Propagation techniques for agroforestry: the case of the rare native medicinal plant, *Lunasia amara* Blanco

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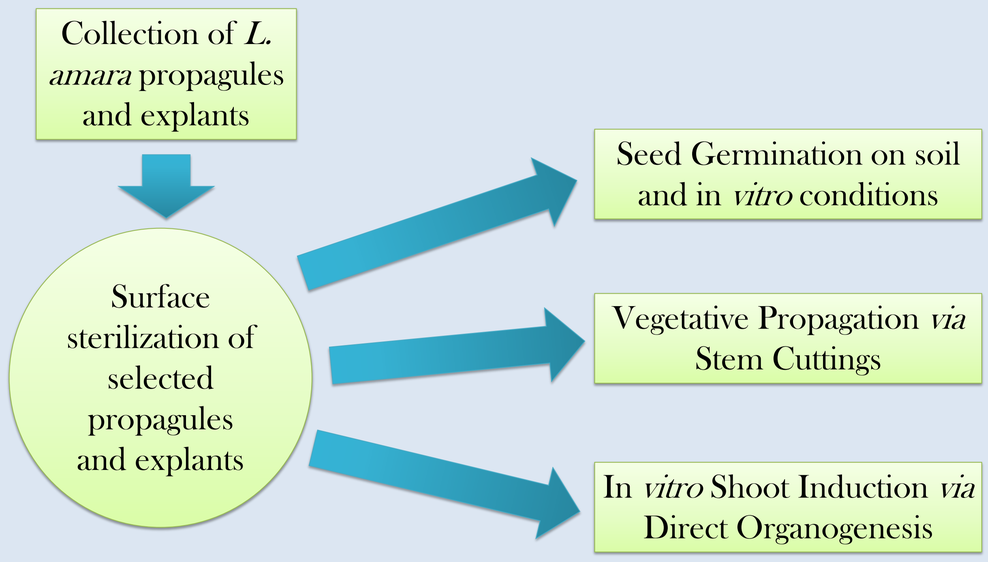
INTRODUCTION

Lunasia amara Blanco is a rare indigenous dioecious evergreen tree, under the family Rutaceae, with great ecological, medicinal, and commercial value. The bark and roots are folk-traditionally used as source of compounds with anti-inflammatory, antihistamine, anti-toxin, and anti-viral properties, specifically as treatment to wounds, allergies, poisoning, rabies, and a whole lot more[1]. The powdered plant organs contain quinolone alkaloids, 3-dimethylallyl-2-quinolones, furoquinolones, 2-arylquinolines and 4-quinolones, and sesquiterpenes[2].

Macro- and micropropagation technologies offer an innovative method of reproducing true-to-type useful plants, such that gaps in conventional means and demand for desired plant material were filled. The techniques were proven to be effective in propagating native timber, aromatic, and medicinal plants. Moreover, clonal propagation through such means are both strategic approaches for sustainable production and conservation of high value forest resources, eradicating the restrictions of time and season year round. Unfortunately, not a single report on propagation of *L. amara* is available. Undeniably, there is an immediate prerequisite to develop a plant propagation technique for rapid production and effective restoration of *L. amara* populations, while meeting local demands.

METHODOLOGY



•Establishment of culture media
- Murashige and Skoog nutrients were used as basal components of the culture medium, each of which contained 3% sucrose (w/v) and 0.6% agar (w/v); pH was adjusted to 5.7 ± 1, autoclaved at 15 pounds per square inch (psi) for 20 minutes; and were incubated in a storage room under 27 ± 1°C prior to anthesis.

•Experimental design
- All experiments were set up on a Completely Randomized Block Design (CRBD).

