



## Forestry Technical Note

FTN-001 May 2023

### MANAGEMENT APPLICATIONS:

- Girdle-herbicide containment method for treating oak wilt pockets was 81% successful with small pockets ( $\leq 4$  newly infected trees)
- Larger oak wilt pockets ( $\geq 5$  newly infected trees) were more difficult to contain with this method (29% containment success).
- The number of infected trees was the best predictor of treatment success and highlights the importance of active detection and rapid control efforts.



# Evaluating effectiveness of girdle-herbicide containment of below-ground spread of oak wilt

Project Type: Forest Health Study

Project Status: 4-year results

## Introduction

Oaks are on the most important sources of timber, mast for wildlife, and ecosystem services across the eastern US. Increasingly, this genus is at risk from diseases including oak wilt, which is one of the most serious threats to oaks, caused by the fungus, *Bretziella fagacearum*. The upper Midwest has over 12 million acres of oak forests much of which is on rocky glaciated soils where traditional methods of containing below ground spread of oak wilt (e.g., vibratory plow lines) are not feasible. This work evaluated an alternative containment of girdling and herbicide of oak wilt infected trees as well as neighboring oak trees likely connected via root grafts.

## Methods & Results

This study included an eight-county region of central and northern Wisconsin (Figure 1).

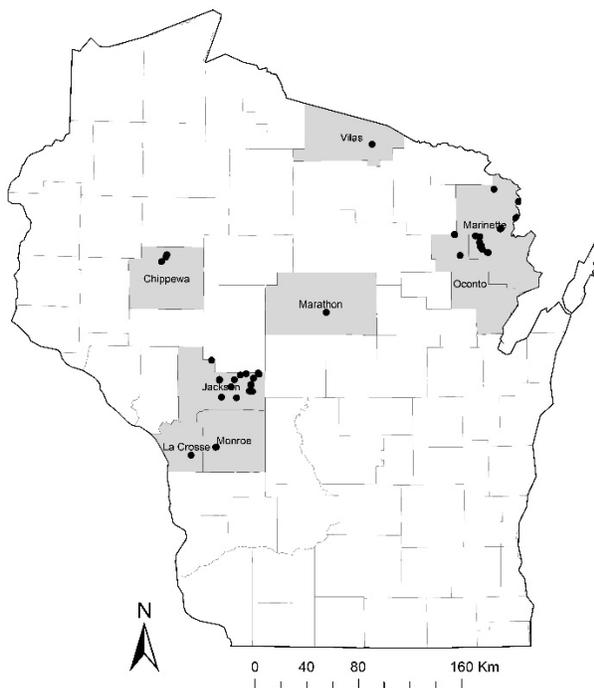
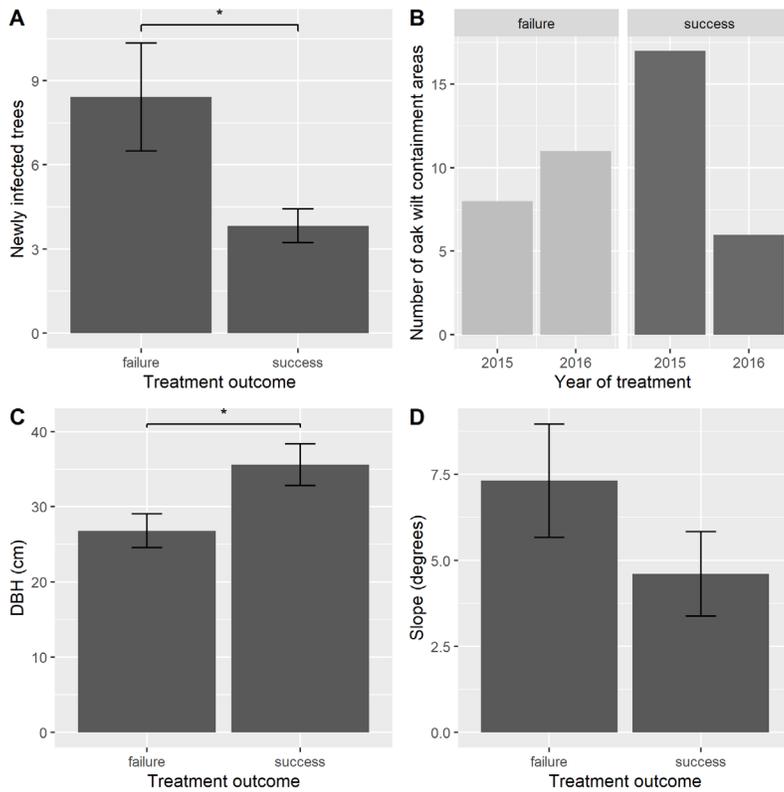


Figure 1. Locations of girdle-herbicide oak wilt containment sites ( $n = 42$ ) within Wisconsin, USA.

We selected 42 independent oak wilt infection centers within stands dominated by the northern red oak group ( $\geq 60\%$  red oak group in overstory; *Quercus rubra*, *Q. velutina*, *Q. palustris*, and *Q. ellipsoidalis*) with basal areas  $> 35$  feet<sup>2</sup>/acre. We lab confirmed oak wilt pathogen for all infections centers. Containment areas were defined based on Bruhn and Heyd (1992) which determines the probability of root grafting based on diameters and distances

among oak-wilt infected trees and neighboring trees. We used a chainsaw to double girdle all red oak trees (live-newly infected, as well as already dead, and apparently healthy neighboring trees) and applied a mixture of 25% Element 4 (Triclopyr 4) and 75% diesel using a handheld sprayer to girdles. All pockets were monitored for four years post Girdle-herbicide (GH) treatment.



Overall success of GH treatment method across all 42 containment treatments was 55%. Containment was 81% successful for smaller pockets ( $\leq$  four infected trees) and only 29% for stands with  $\geq$  5 infected trees. Successful containments were more likely with higher diameter at breast heights (DBH 14 vs 10.6 inches) and lower slopes (4.6 vs 7.3°), though sites were chosen to be similar and without high slopes. While there were significant differences in DBH, slope, and a year effect, the strongest predictor of success or failure of containment treatments was the size of the oak wilt pocket (# newly infected trees).

## Conclusion

Oak wilt has proven to be a manageable disease in the relatively few areas where consistent and long-term suppression programs have been implemented (Juzwik et al. 2011). Early recognition of newly infected trees remains critical for more effective management. The GH treatment method has the potential to increase treatment compliance

and efficacy and serve as another tool to help increase best management practices across land ownerships.

Figure 2. Predictor variables that influenced the success or failure of the oak wilt treatment method. All four variables were included in the best model and were significant ( $p < 0.05$ ) in explaining treatment outcome (a. number of newly infected trees, b. year of treatment, c. diameter at breast height (DBH), d. slope). \*Indicates statistical significant differences ( $p < 0.05$ ) between failure and success of oak wilt treatment outcome within the individual predictor variables.

## References

- Bruhn, J.N.; Heyd, R.L., 1992. Biology and control of oak wilt in Michigan red oak stands. *Northern Journal of Applied Forestry*, 9, 47–51.
- Juzwik, J.; Appel, D.; MacDonald, W.L.; Burks, S., 2011. Challenges and successes in managing oak wilt in the United States. *Plant Dis.*, 95, 888–900.

## For more information, contact:

Jed Meunier, Research Scientist  
[Jed.Meunier@wisconsin.gov](mailto:Jed.Meunier@wisconsin.gov)

## Full research publication:

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