

GEOSPATIAL ASSESSMENT OF POTENTIAL AMERICAN CHESTNUT (*CASTANEA DENTATA*) REESTABLISHMENT (PRESENTATION RESEARCH SUMMARY)

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ABSTRACT. The American chestnut (*Castanea dentata*) was once the dominant deciduous tree species of eastern North America forests. It produced a large amount of seeds and lumber and was regarded as a valuable commercial tree species having also a positive ecological impact on ecosystems. At the beginning of 20th century two exotic fungi, *Phytophthora cinnamomi* and *Cryphonectria parasitica*, killed so many *C. dentata* trees that its population was nearly brought to extinction. By the 1950s, *C. dentata* lost its historical position as a dominating tree species in eastern United States forests. Although some sprouts of this species can still be discovered within its native range, they are usually soon killed by the blight.

Thanks to the breeding techniques and biological control with genetic engineering, advances have been made in efforts to produce blight-resistance *C. dentata* seedlings, and its full production is projected to develop during the upcoming decades. However, even with the blight-resistant seedling production, the cultivation of *C. dentata* species will require a full site preparation and a range of intensive management plantation silvicultural treatments, which will make the reestablishment of this species expensive. Because of the high costs associated with *C. dentata* reestablishment, it is important to maximize its successful deployment by carefully choosing the most suitable sites for its regeneration and growth.

Described here study used Multi-Criteria Decision Analysis (MCDA) method to produce a spatial distribution suitability map for the reestablishment of *C. dentata* in northeast Georgia. Results of the conducted analysis suggest that in the investigated study area there is: only 3.75% of sites either unsuitable or of low suitability for rebuilding the habitats of *C. dentata*; 58.98% of sites with high, or very high, suitability for such habitats; and 37.27% of sites with medium suitability.

The results indicate that soil texture, slope, and soil organic matter, play the most important roles in *C. dentata* reestablishment suitability, while climatic factors and soil pH don't play any significant role in suitability of the sites for *C. dentata* reestablishment. Although most of the suitable sites for reestablishment *C. dentata* are present in forests, particularly with deciduous tree species, the results of this analysis showed no clear preferences of this species towards any specific land cover types. Furthermore, *C. dentata* showed also to be indifferent to most topographic conditions, and only slope appeared to be potentially a limiting factor if it exceeds 70% on the reestablishment sites, when they become unsuitable for the restoration.

This analysis also considers the ownership of the investigated sites to evaluate the potential of the *C. dentata* reestablishment on our study area from the socioeconomic point of view. Of all the suitable sites in this area, 72.56% fall within federal lands and 27.44% in private lands. Deciduous forests are the main land cover type of the suitable sites owned by both the federal government and the private landowners. Since the expensive treatments may be required to successfully reestablish *C. dentata*, the 27.44% of the private land base within the considered area will be subject to the landowners' consideration of the economic versus ecological trade offs, which may affect the reestablishment rate on these lands. Accordingly, it might be also expected that only the high and very high suitability sites may actually prove to be attractive for reestablishment of *C. dentata* on private lands.

Keywords: American chestnut (*Castanea dentata*); GIS; multi-criteria decision analysis; suitability score; Cover type mapping.