

Genetic Variation in the Endangered Florida Torreya (*Torreya taxifolia* Arn.) and Implication for Species Conservation and Resistance Breeding

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Florida torreya (*Torreya taxifolia* Arn.) is a critically endangered (IUCN 3.1) conifer with a very limited native range in the USA-- limited to two counties in Florida and one in Georgia where it persists in ravines along the Apalachicola River. The species suffered a major decline, ~99% loss, beginning in the 1930s with a total population (trees >2 cm dbh) estimated at 357,500 in the early 1900s to less than 1,500 individuals currently in the wild. The initial decline was attributed to an unknown fungal disease with a canker disease, caused by *Fusarium torreyae*, identified in 2011. The objectives of this work were to develop genetic markers to uniquely identify torreya individuals, examine the structure of the *in situ* population, and use an *ex situ* germplasm to determine if reproduction without fertilization (apomixis) occurs. We developed a panel of microsatellite markers, sampled individuals from three natural, *in situ*, populations and found structure at all levels tested. The markers were next applied to *ex situ* mothers, potential fathers, and progeny to investigate the occurrence of apomixis. Although one, of 29, progeny seedling and its mother had identical multi-locus genotypes, the probability of observing this genotype by chance, given the mother and the two possible fathers' genotypes, is approximately one in ten. Thus, we cannot adequately reject the hypothesis that apomixis occurs. Our finding of population structure suggests genotypes from as wide an area as possible are required to capture the diversity of the species in conservation efforts. The multiplexed marker panel can be used to identify individual accessions and help with managing *ex situ* collections, however, the panel is not sensitive enough to differentiate all closely related individual genotypes in the *ex situ* population.