

Chemical control of Phytophthora crown rot

Dan Legard

Phytophthora crown rot can be a serious disease in Florida. In the past, two different species of Phytophthora (*P. cactorum* and *P. citricola*) have



Crown discoloration in plant with Phytophthora crown rot

caused epidemics in Florida. The pathogen does not overwinter in Florida so the primary source of inoculum is strawberry transplants that became infected in the nursery. Because it can be difficult to detect the disease in the nursery, Phytophthora crown rot problems often develop after the daughter plants are transplanted in fruiting fields.

Two fungicides are recommended for the control of Phytophthora on strawberry: Ridomil Gold[®] EC (mefenoxam) ([Ridomil Gold label](#)) which can be applied by drip irrigation and Aliette[®] WDG (fosetyl-al) ([Aliette WDG label](#)) which is either used as a preplant dip or applied to the foliage. We recommend that growers apply Ridomil Gold[®] (1 pt / treated acre) through their drip irrigation system after plant establishment. A second application may be used if symptoms of Phytophthora crown rot appear during the season. Ridomil Gold[®] can be applied while plants are flowering and the PHI is 0 days. Ridomil is very effective at controlling epidemics of Phytophthora because it is a systemic fungicide that can cure plants that are already infected. Growers may also consider using Aliette[®] WDG (fosetyl-al). However, Aliette does not appear to be very effective at controlling Phytophthora crown rot, although pre-plant dip applications (2.5 lbs / 100 gals) may provide control. Aliette[®] is also labeled for foliar applications (2.5 to 5.0 lbs / acre) but the product would need to be applied to the crown of the plant to provide control of the disease. It also appears that multiple applications of Aliette (7 to 14 days between applications) would be necessary to control the disease.

Growers also need to consider that cultivars differ in their susceptibility to Phytophthora root rot. Although we have not experimentally determined the susceptibility of different cultivars, historically, cultivars from the University of California have been more resistant than those from the University of Florida.

Spotlight on Diagnosis

Jim Mertely

Land is already being prepared for the next berry crop, and soon the first boxes of runner plants will arrive from northern nurseries. Early indications are that some of plants will be infected by *Colletotrichum acutatum*. This fungus causes Colletotrichum fruit rot (anthracnose), and is also responsible for root necrosis, poor establishment, and other strawberry problems. How can you tell if runner plants coming out of the box are infected? It's not easy, but two symptoms should arouse your suspicions:



Black sunken lesions on leaf stalks (petioles)

A mixture of dark and tan-colored structural roots in *C. acutatum* infected plants



The first symptom (sunken, black lesions) is probably the most diagnostic. It should not be confused with slimy rotted areas typical of plants that have been stored improperly or for extended lengths of time. Look for dry, sunken lesions on the petioles of younger leaves. The second symptom can be called the "salt and pepper" effect. Make sure that roots from runner plants, not old mother plants, are being examined. Wash the roots and look for a mixture of dark infected roots and tan healthy roots. Roots that appear to be dying back from the tip or have brown blotches may also be infected.

If you note these symptoms and would like to know if *C. acutatum* is present in your planting material, we can help. Collect at least 6 plants showing typical symptoms, place them in a plastic bag, and bring them to the Dover diagnostic lab a.s.a.p. It may be possible to confirm the disease within 24 hr simply by examining the diseased material under the microscope. However, 5-7 d may be required if culturing is necessary to confirm the disease.

Major U.S. Strawberry Insect Problems Outside Florida

James F. Price

Sometimes it is a struggle to successfully manage the insect and mite problems we face in Florida and it seems that we are the only growers burdened with this huge task. Our warm weather and long production period help cause these problems, but producers in other regions also have pest control troubles just as vexing as ours. Florida growers compete on a national scale and can benefit from understanding production outside our own region. The summer inter-season period is a good time to look at the production obstacles of our competitors.

