WiltCast and Oak Wilt Funding: From Reactive to Proactive Forest Management

By Ruhan Gupta and Varun Sanghavi

Oak wilt is one of the most destructive tree diseases in the United States. Caused by the fungal pathogen Bretziella fagacearum, it kills infected red oaks within four to six weeks at an estimated 90% mortality rate. It spreads underground through interconnected root grafts, silently crossing property lines and often going undetected until it is too late. Temperature, rainfall, humidity, and wind all influence how and where the disease spreads, with nitidulid beetles serving as the primary overland spread vector. What makes oak wilt particularly difficult to manage is the gap between detection and response. For communities across Texas and the Midwest, it is a crisis that moves unseen until the damage is done, often leaving municipalities and homeowners with few options beyond removal.

Standard treatment methods—fungicide injection and trenching—are applied reactively, after infection has already taken hold. Arborists and urban foresters are left responding to outbreaks rather than anticipating them, rarely with the spatial and temporal specificity needed to protect entire neighborhoods or municipal forests. Compounding this challenge, oak wilt research and management programs remain severely underfunded, leaving many arborists and organizations without the resources to respond effectively even when outbreaks are identified.

Predicting Oak Wilt Spread

That gap between detection and response led us to develop WiltCast, a spatiotemporal disease spread prediction model designed to help forest health professionals get ahead of oak wilt. Built using 40 years of oak wilt incidence data from City of Austin geospatial analysts and environmental data from the NASA POWER API, WiltCast allows users to input the locations of healthy and infected trees and generate month-by-month infection-progression maps paired with quantified rate-of-spread metrics. Environmental conditions can be entered manually or retrieved automatically from NASA, including temperature, precipitation, relative humidity, and wind speed at a daily scale. The result is a tool that tells arborists not just where oak wilt has been, but also where it is likely to go and how quickly.

Uses of Prediction Model

Agencies conducting forest health assessments can use WiltCast to identify which trees face the highest near-term risk, prioritize treatment resources accordingly, and provide advance notice to residents and managers before infections cross property lines. Rather than applying broad, reactive treatment across entire zones, managers can target interventions with greater precision. Our work has been featured in the International Society of Arboriculture's Tree-Sources newsletter, reaching over 26,000 arborists, and we are actively developing localized models to extend WiltCast's applicability beyond Central Texas.

WiltCast demonstrates what targeted investment in predictive oak wilt technology can create, but the broader oak wilt crisis requires this momentum extending into foundational research funding as well. Oak wilt has received approximately $112,000 total for a joint US-Canada research initiative, a fraction of the millions of dollars the USDA alone committed to threats such as citrus greening and spotted lanternfly. That disparity does not reflect the scale of the problem. Predictive tools like WiltCast can improve how we allocate existing resources, but they cannot replace the foundational research needed to develop more effective treatments and containment strategies.

We encourage SAF members and forestry professionals to explore WiltCast and to advocate for increased federal investment in oak wilt research. Oak wilt is a disease we now have better tools to anticipate: WiltCast proves that predictive, data-driven management is achievable at scale. But prediction alone cannot contain a crisis that has been chronically underfunded for decades. The scientific foundation exists; what is missing is federal investment for treatments and monitoring infrastructure. WiltCast is one step forward, and coordinated funding is the next. FS

Ruhan Gupta and Varun Sanghavi are high school juniors from Austin, Texas, and the researchers behind WiltCast. You can reach out using the contact information at https://wiltcast.ruhangupta.com.