RESULTS AND DISCUSSION

Comparative Germination on nursery and in *vitro*

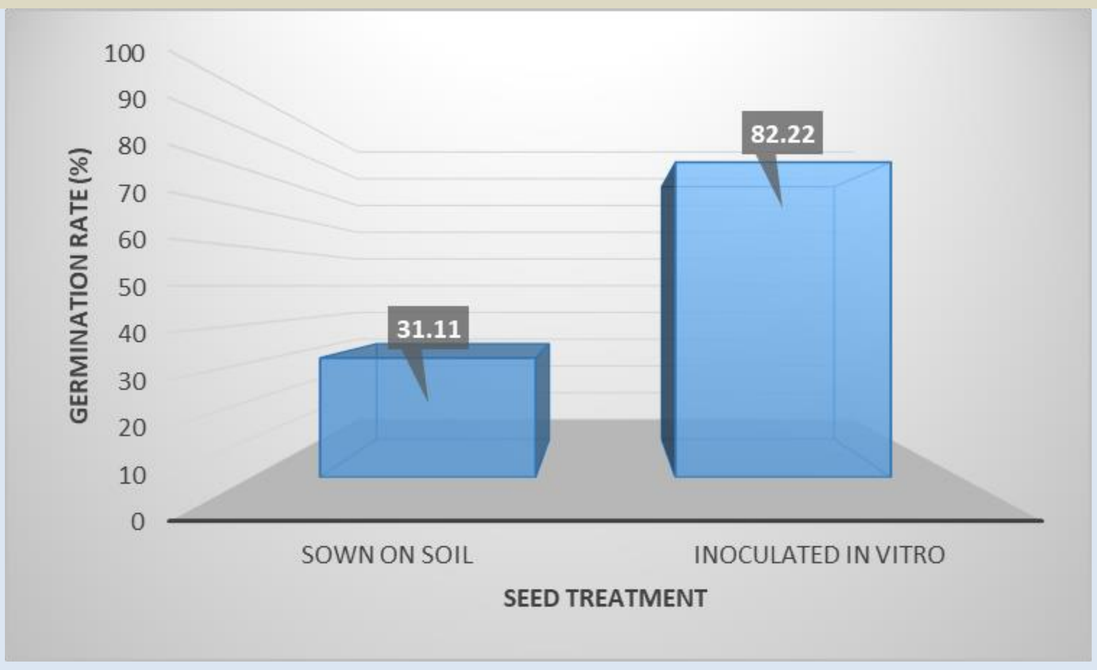


Fig. 1. Comparative germination of *L. amara* seeds under nursery and laboratory conditions.

• Seeds of *L. amara* exhibited germination on both nursery and laboratory conditions.
• However, there is a significant difference between the effects of conventional means and tissue culture on seed germination.
• Evidently, seed germination *via* tissue culture was significantly higher than those of sown on soil.

Exogenous Application of IBA for Stem Cuttings

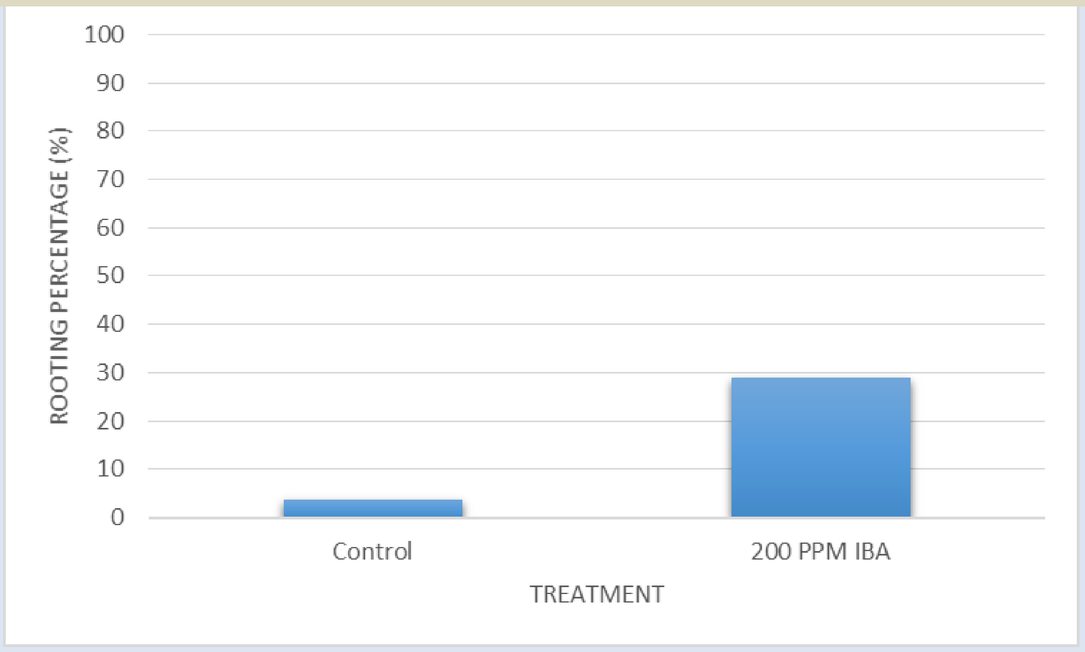


Fig. 2. Rooting percentage of *L. amara* with and without supplementation of 200 mg l^{-1} indole-3-butyric acid (IBA).

