Apple Anthracnose Control in Western Washington

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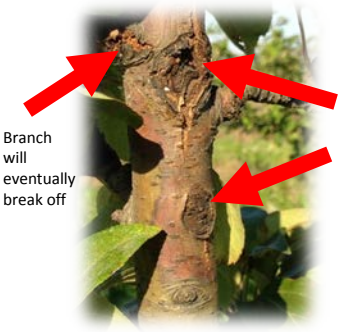
Abstract

Apple production is limited in western Washington due to apple anthracnose (*Neofabraea malicorticis*). This disease can kill newly planted trees and limit productivity of established trees. It does not impact apple trees grown east of the Cascade Mountains, thus there has been very little research done to understand or control this disease. This study includes three separate but related studies that focus on controlling apple anthracnose disease in western Washington. Study one is designed to understand the pathogen's disease cycle. Study two will evaluate current available fungicides for control. Study three will test management practices for established cankers. Information gained from all three studies will provide cider apple growers with effective management and control strategies.

Introduction

Hard cider sales in the U.S have been increasing at the rate of 50% each year since 2007 (ATTTB, 2015). In Washington, western Washington has been the forefront of this expanding market, however apple production is limited in the region due to apple anthracnose. Apple anthracnose is caused by the fungal pathogen *Neofabraea malicorticis* which produces cankers on trees. These cankers serve as a source of inoculum and cause infection to other trees and fruit. If left unmanaged, cankers increase and severely damage or kill young trees in just a few years (Grove, 1990). Apple anthracnose cankers do not impact apple trees grown east of the Cascade Mountains, and is not a serious problem anywhere else in the world. As a result, there is essentially no research done to understand or control this disease. In order for this new high value crop to be successful in Western Washington, apple anthracnose management recommendations are needed.



Branch will eventually break off

Apple anthracnose cankers on cider apple trees

Study 1: Apple Anthracnose Life Cycle and Disease Cycle

Methods

- 35 apple trees will be inoculated with *N. malicorticis* in a screen house with temperatures between 30 – 60° F and relative humidity 50 – 98% (equal to outdoor conditions)
- Bordeaux mix will be applied with a hand sprayer prior to inoculation
- A mycelia plug of the culture will be placed directly onto bark or wound for inoculation and secured with a cheesecloth and parafilm bandage for 21 days

Treatments

1. ***Bordeaux mix + wounding + inoculation***
2. ***Bordeaux mix + no wound + inoculation***
3. ***Wounding + inoculation***
4. ***Inoculation only***
5. ***Control (no treatment)***

Measurements

- Signs and symptoms of when canker appears
- Number of cankers and canker size per tree
- Number of conidia produced per canker
- Temperature and humidity in screen house

Neofabraea malicorticis culture on oatmeal agar

Cheesecloth and parafilm inoculation bandage including mycelia plug

Study 2: Evaluation of Fungicides for Control of Apple Anthracnose

Methods

- Fungicides applied to cider apple trees at WSU Mount Vernon NWREC
- Applied with a backpack sprayer every 3 weeks from March – October
- Plastic screens placed between trees to prevent chemical drift

Fungicides

1. ***Ziram*** *(a.i. Zinc)*
2. ***Pristine*** *(a.i. Pyraclostrobin + Boscalid)*
3. ***Topsin M*** *(a.i. Thiophanate-Methyl)*
4. ***Bordeaux mix*** *(a.i. Copper)*
5. ***Control*** *(no treatment)*

Measurements

- Number of cankers and canker size per tree
- Pathogen identification with species-specific PCR primers
- Resistance to fungicides

Study 3: Management of Apple Anthracnose Cankers

Methods

- Similar size cankers selected
- Apply treatments early January
- Carve out cankers with pruning knife
- Remove new cankers to appear

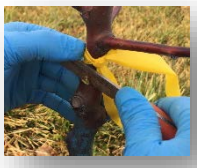
Measurements

- Canker size pre and post treatment
- Number of cankers per tree

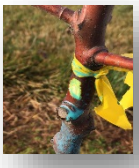
**These treatments are commonly used by growers in this region, however efficacy has not been tested; Additionally, it is not known if wounding exacerbates disease incidence*

Treatments

1. ***Carve out canker, spray carved area with 10% bleach solution***
2. ***Carve out canker, spray carved area with Nu-cop (copper fungicide)***
3. ***Carve out canker, burn carved area with hand-held propane torch***
4. ***Carve out canker, burn carved area with hand-held propane torch and spray Nu-cop***
5. ***Carve out canker, apply Bordeaux paste to carved area***
6. ***Completely cover canker and additional 1 cm margin with Bordeaux paste***
7. ***Control (no treatment)***



Carving out a canker



Nu-cop application

Literature Cited

- Dept. of the Treasury. 2015. Statistical report- wine. Alcohol and tobacco tax and trade bureau. http://www.ttb.gov/statistics/2014/2014wine.pdf
- Grove, G.G. 1990. Anthracnose and perennial canker. Compendium of apple and pear diseases. Pg. 36-37.

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