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Evaluation of *ex vitro* growth and field performance of micropropagated polyploid clones of *Neolamarckia cadamba*

Wei Seng Ho[1]*, Shoufu Gong[2], Wee Hiang Eng[1], Kwong Hung Ling[3]

[1]Forest Genomics and Informatics Laboratory (fGiLab), Faculty of Resource Science and Technology, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia.
[2]School of Horticulture, Xinyang Agriculture and Forestry University, Xinyang City, Henan Province, China.
[3]Sarawak Timber Association, 93450 Kuching, Sarawak, Malaysia.

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ABSTRACT

The evaluation of field performance in tissue culture-derived seedlings is essential to determine their suitability for reforestation programs and commercial forestry, as it provides valuable insights into their adaptability to different environmental conditions and management practices. This report provides the first analysis of the growth characteristics of colchicine-induced polyploids of *Neolamarckia cadamba*. Field planting revealed that octoploid plants grow slower than mixoploid and tetraploid plants, but SPAD results showed that they have better photosynthetic capacity than the other two types. Notably, after 30 months of transplantation, the polyploid clones of *N. cadamba* exhibited better growth performance than other *N. cadamba* trees planted in various locations. These novel polyploid clones of *N. cadamba* could be valuable resources for advanced breeding programs aimed at producing improved clones for planted forest development. By enhancing the adaptability of polyploid *N. cadamba* clones, they have the potential to reduce the site-specific effects of *N. cadamba*, ultimately improving tree productivity and adaptation across different planting sites.

1. INTRODUCTION

The field performance of *in vitro* regenerated seedlings is critical to consider when evaluating the success of tissue culture-derived planting materials. Tissue culture techniques have gained popularity due to their advantages over traditional seedling propagation methods. These techniques enable the production of large numbers of true-to-type seedlings with desirable traits [1,2]. Hence, it is essential to evaluate the field performance of tissue culture-derived seedlings to determine their suitability for reforestation programs and commercial forestry. Furthermore, it provides valuable insights into the adaptability of these *in vitro* regenerated seedlings to different environmental conditions and silvicultural practices, ultimately contributing to the development of sustainable and productive forestry practices [3].

Neolamarckia cadamba is traditionally propagated using seeds from the selected candidate plus trees, and planted forests are established by planting the seedlings [3,4]. Propagation using seeds is undesirable and leads to off-type plants appearing in the progeny due to cross-pollination and segregation. Furthermore, if the mother trees are infected with diseases, they are transmissible to the next generation, despite the application of fungicide or insecticide during the seed germination. *In vitro* propagation or micropropagation is the method of choice to palliate this problem by producing disease-free and quality planting materials from the elite mother trees in large numbers. In fact, quality planting materials can be generated in large volumes for any planting season with minimum use of space and less initial plant material compared to traditional propagation methods.

N. cadamba, a species commonly used in reforestation programs, has well-established protocols for micropropagation [1,5-7]. However, limited information is available regarding the field performance of micropropagated *N. cadamba* in Malaysia. This study aimed to determine the *ex vitro* growth and field performance of *N. cadamba*, focusing on tissue culture-derived seedlings. The results of this study will provide useful information for the development of reforestation programs using tissue culture-derived seedlings of *N. cadamba*.

2. MATERIALS AND METHODS

2.1. Plant Materials

The plant materials used in this study were derived from prior research conducted by Eng *et al*., [7]. Briefly, nodal segments of *N. cadamba*

*Corresponding Author:
Wei Seng Ho,
Forest Genomics and Informatics Laboratory (fGiLab),
Faculty of Resource Science and Technology,
Universiti Malaysia Sarawak, 94300 Kota Samarahan,
Sarawak, Malaysia.
E-mail: wsho @ unimas.my