• Both *L. amara* rooting treatments for stem cuttings exhibited root formation after 4 to 6 months.
• Control produced 3.76% rooting while 200 mg l^{-1} IBA generated 29.03%.
• Majority of the remaining stem cuttings which did not exhibited rooting remained surviving.

In *vitro* Shoot Induction *via* Direct Organogenesis

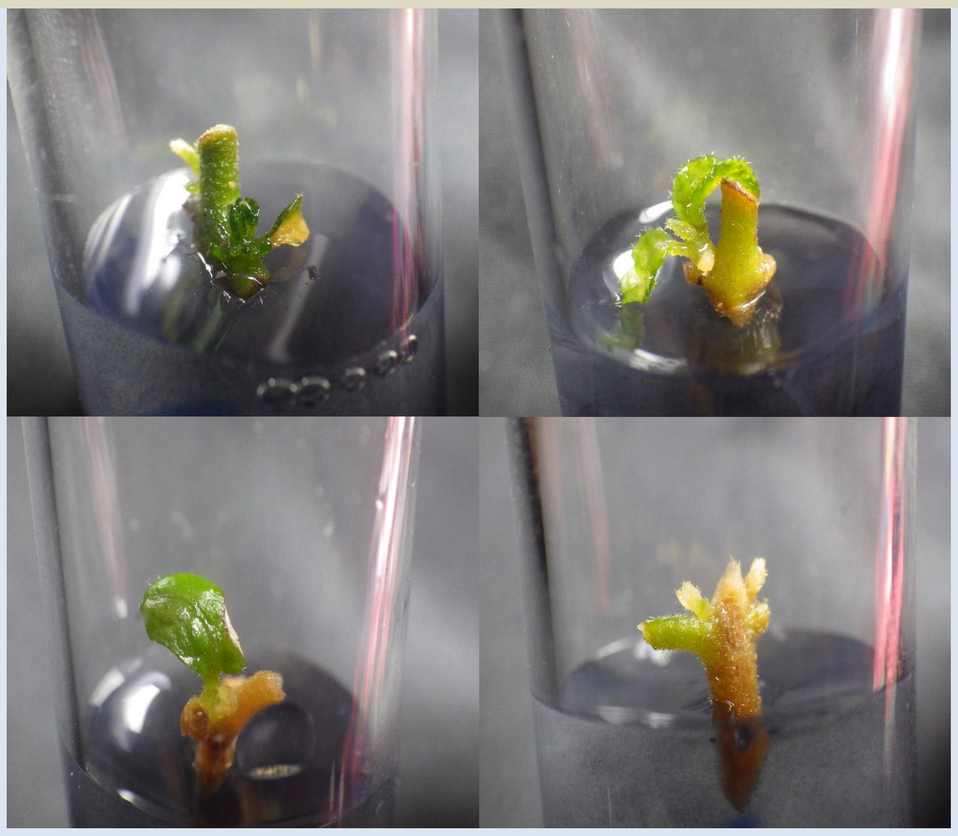


Fig. 3. Axillary shoot induction of *L. amara* inoculated onto Murashige and Skoog medium supplemented with 5 mg l^{-1} 6-benzylaminopurine (BAP)

• *L. amara* nodal sections were inoculated onto MS medium with and without supplementation of 1, 3, 5, and 10 mg l^{-1} BAP.
• Nodal sections inoculated onto 3 and 5 mg l^{-1} BAP exhibited multiple axillary shoot production with 2.00 ± 0.31 and 2.50 ± 0.50, respectively. While 1 and 10 mg l^{-1} BAP exhibited no to extremely minimal response.
• There is no significant difference between 3 and 5 mg l^{-1} BAP treatments.

CONCLUSION AND RECOMMENDATIONS

• Both macro- and micropropagation technology exhibited a promising potential onto production, conservation, and commercialization of true-to-type *L. amara.*
• The environmental conditions implemented on this study can still be optimized in order to yield more desirable results. Cooler environmental conditions can be provided as optimal cascade of several biomolecules require lower temperature. Additional amendments can also be utilized.

REFERENCES

[1]Dapar MLG & Demayo CG. 2017. Folk medicinal uses of Lunas (*Lunasia amara* Blanco) by the Manobo people, traditional healers, and residents of Agusan del Sur, Philippines. Sci Int (Lahore), 29(4), pp. 823-826.
[2]Macabeo APG & Aguinaldo A. 2008. Chemical and phytomedicinal investigations in *Lunasia amara.* Phcog Rev, 2(4), pp. 317-325.