Evaluating Discoloration of Woody Tissue in Relation to Mulch Type and Fungal Inoculations

Stephanie Adams[1] and Gary Watson[2]

[1] Research Specialist–Plant Health Care and Project Contact; [2]Senior Research Scientist, The Morton Arboretum, Lisle, Illinois

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Introduction

It is commonly assumed that volcano mulching (VM) can promote disease on trees, but this has not been verified by research. It is thought that VM may provide the environment and possibly render the host tree more susceptible.

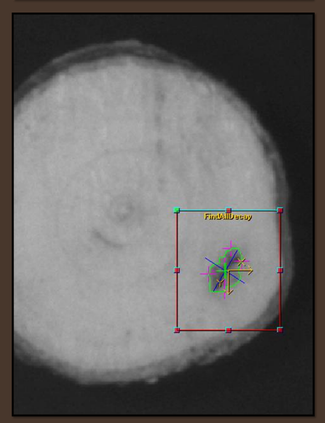
The goals of this research project are to determine 1) if disease symptoms exist on VM trees, 2) identify saprophytic and pathogenic fungi in the VM environment, and 3) whether disease symptoms (wood discoloration in this portion of the study) are more commonly associated with VM or, what is considered, properly applied mulch (RM).

Materials and Methods

In the western Chicago, Illinois suburbs *Acer*, *Tilia*, *Betula* (birch), *Malus* (crabapple), and *Gleditsia,* with >21 cm of VM, were surveyed for disease symptoms.

- Tissue samples were taken from the symptomatic areas and cultured for pathogens in the lab
- Fungal identification was done using DNA sequencing
- Isolated fungi and container-grown trees were used for inoculations
- Trees were RM or VM and inoculated with a sterile PDA plug or a fungal plug

Tree species were treated as separate experiments. The percent of the volume discoloration to the volume of the cookies were analyzed with two-way ANOVA with mulch treatments and inoculation treatments being the main factors. The Holm-Sidak method was used to determine if values were significant ($p \leq 0.05$) (SigmaStat 3.0, SPSS Science).



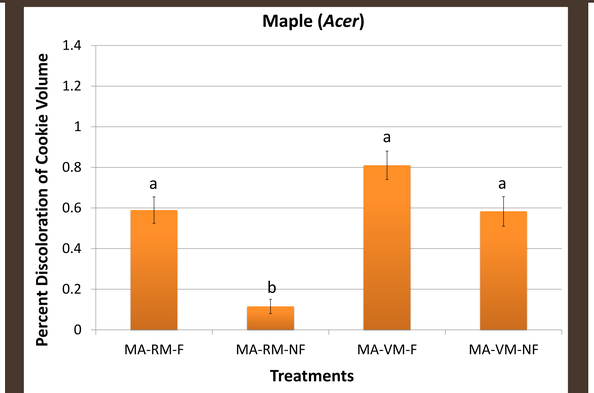


Figure 1. Significantly more discoloration was seen in VM and inoculated trees than VM and NF trees

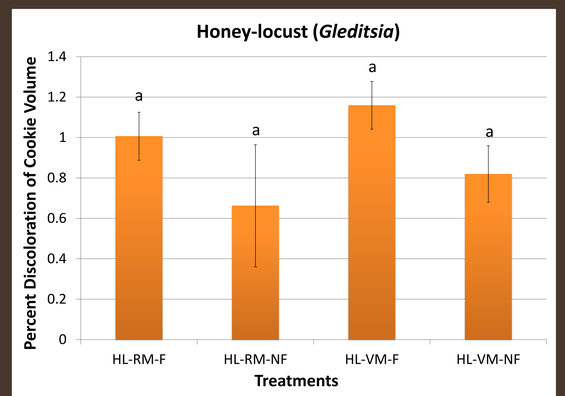


Figure 2. No significant differences were seen regardless of mulch or inoculation treatments.

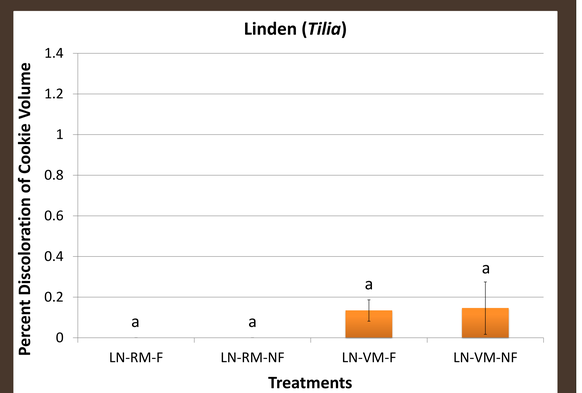


Figure 3. No significant differences were seen regardless of mulch or inoculation treatments.

Results

- Isolated potentially pathogenic fungi selected for each tree species
  - Maple: *Sporamia subticinensis* (Fig. 1)
  - Honey-locust: *Fusarium solani* (Fig. 2)
  - Linden: *Botryosphaeria stevensii* (Fig. 3)
  - Crabapple: *Lecythophora* (not shown)
  - River birch: none
- Although not significantly different, more wood discoloration was associated with volcano mulching in all each tree species
- Seventeen of the 83 trees surveyed had symptoms of disease
  - Canker, discoloration, ooze
- External symptoms were minimal for all treatments and species

Discussion

- Whether the discoloration represents infection or a physiological response to wound compartmentalization has yet to be determined.
- Some fungal species (*Fusarium*) cause staining host tissue without infection
- The lack of discoloration could be due factors including whether ample time was allotted for disease development, or the tree's ability to compartmentalize the wound.