EARLY SCREENING POTENTIALLY BLIGHT-RESISTANT AMERICAN CHESTNUT USING SMALL STEM ASSAYS

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Restoration of the American chestnut (*Castanea dentata*) depends on producing a founder population of trees that are sufficiently disease-resistant to provide self-sustaining populations that have the timber-type growth and form of American chestnut. For 30 years, The American Chestnut Foundation (TACF) has pursued backcross breeding to introgress genetic resistance to chestnut blight (caused by the fungal pathogen *Cryphonectria parasitica*) from Chinese chestnut (*C. mollissima*) into a genetically diverse population of American chestnut. The final step in TACF's backcross breeding program, prior to species restoration, is to establish multiple, large-scale seed orchards throughout the Eastern United States. Although many thousands of seedlings are planted in each seed orchard, once seedlings are artificially inoculated and assessed, only the few hundred trees with demonstrated high levels of resistance are kept. Initial screening may be performed by visual inspection of cankers, but the final candidates must be progeny tested in order to select the best trees in the orchards. The small stem assay (SSA) is one method being tested to progeny test large numbers of chestnut seedlings for resistance, which, when compared to orchard progeny tests, may allow for a greater number of seedlings to be tested in less time. In the small stem assay, the stems of chestnut seedlings > 3 mm in diameter are inoculated with *C. parasitica* and canker length is measured every 6 to 8 weeks for several months. In 2017, TACF tested approximately 5,180 seedlings among 95 hybrid families. Results indicate that canker length was heritable among test families ($h^2 = 0.30 \pm 0.09$) and variation in canker length was significantly correlated between SSA tests and orchard progeny tests ($r_{genetic} = 0.84 \pm 0.74$). TACF will continue to experiment with SSA techniques, as many tactical questions remain and results were not consistent throughout all tests.

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