CLONING ELITE HYBRID SWEETGUM TREES FOR ENHANCED BIOMASS PRODUCTION AND OTHER APPLICATIONS

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Somatic embryogenesis-derived hybrid sweetgum (*Liquidambar styraciflua* x *Liquidambar formosana*) clones developed for pulp and paper and biomass energy applications, have displayed a range of growth rates and other phenotypic variation. Some of the fast-growing clones show promise for fiber production, while others offer potential as ornamental trees. We investigated variables to try to improve somatic seedling quality of the most interesting hybrid sweetgum clones. A pre-germination cold treatment of at least eight weeks improved both germination frequency and conversion frequency of the somatic embryos to close to 100 percent, and produced more vigorous plantlets than embryos given a four-week cold treatment or no cold treatment. Germinating embryos vertically in test tubes rather than on plates of gelled medium helped eliminate a problem with crooked root collars in the resulting somatic seedlings, which had previously been found to lead to a higher chance of stem breakage. A group of eight-year-old hybrid clones that had displayed outstanding growth rates in a test planting were propagated via somatic embryogenesis using staminate inflorescence explants excised from dormant buds. Embryogenesis induction for the three clones in the study ranged from 1.6% to 12.8%, depending on clone and plant growth regulator treatment, with NAA providing a higher induction frequency than TDZ. A demonstration planting of somatic seedlings representing seven hybrid sweetgum clones revealed a number of potentially useful phenotypes for rapid biomass production or ornamental uses after one season of growth, with some clones growing over 1.1 m in 4 months and others with dwarf or shrub phenotypes. Some clones also displayed striking fall leaf color. The manipulation of embryogenic suspension cultures of the hybrid clones will enable the synchronous production of thousands of propagules of the most desirable clones for biomass energy, as well as for landscape trees and other applications.