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Cloning systems of traditional and alternative Brazilian forest species

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Cloning has an important place in the production of forest plants in Brazil, and its use is justified mainly when the availability of high productivity and quality genotypes is limited. It is an important tool to aid the plant breeding programs and mass propagation of plants. However, difficulties in obtaining rooting in some species or clones, mainly adults, have made it difficult to use in many cases. Cloning is responsible today for most of the commercial forest area planted in Brazil, mainly for the genus *Eucalyptus*. Numerous methods have been adapted and developed; among the most used and, or, with greater possibilities of application, we can mention grafting, cuttings, micropropagation, micro-cuttings and mini-cuttings techniques. Species where the objective is the production of wood and leaves (*Eucalyptus* spp and *Ilex paraguariensis*) are propagated by cuttings / mini-cuttings techniques for the formation of high production commercial clonal plantations and by grafting of adult trees for the installation of seed orchards. On the other hand, species such as *Hevea brasiliensis* and *Araucaria angustifolia*, where the objective is the production of latex and seeds (pine nuts), are propagated by grafting. Among the techniques of *in vitro* propagation, micropropagation is the most used in Brazil, mainly for the rejuvenation / reinvigoration of adult elite clones, being the high production costs the greater disadvantage. In the micro-cuttings technique, rejuvenated / reinvigorated propagules (micro-cuttings) are produced *in vitro* for later rooting to obtain plants and their continuous multiplication *ex vitro*, reducing the costs. The mini-cuttings technique arose from the limitations of the micro-cuttings technique in obtaining rejuvenated / invigorated material *in vitro*. It is characterized by the use of sprouts of plants propagated by the conventional cuttings method as sources of vegetative propagules for the formation of the mini-gardens, not previously promoting its passage through the laboratory. Over the past few years, several studies have been carried out aiming at the development of cloning systems for different native forest species in Brazil, although most studies have focused on juvenile materials. The results are still very shallow, not providing enough technology for the development of clonal forestry in most of them.

Keywords: vegetative propagation, genetic improvement, clonal forestry, woody species, rooting.