

AMERICAN CHESTNUT PERSISTENCE IN SOUTHWESTERN VIRGINIA 80 YEARS AFTER CHESTNUT BLIGHT INTRODUCTION

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Forest disease noticeably alters spatial patterns of a species' distribution and this alteration is complex when host mortality is affected by site qualities. In the 1930s, chestnut blight (*Cryphonectria parasitica*) spread through southwestern Virginia, after its introduction to New York in 1904. This pandemic completely altered Appalachian forests, where a native host, the American chestnut (*Castanea dentata*) was dominant. Today, some chestnuts continue to persist in the forest understory as resprouting root stocks. Understanding the current distribution of chestnut is necessary for the management of the American chestnut, for the reintroduction of blight resistant chestnuts, and for control of invasive forest diseases in general. This project determined whether preblight chestnut density predicts current, post-blight chestnut density, and, if not, the site factors that contribute to chestnut persistence. This project was conducted at Mountain Lake Biological Station in southwestern Virginia. Sites (n=24) that were sampled before the blight pandemic were resampled using regularly spaced circular plots (1/25 ha). At each plot, aspect, slope, elevation, soil pH, and stand age were determined. Preblight chestnut and post-blight chestnut were significantly positively correlated ($p = 0.042$, $F = 4.64$, $df = 23$), but the relationship was weak ($r^2 = 0.17$) due to high variation in post-blight chestnut density. To explain this variation, an ordination using nonmetric multidimensional scaling was used to understand the relationship of site quality to chestnut loss. This analysis showed that chestnut persistence was favored on sites with low soil moisture, high heat load (southern to western exposures), steeper slopes, and acidic soil. These environmental variables may affect the prevalence or virulence of the disease. Conditions that once favored chestnut do not necessarily favor chestnut today as an understory shrub with the blight, and sites that once harbored many chestnuts before the blight may not harbor large numbers of chestnuts today.

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