

Improving rooting and acclimatization of micropropagated transgenic American chestnut

Allison D Oakes; William A. Powell; Charles A. Maynard, State University of New York College of Environmental Science and Forestry

ABSTRACT

Many native hardwood tree species are being threatened by exotic pests, and only genetic engineering can offer a solution before functional extinction occurs. The transgenic American chestnut aims to be a success story in the field of restoration; a transgene from wheat confers full resistance to the chestnut blight. Many hundreds of these trees are needed for inoculation plantings throughout the country, but production is bottlenecked due to the difficulty of making hardwood trees produce roots through micropropagation. In these experiments we attempted to improve the post-rooting stage of our American chestnut propagation protocol. The presence of roots and living shoot tips precede successful acclimatization of tissue culture-produced American chestnut plantlets. Several variables were tested in the post-rooting stage of plantlet production to increase root production and shoot tip survival, including vessel type, hormone and activated charcoal concentrations, and a vermiculite substrate. For plantlets with the best combination of roots and living shoot tips we recommend using post-rooting medium solidified with phytigel, containing 2g/L activated charcoal in addition to 1000uM IBA and 100mg/L humic acid in vented Magenta vessels. Improving the survival rates of the American chestnut plantlets will greatly benefit the American chestnut restoration project by providing substantially more plant material for both inoculation and ecological studies. In particular, pursuit of a non-regulated status for these transgenic trees will require years of field testing. Also, these procedures may be applicable to other difficult-to-root hardwood trees in transgenic programs, such as American butternut, white oak, and black walnut.

BIOGRAPHY

Allison Oakes has been working for the American Chestnut Research and Restoration Project since 2006. She is currently a PhD Candidate in Plant Science and Biotechnology at the SUNY College of Environmental Science and Forestry and aims to graduate in December 2015. Her current area of research is improving micropropagation of American chestnut, specifically root formation and acclimatization. She has also investigated optimal shoot forcing regimes for optimal culture establishment, environmental variables in the rooting and post-rooting stage, ex vitro rooting, and fertilization treatments. To date she has established over twenty species in aseptic culture, including the heritage Robin Hood Oak on ESF's campus.