Determining Incidence of Three Diseases in Utah Stone Fruit Orchards

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Project Summary

With increasing varieties of planting stock from sources outside Utah, and changes in orchard designs and operational practices over the last several years, we have seen an increase in symptoms on stone fruits, some of which have not been identified to cause. Speculation has led some growers to apply fungicides that may have been unnecessarily applied, or may have been applied at the wrong timing. There are a few plant diseases of stone fruit trees that are fairly common in many parts of the country, but in Utah, we do not know how prevalent they are because a formal survey had never been conducted before now.

This project surveyed Utah stone fruit orchards for three specific diseases: brown rot (*Monilinia fructicola*), bacterial canker (*Pseudomonas syringae*), and cytospora canker (several *Cytospora* sp.). Brown rot has never been found in Utah, but is a major problem on peaches in some parts of the West including California and parts of Colorado, resulting in significant yield losses due to diseased flowers and fruit. *Pseudomonas* and cytospora cause stem cankers and are challenging to manage, and depend upon proper pruning, plant health maintenance, and prevention of wounds, rather than chemicals.

Cytospora was the most common pathogen found in the survey. Bacterial canker was found in eight samples, and visual inspections and culturing of plant material did not yield any occurrence of *Monilinia* (brown rot). We have received a second year of funding to continue looking for these diseases and identifying symptoms in Utah. Results of this project will help to build the capacity of Utah Extension specialists in diagnosing plant diseases accurately and provide control recommendations, and will enable growers to more effectively implement stone fruit disease IPM programs.

Project Approach

The lead investigator (Marion Murray, USU) received training from Colorado State University in identification techniques for stone fruit pathogens including preparation of specialized media, fungal identification, and incubation techniques. Marion then trained a student assistant to help work on the project (the project team).

The team traveled to a total of 12 stone fruit orchards in Utah and Box Elder counties to survey for diseased tissue at various times of the season. Most of the inspection and collection occurred during spring and early summer, when the pathogens would have been most active. During that time, each orchard was surveyed approximately 8 times, and then they were surveyed 6 additional times over the course of the summer, including harvest. The orchards were surveyed by walking in a random pattern and stopping at every 10th tree to look for: dead flower buds and shoot tips, recently killed branches, flower blasting and oozing sap, and diseased fruit. Suspect plant material

was collected and portions of the tissue were either cultured on sterile growth media or incubated. The collection sites were identified using a GPS transmitter in case a unique pathogen was detected.

Utah county agriculture extension agents were trained on identifying the specific diseases in question in early March at an in-service training workshop, and were asked to provide notification of suspect symptoms. The team received no notifications from county offices.

The team cultured and identified fungi from 181 samples while an additional 120 isolations did not grow anything on the media. Fungi were identified based on taxonomic keys. For most specimens, a wet mount of spores was prepared by teasing apart colonies with a dissecting needle and transferring to a slide with cover slip. All cultures were observed under a microscope. Out of all identified samples, the most common pathogen was cytospora, which kills bark and cambium, causing gummosis and cankers. Coryneum blight (shothole) was the second most commonly isolated pathogen, and *Pseudomonas syringae* (bacterial canker) was third. *Monilinia*, which causes brown rot, was not found. Results are shown in the table below.

Fungus	**Type**	**Number of Isolations**
Cytospora	Fungal pathogen (cytospora canker)	36
Wilsonomyces carpophilus	Fungal pathogen (coryneum)	17
Pseudomonas syringae	Bacterial pathogen (bacterial canker)	8
Monilinia fructicola	Fungal pathogen (brown rot)	0
Pennicillium	Secondary fungus	14
Alternaria	Secondary fungus	12
Botryosphaeria	Secondary fungus	11
Cladosporium	Secondary fungus	5
Botrytis	Secondary fungus	4
Aspergillus	Secondary fungus	2
Other secondary fungi	contaminants or non-pathogenic fungi	65
Other secondary bacteria	contaminants or non-pathogenic bacteria	7
Abiotic problem	hail, freeze injury	17
Blank cultures	asymptomatic flowers that were tested for latent pathogens	103

We have received a second year of funding to continue with this project. After the second year of work, results of the survey will be posted to the Utah Pests IPM website (utahpests.usu.edu/ipm). In addition, results will be written in article format with pictures, and included in the first Tree Fruit IPM Advisory for each of the 2011 and 2012 seasons, which are emailed to a membership of 3000 fruit growers. We will present results of this first year to growers at the 2011 Utah State Horticultural Association. The Utah Plant Pest Diagnostic Lab staff is now more aware of the fungi and bacteria that commonly occur in Utah stone fruit trees.

Goals and Outcomes Achieved

1. Cultures collected from this survey were donated to the Utah Plant Pest Diagnostic lab, where they can be used to help the lab improve response time to clients concerned with

stone fruit diseases. Through the second year of funding, we will look at the number of stone fruit disease samples sent to the lab, response time, and compare this to results in 2010.