Some of the major U.S. strawberry insect problems, not normally encountered in Florida are described below:

1. **The strawberry root weevil and similar black vine weevil are pests of strawberry produced in perennial culture.** These weevils feed on strawberry foliage and their grub larvae feed on roots. Just two of these insects per plant can cause economic damage, but no satisfactory control of the underground larvae exists. Control often is not achieved until the perennial field is plowed under and fumigated.



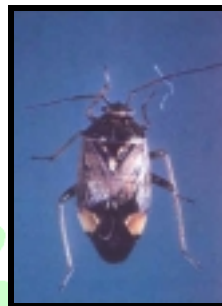
White grub of a June beetle

2. **Various white grubs of scarab beetles (including Japanese beetles, Rose Chafer, June beetle, and Asiatic garden beetle) cause similar damage and are just as problematic to control.** These are huge grubs like the ones we sometimes dig up in our yards and they are problems throughout much of the northern production areas.
3. **In the same regions, the strawberry clipper or bud weevil causes severe damage in perennial culture. These weevils girdle the flower pedicle allowing the dried flower to drop to the ground.** Control is recommended when 0.6 clipped buds are found per 2 feet of row.
4. **Whiteflies, including the greenhouse, silverleaf (sweetpotato) and banded wing whiteflies are an increasing problem in California.** The problem has reached a point that emergency use of a new pesticide has been required. These insects feed and reproduce on the undersides of leaves, weaken the plant and create sticky honeydew and the black sooty mold that follows. Low quality fruit result. Each of these insects resides in Florida, but none has become problematic on strawberry here.
5. **Potato leafhoppers with their toxic saliva plague**

strawberries in many regions outside Florida.

Affected plants are stunted and have leaves streaked with yellow that cause suspicions of herbicide damage.

6. **In production areas of high relative humidity the spittlebug creates a nuisance.** Nymphs feed on leaves and flowers and exude a frothy "spittle" mass. This activity damages the plants, but the real loss is from the terrific annoyance to pickers. Use your imagination.



Tarnished plant bug - a major pest in California

7. **The tarnished plant bug is a major pest of strawberry from California to Maine.** The insect occurs in Florida, but, surprisingly, we do not sustain economic losses. This insect inserts its needle-like mouthparts into developing flowers causing severe deformities in the fruit. Affected fruit are small, cat-faced and unfit for market. Damage can reach as high as 90%. The necessity to apply chemicals for tarnished plant bugs sometimes limits progress toward biological control of spider mites. A few ago, some growers in California used enormous tractor-mounted vacuums to control plant bugs and to allow survival of predator mites.
8. **There are still more insect pests that the other farmers must worry about.** For instance, strawberry rootworm (different from the strawberry root weevil), strawberry leafroller, and cutworm are all lepidopterous pests of strawberry that cause concern in many regions except Florida. And too, there is the cyclamen mite that infrequently visits us on transplants brought from regions that must deal with it regularly.

When the entire picture is examined, we can see that we are not alone in having to square off against threatening insects. Maybe we are even lucky that we have only the menacing few.

Smoothing out the peaks and valleys in winter strawberry production

Craig Chandler

From a labor management and marketing point of view, it would be most desirable if strawberry growers could harvest the same volume of fruit from their farms each week – just as factories produce manufactured

products on a regular and consistent basis. But, because of interactions between plants and the environment (some of which are unpredictable), this does not happen. However, it may be possible to smooth out the typical peaks and valleys that occur in winter strawberry production. Listed below are some ideas on how this might be accomplished:

