, Sumatra, Sabah, Sarawak and The Philippines.<sup>2</sup> According to World Conservation Union and the IUCN Red List of threatened species,<sup>3</sup> Borneo Ironwood is classified as a "Vulnerable species" as per the criteria A1cd+2cd. According to IUCN,<sup>4</sup> any of a species under "Vulnerable" category is not critically endangered or endangered but this species may facing a high threat of extinction in the wild in the medium-term future.

Traditionally, *E. zwageri* was propagated by seed. The seed of this species are recalcitrant with strong tegument dormancy and these caused the germination rate of this species is slow. In the natural forests, the regenerated seedlings can be found under the mother trees

but however due to over exploitation and shifting agriculture, the mother trees are cut off before they produced seeds and this limits the number of seed production of this species.<sup>5</sup> To date, this species has only been planted in a small scale as the supply of its seeds and seedlings is insufficient. Therefore, to prevent the extinction and derive the maximum benefits from this hardwood timber, it is necessary to preserve this species which was possible through the innovative and cost effective technologies. In this scenario, micropropagation by a mean of tissue culture such as through induction of shoot buds multiplication is one of the ideal way to overcome this problem. In this study, different concentrations and combinations of BAP (1.0, 2.0, 3.0, 4.0, 5.0 and 6.0mg/L), NAA (0.5mg/L) and IBA (0.5mg/L) were used in order to induce multiple shoot buds of this species from the nodal segments.

## Materials and methods

### Plant material

In this study, the two to three years old of *E. zwageri* trees originally sapling from the forest were maintained in the pot culture outside Plant Tissue Culture Laboratory of Universiti Malaysia Sarawak (UNIMAS). The nodes were collected from the healthy lateral branches and used as the explants. Pre-sterilization procedure was carried out in which these explants were placed under running tap water for about one hour and soaked with 0.1% Benomyl for 30minutes before they were surface sterilized with 0.1% Mercuric chloride for 5minutes. After sterilization, these nodes were thoroughly washed three times with sterile distilled water. The nodal explants were cut into 1.0 to 2.0cm before they were cultured into culture