



# Understanding the Role of Insect Vectors in Oak Wilt Disease Cycle & Impacts on Chestnut Restoration



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## Oak Wilt: The Basics

Oak wilt is a disease caused by the fungus *Bretziella fagacearum* that affects certain Fagaceae species. Fungal spores enter and germinate in xylem tissue, preventing the movement of water and sap through the tree [1,2]. This causes wilting and necrosis of leaf tissue [3]. Tree death occurs rapidly as healthy cells are infected and ruptured, allowing the fungus to disperse. Spores are transmitted to healthy trees via insect vector or by root grafts [4].



Oak wilt symptoms on white oak [Germania Insurance]



Mycelial mats formed under bark are the site of spore production; these attract insect vectors using volatile compounds [Karandeep Chahal, MSU]



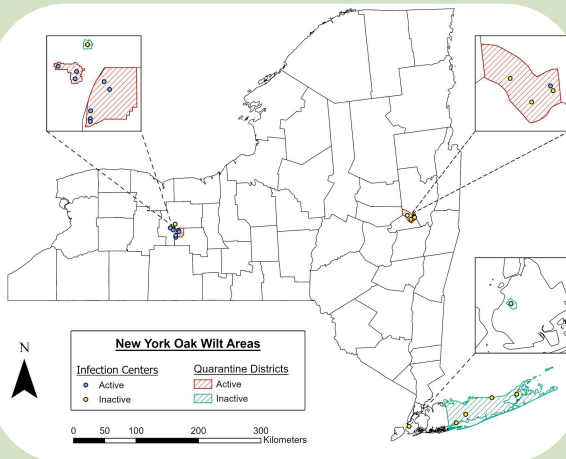
Oak wilt symptoms on a hybrid chestnut [Erin Lizotte, MSU Extension]

## Insect Vector Research

The interactions between chestnut hosts and nitidulid beetles are not well documented. The majority of studies investigating disease effects on chestnut hosts involve direct inoculation, removing the insect vector component completely. In order to further understand the role that insect vectors play in the oak wilt-chestnut complex, my research will monitor insect vectors by deploying a series of beetle traps on select chestnut species to determine the prevalence of the oak wilt pathogen in sampled nitidulid populations.

## Oak Wilt in New York

Oak wilt was identified in Schenectady County, New York in August 2008. The disease was confirmed in three more counties by 2016, and in Ontario, Canada by 2023 [5]. The NYSDEC has established quarantine zones around these areas prohibiting the movement of oak logs, branches, and firewood in an effort to prevent further spread of oak wilt.



Map of New York counties under oak wilt quarantine as of September 2024 [NYSDEC Bureau of Invasive Species and Ecosystem Health]

## Threat to Chestnuts

Chestnut trees are closely related to oaks and are susceptible to oak wilt. Oak wilt has killed chestnut trees about ten days after infection in Michigan and Ohio, first documented in 2021 and identified as recently as 2024 [6, 7].

Historically, American chestnuts were largely important to the eastern North American ecosystem and culture, but have been largely eradicated due to chestnut blight. Chinese and hybrid chestnuts are commonly planted due to their heightened resistance to blight, while multiple restorative efforts are ongoing in order to bring back the American chestnut.

Another fungal pathogen affecting chestnut trees is a concern for chestnut growers and enthusiasts alike. Understanding the oak wilt disease cycle will aid in the planning of chestnut restoration strategies, as well as inform early detection and intervention methods.

### Literature cited

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Sap beetles (Coleoptera: Nitidulidae) are widely reported vectors of oak wilt [Tom Murray, PBase]

## Objectives & Outcomes

This project will identify what fungal pathogens are vectored by sap beetles sampled from chestnut trees in New York. The objectives of this research are to characterize the interactions between nitidulid beetles and fungal pathogens, and their effects on the growth and health of chestnut trees. Understanding the interactions between oak wilt vectors and non-oak species may help organizations such as the NYSDEC implement successful mitigation strategies for future oak wilt outbreaks and will further aid restorative efforts for both chestnuts and oaks.

Outcomes of this project will provide important insight into developing threats to chestnut restoration, support arborists in restoration and conservation efforts, expand the technical knowledge of commercial growers and cultivators, and help foster greater appreciation and awareness of wildlife and nature lovers.