

# Phytophthora Crown Rot: Widespread in 2004

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Phytophthora crown and root rot, caused by *Phytophthora cactorum*, appears to be widespread this spring. We have had 14 confirmed cases in the last few weeks. The problem is more severe in Sweet Charlie plantings, but has also been recorded in a number of Chandler plantings. In the case of Sweet Charlie, there is clear evidence the problem is plant-source related. Field observations suggest Sweet Charlie is more susceptible than Chandler and Camarosa. The incidence in Chandler plantings is sporadic and it is not clear if the disease originated with the plants or from infested fields that have a history of the disease. Once the pathogen is introduced into a field, it may become established and be a problem in future years (like black shank of tobacco).

This note is written primarily for agents and advanced growers. Growers not familiar with the disease should contact their county office and send samples to our Plant Disease and Insect Clinic.

## Symptoms

Stunting of plants or wilting of young leaves are the first symptoms and may appear at any time during the season. Current plant collapse problems are associated with fruit production and the warm weather. The pathogen infects the crown and causes a uniform brown discoloration (Figure 1) and plants will die. The dark brown discoloration may appear at the base or middle of the crown. In many cases, the brown discoloration in the crown is associated with roots that are infected and by which the pathogen enters the crown. This crown infection results in symptoms similar to severe drought stress. Leaf margins begin to turn brown and entire leaves will die (Figure 2). Plants may break freely at the upper part of the crown when pulled. Roots often are discolored brown also. In contrast, tissue infected by the anthracnose pathogen takes on a darker cinnamon color, is more firm, and often has a “marbled” appearance. In diagnostic clinics, root surface scrapings will (often) reveal *P. cactorum* oospores in the tissue (Figure 3) using a compound microscope.

## Disease Cycle

Infection is favored by wet conditions. The primary inoculum sources include oospores in the soil and infected transplants. Most epidemics in the southeastern region to date have been associated with plant problems and the importance of soil-borne inoculum is not well documented. Disease expression is influenced by time of planting and environmental conditions. Plantings established in fall may have wilted plants soon after planting but it is possible the disease will not be expressed until the following spring after the pathogen has resumed activity.



Figure 1: Left) Internal crown discoloration due to Phytophthora infection. Right) Mature planting near bloom showing empty spaces where infected plants died. Neighboring plants did not appear to be infected.



Figure 2: Left) Part of the plant has wilt symptoms due to Phytophthora infection. Right) Leaves show symptoms of drought stress beginning at the leaf margins.

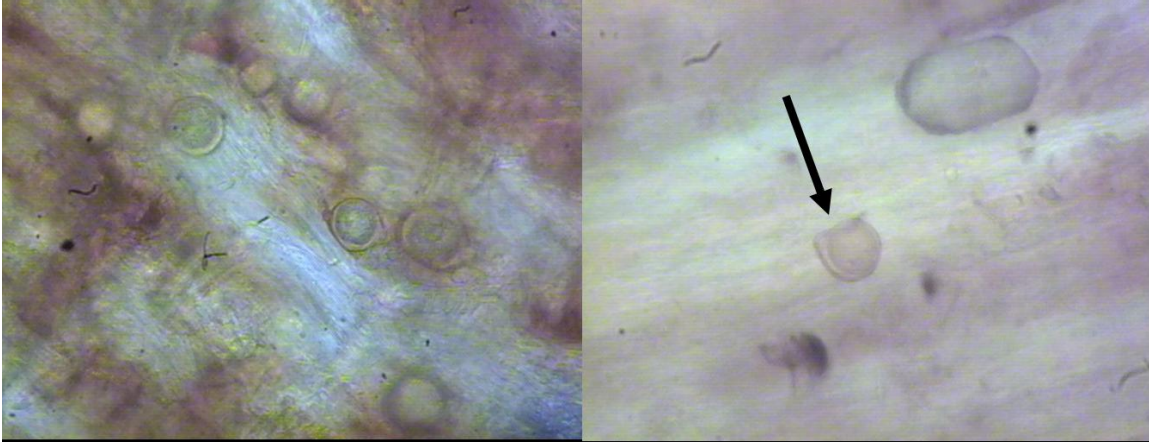


Figure 3: Clinics or labs with microscopes can take root tissue and directly observe oospores in infected tissue to achieve a rapid diagnosis. We also culture on Phytophthora selective media to confirm the problem. These oospores can escape into the soil and potentially persist for years.

