Optimizing short term conservation methods for a functionally extinct tree species, American chestnut (*Castanea dentata* (Marsh.) Borkh.)

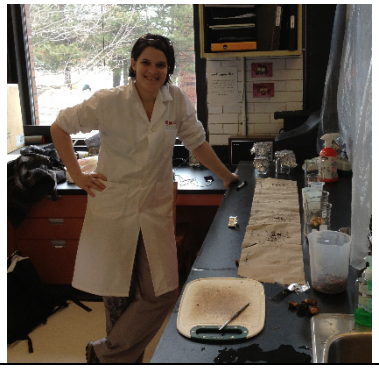
Oral Defence by PhD Candidate Christie-Anna Lovat

Plant Science

March 22, 2019 @ 13:15 — Institute of Parasitology, Room P-117

Abstract

American chestnut (*Castanea dentata* (Marsh.) Borkh.) is functionally extinct in its native range. Short term conservation methods for *C. dentata* in tissue culture were developed and improved upon in this work. Methods to improve multiplication rate (physiological stage of source material and incubation temperature) and microshoot quality (effect of exogenous medium modifications in 6-benzylaminopurine, calcium, magnesium, boron, and gelling agent type and concentration on the incidence of shoot top necrosis (STN)) were investigated in the axillary shoot culture of genotypes from genetically diverse sub-populations of *C. dentata*. Physiological stage of source material effected multiplication rate, with seedling-stage source material producing the most vigorous cultures. Incubation temperature effected multiplication rate in three out of eight genotypes tested. The most concentrated 6-benzylaminopurine treatment significantly reduced the incidence of STN. No other exogenous medium treatments reduced STN. A framework for developing a conservation plan utilizing axillary shoot culture with *C. dentata* was also discussed. A somatic embryogenesis protocol utilizing axillary shoot cultures as microcuttings was developed, with a highly successful embryo production rate (14-19 out of 20 microcuttings in competent genotypes). As well, a review was conducted critically assessing known information on the metabolomics of the host-pathogen interaction between *Cryphonectria parasitica* and *Castanea* spp. These tissue conservation tools and metabolomic insights will allow for the more effective preservation of this



About the Candidate

Christie-Anna Lovat completed her Bachelors in Botanical Science with a minor in Plant Ecology at McGill University, as well as her Masters in Science (Agricultural and Environmental Sciences) with a minor in Environmental Science. During her doctoral research, she worked as a visiting scholar at the College of Environmental Science and Forestry at Syracuse University (New York). Her research examines the role of tissue culture in conservation through the endangered plant species, American chestnut.