

Bark Scribing as a Treatment for Sudden Oak Death: A Case Study in Why Controls Matter

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Over the past two decades, many treatment methodologies have been proposed to therapeutically treat oaks infected with *Phytophthora ramorum*, causal agent of sudden oak death. Because of the coastal distribution of *P. ramorum*, one of the species at greatest mortality risk is coast live oak, *Quercus agrifolia*. Bark scribing, a treatment technique listed by the University of California Integrated Pest Management program to treat *Phytophthora* infected citrus trees, seemed to show promise, especially as it had a treatment history going back nearly 100 years. We therefore endeavored to test the technique on *Q. agrifolia*.

Detecting lesion size in the bark of infected trees is a challenge without cutting into the bark. An attempt at using thermography to non-invasively detect lesion size in naturally infected oaks failed. Another approach is to introduce live inoculum at known rates into the bark of healthy trees. However, mature trees would be required for this study because young trees differ in their infection response. Finding enough uninfected mature trees to do the work took time, as it is somewhat difficult to find property owners willing to potentially sacrifice enough healthy coast live oaks to be statistically significant. In the interim, uncontrolled bark scribing pilot studies using over 200 naturally infected trees suggested that treated oaks had a better than 80% survival rate in the field.

Controlled, replicated studies done on branches of mature oaks show that the situation is much more complicated than expected. Of the approximately sixty trees used in the study, about one third resisted the pathogen so effectively that no growth occurred in either the treatment inoculations, the control inoculations, or both, and in most of these cases no living isolate of the pathogen could be recovered (though residual pathogen DNA could be detected via PCR in many of these lesions). Another sixth or so of the trees were killed by the inoculation, and therefore could not be used for this study. The remaining half of the oaks showed no significant difference between treatments and controls at the 95% confidence level.

Our interpretation of the results is that oaks are surprisingly good at killing *P. ramorum*, even if the trees do not always survive infection. Our findings have been corroborated by other researchers, using other field techniques. Thus, when practitioners utilize tools such as bark scribing to treat infections, results cannot be reliably interpreted from the survival rates of treated trees alone. Furthermore, our results cast doubt upon the purported efficacy of bark scribing as a treatment technique, even in such “proven” systems as citrus (Grafton-Cardwell et al. 2008). It turns out that this technique does not have adequately controlled research studies to back up its purported efficacy in citrus systems.

References

Grafton-Cardwell, E.E.; Morse, J.G.; O'Connell, N.V.; Phillips, P.A.; Kallsen, C.E. and Haviland, D.R. 2008. UC IPM Pest Management Guidelines: Citrus. UC ANR Publication 3441. <http://ipm.ucanr.edu/PMG/r107100411.html> (accessed 16 January 16, 2019).