FURTHER READING

https://wiltcast.ruhangupta.com/

https://texasoakwilt.org/backend/Docs/Materials/IntroductionToOakWilt.pdf

https://www.lakeway-tx.gov/210/What-is-Oak-Wilt-and-Why-Do-We-Care

https://texasoakwilt.org/oakwilt/oak-wilt-management

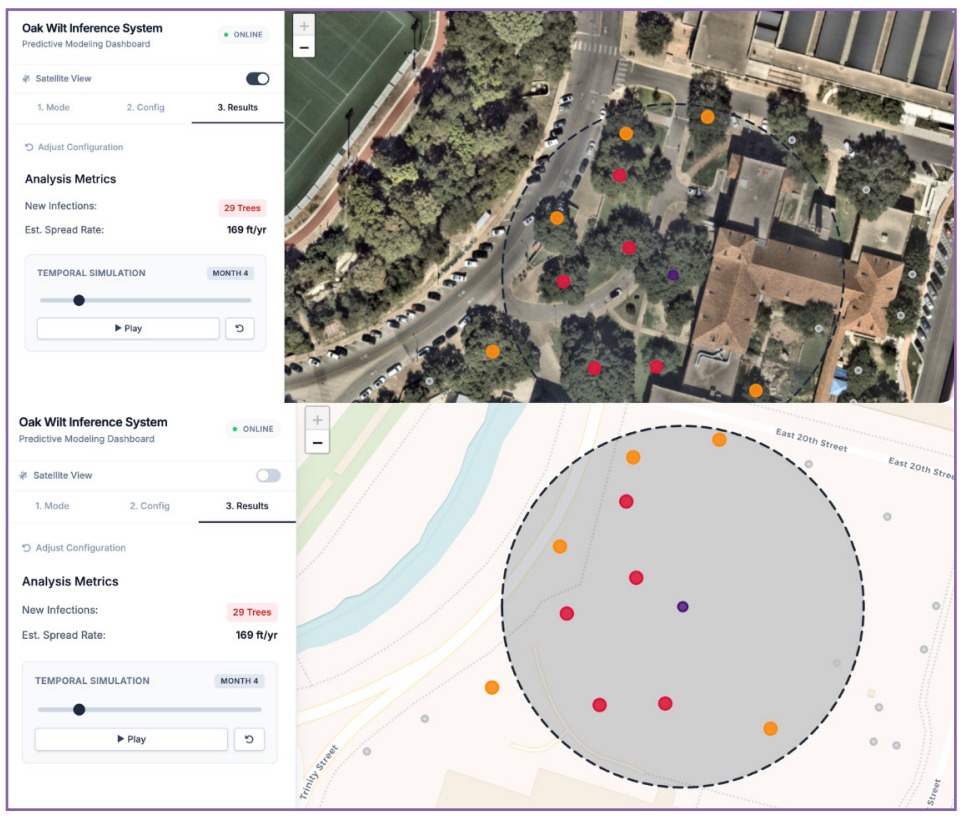
https://power.larc.nasa.gov/

https://www.fs.usda.gov/inside-fs/delivering-mission/sustain/us-canadian-project-examines-oak-wilt-expansion-factors

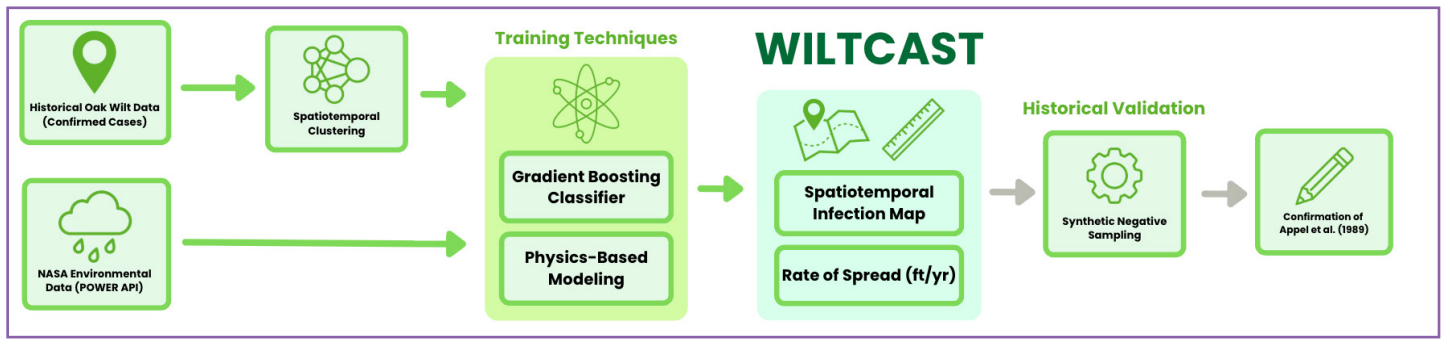
https://www.nifa.usda.gov/about-nifa/announcements/nifa-awards-nearly-23m-thwart-devastating-citrus-greening-disease

https://www.usda.gov/about-usda/news/press-releases/2018/02/07/perdue-announces-emergency-funding-spotted-lanternfly-pennsylvania

Oak wilt fungal mat on a tree. *Photo credit: Wisconsin Department of Natural Resources.*



WiltCast inferences and predictions. *Figure generated by Ruhan Gupta and Varun Sanghavi.*



The methodology of WiltCast at a glance. Figure generated by Ruhan Gupta and Varun Sanghavi.