

Survival, Growth, and Blight Incidence of Chestnuts on an FRA-Reclaimed Coal Mine in Southwestern Virginia¹

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Abstract: Until the rapid spread of a fungal blight in the early 1900s, the American chestnut (*Castanea dentata*) was the dominant hardwood species in Appalachia. Organizations such as the American Chestnut Foundation have been crossing American and Chinese chestnuts (*Castanea mollissima*) to produce blight-resistant trees, but field-testing is necessary to assess their efficacy. Reclaimed coalmines in need of reforestation in Appalachia provide thousands of acres within the range of American chestnut for field-testing. The Forestry Reclamation Approach (FRA) has improved reforestation success on coalmines, but chestnuts often do not establish well and it is unclear why. In 2008, a mix of American, Chinese, and hybrid chestnuts were planted on an FRA-reclaimed coal mine in southwestern Virginia to quantify survival, growth, and blight incidence in response to annual rye (AR), tree compatible (TC), and conventional (CON) seeding treatments. In 2016, we revisited these research plots to quantify chestnut performance in response to seeding treatments and site characteristics including soil pH, vegetation competition, slope (%), and downhill aspect. Survival was highest among the Chinese chestnuts (72.7%) ($p < 0.001$). Survival was higher within the AR seeding treatment (51.2%) than the CON treatment (36.7%) ($p = 0.005$). Several site variables affected chestnut performance. Downhill aspect was a strong driver of both ground-line diameter ($p < 0.001$) and height ($p < 0.001$). Trees at southerly aspects grew more compared to easterly aspects, though larger trees had more blight symptoms. We suspect the higher blight incidence was a function of; 1) larger trees being more likely to exhibit blight symptoms and 2) higher tree density resulting in faster spread of disease. Several site variables such as soil pH and aspect were auto-correlated and limited the conclusions that we could make. Therefore, additional studies are needed to specifically investigate the effects of site variables such as soil pH and aspect on chestnut performance.

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