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FIELD PERFORMANCE OF SELECTED MALAYSIAN COCOA CLONES REGENERATED THROUGH SOMATIC EMBRYOGENESIS CULTURES

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ABSTRACT

Somatic embryogenesis is one of an efficient *in vitro* clonal propagation technologies with potential to be used to mass propagate cocoa clones in Malaysia. To ensure this technology for commercial production of cocoa across Malaysia can be applied, field performance of somatic embryogenesis-derived cocoa plants were evaluated for one year in Malaysian Cocoa Board, Kota Samarahan, Sarawak, Malaysia (MCB). Twenty-five cocoa plants derived from immature zygotic embryo and 25 cocoa plants derived from staminode explants of Trinitario variety were successfully propagated and acclimatized in greenhouse condition in UNIMAS before planted in field condition in MCB. Twenty-five mother plants from the same variety propagated through grafting were planted and used as control plants. At one year after planting, there were no major differences in growth parameters between somatic embryogenesis-derived plants with mother plants. Cocoa trees from immature zygotic embryo were slightly taller (998.1 mm), exhibit larger average stem diameters (34.6 mm) and taller jorquette branches (850.5 mm) than cocoa trees propagated through staminode cultures and grafting. After one year of field test, it can be concluded that somatic embryo-derived cocoa plants showed normal phenotypes and have growth parameters similar to cocoa plants propagated through conventional method of grafting.

Key words: *Theobroma cacao*, physiological characteristics, tissue culture, field experiment

INTRODUCTION

Theobroma cacao L. or simply known as cocoa tree is one of the most important cash crop trees currently grown in the humid tropics such as in Malaysia. In the last decade, its consumption has increased as it is cultivated for its fruit in which its seeds are used for the production of chocolates and confectionaries. Presently in Malaysia, cocoa trees are mainly propagated through seed as well as via rooting and grafting of plagiotropic cuttings. Cocoa is well known for its genetic variability due to its natural propagation system (allogamous), which generates a high degree of yield variation among the seed-derived plant (Maximova *et al.*, 2002). The cocoa seeds are one of the main sources of heterozygosity of the crop in most cases, the result of cross linking between two genotypes. A large portion of low yielding trees in a single plantation was reported among the seed-derived plants (Irrizary & Rivera, 1999). In addition, there are also a number of disadvantages with the propagation of cocoa plants through rooting and grafting. These includes the need of intensive labor and thus costly, low propagation rate and formation of undesirable bush-like growth pattern of the cocoa plants. Although attempts have been made to develop organogenesis-based propagation methods, cocoa has demonstrated to be recalcitrant to *in vitro* shoot regeneration (Flynn *et al.*, 1990).

Plant regeneration through somatic embryogenesis offers an alternative approach for clonal propagation of cocoa in Malaysia. Since somatic embryos are produced through bipolar development of somatic cells, plants derived from somatic embryos are morphologically identical to their mother plant

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