

SOMATIC EMBRYOGENESIS IN *HEVEABRASILIENSIS*: ADVANCES AND LIMITATIONS

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Abstract

Plant regeneration through in vitro techniques is commercially achieved for a large number of annual species and some perennials. Among perennials, rubber tree is one of the most recalcitrant species and clonal planting material is still restricted to budded scion clones on rootstocks derived from seedlings. This talk aims to overview development of somatic embryogenesis in *Heveabrasiliensis* and discuss recent advances and limitations.

Somatic embryogenesis is the most suitable technique for large-scale plant multiplication of clones at low cost of production. Several processes were attempted in *Hevea*. Primary somatic embryogenesis generated low quantity of in vitro plants but for more than twenty *Hevea* clones (Montoro et al. 2012). Field tests revealed a higher growth and latex production for this planting material compared with conventional budded clones (Carron et al. 2009). Both absence of graft and rejuvenation process were expected to play a role in the superiority of this material. For a few number of clones, microcutting allowed getting a large quantity of plants from a few in vitro plants regenerated by primary somatic embryogenesis (Hua et al. 2010). Long-term somatic embryogenesis processes were attempted in order to develop large-scale propagation method including several ways of secondary somatic embryogenesis (Lardet et al. 2009). These processes have two main limitations. First, they are restricted to a few numbers of clones. Second, long-term multiplication of embryogenic friable calli increases risk to induce somaclonal variation. To date, no strict somaclonal variant was described in rubber tree. In some process, the use of cryopreservation and attention to culture conditions are proposed to reduce the risk of somaclonal variation (Lardet et al. 2006). Direct secondary somatic embryogenesis without passing through the stage of callus was recently developed. The direct production of secondary embryos from primary embryos was obtained for about seven clones (pers. comm. Huang Huasan). Although initially developed for the production of self-rooted plants, scions from primary somatic embryogenesis-derived plants was also identified as an efficient material to rejuvenate budwood garden. Taking advantage of the rejuvenation by primary somatic embryogenesis, conventional budding method led to generate large-scale field trials of rejuvenated budded clones (Carron et al. 2008). Other material such as rootstock clones may also be considered in the future. Finally, somatic embryogenesis was successfully used in genetic engineering programmes (Arokiaraj et al. 2001; Leclercq et al. 2012; Sobha et al. 2003).

Development of somatic embryogenesis was long hampered by the *Heveabrasiliensis* recalcitrance to in vitro methods. First developed for large-scale propagation at low cost of production, somatic embryogenesis is also a way to rejuvenate the plant material. Various varietal types could be considered using somatic embryogenesis (Montoro et al. 2012). Plant material from direct secondary somatic embryogenesis and rejuvenated budding is under test at large-scale. These methods have a low risk of somaclonal