## **Control**

### **CHEMICAL CONTROL THIS SPRING**

If a substantial number of plants have symptoms then field treatment may be economical. The product of choice is Ridomil Gold using a rate of 1 pint per treated acre applied through the drip line. We generally recommend an application during the period of active new root growth (early March). However, in fields that had 1 spring application or no Ridomil applied, an application now during the early part of harvest season should be beneficial.

In fields with severe and widespread stunting, the use of Aliette or ProPhyt may prove beneficial as a foliar spray. Such plants may have poor root systems and will not take up Ridomil efficiently. Aliette and ProPhyt will be absorbed into the leaves and move down the plant to the crown and roots. Excess use of Ridomil will lead to pathogen populations resistant to the chemical.

In future years, an integrated management plan should be adopted: use disease free plants and adopt practices to minimize cross contamination during plug production. Choose a site with adequate soil drainage and avoid fields with a history of disease. Plant in raised beds, not low wet spots, and rip fields during preparation if a hard pan is present. Soil fumigation may help to reduce inoculum.

Our experience with Phytophthora crown rot of pepper has shown that there is benefit when Ridomil Gold is applied as a broadcast treatment prior to forming the beds. Alternatively, Ridomil Gold could be drip applied prior to field setting transplants. This apparently ensures Ridomil is available to the plants when they are field set. It can be difficult to get adequate concentrations of Ridomil Gold to the plants relying on drip irrigation only in the fall. These thoughts are consistent with the label but have not been adequately researched in strawberry production systems.

**About The Use Of Ridomil Gold During The Harvest Season.** Growers ask about the use of Ridomil Gold during harvest and the waiting period required after treatment. The label offers no clear guidelines and I pursued this with the company. There is no waiting period for Ridomil when applied through the soil as recommended. This may seem concerning since Ridomil Gold is a systemic fungicide and may pose a health concern. However, the answer probably relates to the anatomy of the strawberry leaves and fruit. Ridomil moves through the apoplastic tissue (dead tissue and cells like the xylem or water conducting tissue). Therefore, soil applied Ridomil Gold typically follows the transpiration stream of the water and will accumulate in the leaves and other tissue that have stomates and therefore transpire a lot of water. However, the strawberry fruit does not have stomates and the fruit does not transpire large volumes of water. Rather, the fruit is a sink accumulating sugars etc from the symplastic pathway (living cells such as the Phloem). Therefore, Ridomil Gold does not accumulate in the fruit reducing residue concerns. I was involved in a number of studies with Ridomil 15 years ago documenting this type of effect. Therefore, in fields where harvest has not reached a peck and plant vigour is good, benefit may be achieved with a Ridomil Gold application if *Phytophthora cactorum* has been diagnosed. Strawberry plants will continue to put out adventitious roots and (in previous work I've done with red steele at least) there is a curative effect. Dr. Fernandez and I have had students who monitored root growth and plant anatomy and after this peek growth period the plant seems to go "downhill" and there is likely little benefit to the use of Ridomil Gold to limit disease problems. That is why in our previous recommendations we emphasized the use of Ridomil Gold as the spring growth season really initiates.

**PLEASE NOTE:**

Recommendations of specific chemicals are based upon information on the manufacturer's label and performance in a limited number of trials. Because environmental conditions and methods of application by growers may vary widely, performance of the chemical will not always conform to the safety and pest control standards indicated by experimental data.

Recommendations for the use of chemicals are included in this publication as a convenience to the reader. The use of brand names and any mention or listing of commercial products or services in this publication does not imply endorsement by the North Carolina Cooperative Extension Service nor discrimination against similar products or services not mentioned. Individuals who use chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain current information about usage and examine current product label before applying any chemical. For assistance, contact your county North Carolina Cooperative Extension Service agent.