PLOIDY VARIATION IN EMBRYOGENIC YELLOW-POPLAR

C.L. Rugh[1], WA. Parrott[2], and S.A. Merkel[1]
[1]D.B. Warnell School of Forest Resources and [2]Department of Crop and Soil Sciences
University of Georgia, Athens, GA 30602

Tissue culture methods have been used to proliferate many plant taxa with great rapidity and in high numbers. These features alone make such methods attractive for plants having long generation times and/or low seed yields. In addition, for many agronomically important plants, genotypic variation is problematic. Somatic embryogenesis, a specific form of tissue culture technique, may potentially avoid the genotypic variation that exists in seed progeny. Rather than resulting from the fusion of meiotically "mixed" gametes in many independent fertilization events as in sexual reproduction, somatic embryos may be derived from cells of a non-sexual vegetative tissue, presumedly all cells having identical genotypes. These progeny may then be considered clones of the "parent" tissue source. Field trials have shown somatic embryo-derived plants to perform comparably to seed derived-plants during the juvenile stages observed so far. We have developed and maintained somatic embryogenic yellow-poplar *(Liriodendron tulipifera* L.) tissue culture lines for several years. These cultures are maintained in a proliferative state as proembryogenic masses (PEMs), by the inclusion of plant growth regulators (2 mg/1 2,4-D, 0.5 mg/I 6-BAP) in the growth medium. Transfer of PEMs into medium devoid of growth regulators allows for the development of embryos. However, as time in culture increases, the embryogenic capacity of the tissues continues to diminish. One line maintained in culture for five years appears healthy and highly proliferative, but upon transfer to permissive medium PEMs produce embryos with very low frequency. The genetic regulation of the embryogenesis process is apparently being lost in culture over time. This breakdown is probably highly variable within a given culture, and may simply be less severe in younger aged culture lines. We have examined culture lines for cytogenetic variation using chromosomal staining techniques. Ploidy variation has been observed within culture lines. These variations in chromosomal set number may be correlated with genotype of the source tissue and time in culture. These results may demonstrate one source of variation inherent in tissue culture systems, and may also have consequences for long term tissue culture programs.