- 1. Plant more than one cultivar.** Cultivars tend to differ from each other in their fruiting pattern, and these different patterns can be complementary. For example, 'Sweet Charlie' generally produces more fruit than 'Camarosa' in February, but 'Camarosa' produces more fruit than 'Sweet Charlie' in March.
- 2. Obtain transplants from more than one propagation site or nursery.** The environmental and cultural conditions a transplant is exposed to prior to digging can affect its fruiting pattern. For example, transplants exposed to cool weather during the last couple of weeks in the nursery will start to flower and fruit before transplants that are exposed to warm weather during the last couple of weeks in the nursery.
- 3. Plant the crop over several weeks.** Plants set in early October will tend to flower and fruit before plants set in mid to late October. But then as plants set in early October cycle down in production, later set blocks will often be cycling up in production.
- 4. Vary plant density.** Higher plant densities (accomplished by closer within row spacings) result in higher early season yields, generally at the expense of late season harvest efficiency and disease control. (For more information on the effects of plant spacing, link to the following research paper on the GCREC-Dover web site: ["Effect of plant spacing and cultivar on the incidence of Botrytis fruit rot in annual strawberry".](#))
- 5. Use more than one transplant type.** Plug transplants tend to have a slightly different fruiting pattern than bareroot transplants. The initial crown size of the transplant is also important. Large crown transplants tend to flower and fruit before smaller crown transplants, but the fruiting cycles of smaller crown transplants may be complementary to those of larger crown transplants.
- 6. Use more than one cultural system.** In the Po Valley in Italy, strawberry growers use a combination of open field production and plastic tunnel production to extend their season. Plants under the clear plastic tunnels come into production first because of the higher soil and air temperatures inside the tunnel, but then as the fruit production under tunnel is cycling down, plants in the open field are increasing in yield. In Florida, plastic tunnels would also allow fruit to be harvested during rainy periods, and would protect fruit from rain damage. (Please note, however, that the economic viability of tunnel production in west

central Florida has not yet been established.)

- 7. Take some acreage out of production at the end of February or in early March.** This will help lower the major production peak that occurs in March. Cultivars such as Sweet Charlie, Earlibrite and Carmine lend themselves to early termination because of their high *early* season yield. Blocks planted in these cultivars can then be converted to spring vegetable production.

Transplant storage and handling

John R. Duval

In a few weeks transplants will begin arriving in the Plant City area for planting for the 2002-2003 strawberry season. Most of these transplants will be set soon after arriving; however some will need to be stored for a period of



Overhead irrigation of new transplants

time before they are planted. Transplants should be held in cold storage at 32 to 40 °F. Once transported to the field, plants should be planted immediately and overhead irrigation applied as soon as possible to reduce heat stress and prevent desiccation. If plants cannot be planted immediately, they should be placed in a shaded spot out of the sun and protected from the wind if possible to minimize desiccation. Research at the GCREC-Dover has shown that reducing stress a transplant receives before establishment can significantly increase early yields of strawberry. By maintaining proper storage conditions and minimizing water and heat stress in the field strawberry plants will establish quickly, resume growth and begin to produce berries earlier.

Center Update

Christine Manley

Another successful AgriTech meeting was held August 27 and 28 in Plant City, and we received some valuable feedback with our Grower Survey. We received 26 surveys back from the meeting participants who farm over 2500 acres in the area. Nearly 1800 of those acres are for strawberries. In addition, the average number of years the growers have been farming was 20. Other interesting findings included the traits a grower looks for in strawberries, which were firmness and disease and pest resistance. All but two of the survey participants have brought a sample to our diagnostic clinic and 100% of the

problems were properly identified and growers found the service very useful. Every single survey noted that growers are very interested in a Production Guide being developed, and many of the respondents agreed that a certification program for healthy transplants would be desirable. The most popular variety last year was Camarosa partly because it has the least fruit rejections and most attractive fruit. Over 30% of the growers were using predatory mites for spider mite control. Reasons growers didn't use predatory mites were that miticides are effective and predators control spider mites too slowly. All but two of the participants in our survey use drip irrigation. And when it comes to determining fertilization requirements and the rate applied, most growers use experience as their guide. We appreciate the time each grower spent completing our survey and the information will be put to good use. Look for complete results of our survey on our website in the near future. In addition, you will be able to access the PowerPoint presentations and abstracts from several of the IFAS speakers.



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