

Beyond Blight: Silviculture and Policy Considerations for American Chestnut Restoration

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American chestnut (*Castanea dentata*) was functionally extirpated from eastern US forests by chestnut blight. As efforts to produce blight-resistant American chestnut germplasm advance, approaches to reintroduce chestnut throughout its former range are being developed. Over the past twenty years, I have collaborated with colleagues to better understand how reintroduced chestnut will perform across the landscape. We have parameterized chestnut ecophysiology, responses to silviculture, seed dispersal and establishment, and carbon storage / decay; and then used these findings to conduct modeling experiments. We have produced several key findings from this work. First, American chestnut is very fast growing, relatively long-lived, and resistant to decay. Nevertheless, aggressive restoration efforts are needed to ensure that chestnut will become a significant and stable component of the forest within a century under current or future conditions (i.e., pests, climate change). Additionally, despite its fast growing and long-lived nature, chestnut will produce only modest increases in carbon storage, mainly through slow decay of its wood. Second, analysis of non-structural carbohydrate (NSC) pools in different organs of American chestnut trees found that coarse roots were a remarkably important storage site, suggesting that chestnut may thrive under disturbance-based management. Third, the pathogen *Phytophthora cinnamomi*, which causes a root rot disease, generally reduced chestnut biomass on the landscape even when modeling using the highest levels of resistance to root rot infection that are incorporated into current breeding efforts. As root rot is expected to increase in virulence and migrate north in response to climate change, we suggest the need to further increase root rot resistance through biotechnology, as well as to target reintroduction to sites where root rot is not expected to be present well into the future. Finally, although remarkable progress has been made in developing blight-resistant chestnut, we suggest that successful reintroduction will ultimately depend on regulatory policy, informed by science and with public support.