2. Utah State University Extension faculty working on this project will use results of this year and next year to develop future integrated pest management strategies for stone fruit diseases through the production of fact sheets and information output in the weekly Tree Fruit IPM advisories. USU Extension is currently writing the 2011 Utah-Colorado Tree Fruit Management Guide and is incorporating results of this project into the publication.

3. Knowing which diseases are established in stone fruit orchards will allow Extension agents and specialists the ability to provide early warnings of potential disease outbreaks so that appropriate control measures may be accurately advised.

4. After the second year of this project, we expect to see improvements in profitability for Utah stone fruit growers due to improved ability to properly identify certain symptoms. Some diseases are managed with cultural controls, such as cankers, while others are managed with chemicals, such as brown rot. For example, growers learned in the weekly tree fruit advisory mailing this summer that the disease, brown rot, has still not been found in Utah, and fungicide applications that had been wrongly applied in 2009 were not applied in 2010. Pesticide applications should only be made when exact confirmation of a particular disease is made.

5. A second year of study will allow us to prepare a map of disease locations in Utah orchards from the GPS data. This information will be useful to Extension faculty and agents at Utah State University as well as to the Utah State Horticultural Association. Growers and others will know where the disease is most prevalent and could use the information for treatment, and for establishing new orchards or removing old orchards. Extension faculty and agents will be aware of potential yield reductions associated with these pests, and can quickly consult with the growers on necessary remedial actions.

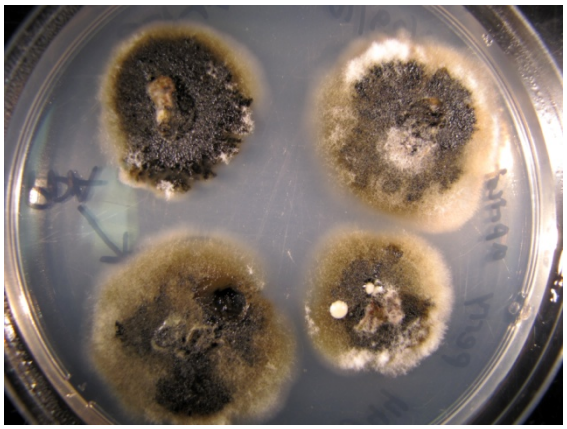
6. This project provided a training opportunity for a USU student employee majoring in horticulture. The student learned about disease identification, monitoring and sampling techniques, sterile culturing and incubation techniques, photography, and management strategies. The student has since moved on to manage a greenhouse operation. Part of his position will be to diagnose and manage plant pests. The information he learned working on this project will help him greatly in his new career.

Beneficiaries

All commercial operations growing stone fruits in Utah will benefit from this project. Approximately 200 operations grow grown stone fruits on 5,181 acres. Utah is second nationally in tart cherry production, comprising 47% of all Utah grown tree fruits, and 61% of Utah stone fruits (3,150 acres). Peach is the second most commonly planted stone fruit, comprising 1,278 acres (26% of the total stone fruit acreage). Residential backyard growers will also benefit as this group

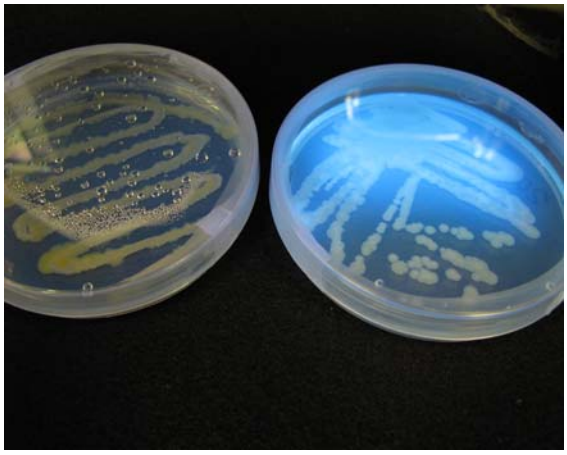
contributes significantly to pesticide applications, and having a greater understanding of fruit tree pests will help them to fine tune applications. The end goal is sustainable, healthy fruit.

Images of Cultures:

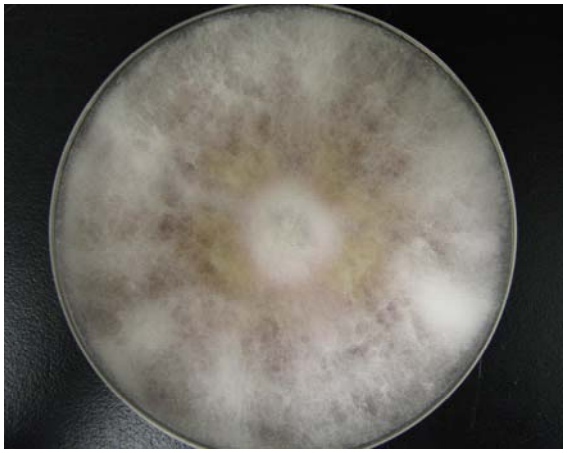


*Wilsonomyces carpophilus (*coryneum*)*

Cytospora culture



Pseudomonas syringae flourescing



Fusarium culture