

Root Necrosis of Strawberries Caused by *Colletotrichum acutatum*¹

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Colletotrichum acutatum is widely known as a fruit rot pathogen, but also infects other strawberry tissues, including the roots. Root necrosis has been observed in Florida since 2000.

Pathogens and Symptoms

Transplants with infected root systems often grow poorly or fail to become established after overhead irrigation is withdrawn. In 1997, Freeman and Katan reported similar symptoms in Israel, and linked the problem to root necrosis (root rot) caused by *Colletotrichum acutatum*. Few functional roots are found on infected plants even 1 to 2 weeks after transplant (Figure 1). Old structural roots are brown or black with few feeder roots, whereas new roots develop brown lesions, die back from the tip, or fail to emerge from the crown (Figure 2). In severe cases, *C. acutatum* enters the crown, causing a basal crown rot and eventually killing the plant (Figure 3). Surviving plants are stunted or variable in size, flower late, and produce a poor early crop (Figure 4). Infected plants may recover during the cool winter months and produce normally in February and

March, if an outbreak of anthracnose fruit rot does not occur.

Disease Development and Spread

C. acutatum frequently colonizes leaves and petioles of runner plants in the nursery. Symptoms may not be visible in the nursery environment, but if inoculum is allowed to build up and the weather is favorable, flowers and fruit are attacked and lesions may develop on the petioles (Figure 5). Little is known about how or when the pathogen spreads from colonized tissue above the ground to the root system below. However, *C. acutatum* grows freely in diseased tissues, and has been isolated from the soil around diseased plants. Healthy plants are presumably contaminated by this inoculum during normal digging, trimming, and packing operations in the nursery.

Early in the season, disease spread below ground is unlikely since the root systems are relatively isolated; however, above-ground spread in the foliage does occur and may be facilitated by overhead

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irrigation during establishment. Observations made at the GCREC-Dover suggest that disease severity is influenced by the degree of plant stress during establishment. Preliminary studies suggest that plant losses are increased by high levels of fertilization. Cultivars that are highly susceptible to anthracnose fruit rot, e.g., Camarosa and Treasure, are also susceptible to root necrosis disease. Additional research is needed to confirm these observations and to investigate other factors which influence disease development in the field.

Control

Diseases caused by *C. acutatum* are best controlled by exclusion (not introducing the pathogen into the field). Therefore, transplants should be purchased from a reputable source. While this does not guarantee disease-free material, reputable nurserymen take measures to limit disease occurrence and spread, and avoid selling transplants from obviously infected fields when control measures fail. Transplants should be inspected for petiole lesions caused by *C. acutatum* (Figure 5).

When the pathogen is present and susceptible cultivars are being grown, pre-plant fungicide dips may be used to suppress disease development. Abound®, Oxidate®, and Switch® are currently labeled for this use (Table 1). All three products were tested over two seasons at GCREC-Dover by dipping naturally infected runner plants for 5 minutes just before planting. In the first year, few plants were lost to root necrosis disease regardless of the treatment, and only Switch produced a significant increase in late-season marketable yield. In the second year, plants dipped in Abound or Switch survived better and produced higher marketable yields than those dipped in Oxidate. In both tests, Switch was more effective than other products in reducing plant colonization by *C. acutatum*.

Measures that reduce plant stress during establishment may also reduce the severity of root necrosis disease. Whenever possible, strawberries should be planted in the morning to avoid high temperatures and drying conditions that occur in the afternoon. After setting, overhead irrigation should be started as soon as possible to prevent transplants from

wilting on the hot plastic. After 7 to 8 days, plant response should be used to determine if overhead irrigation is still necessary. Irrigation should be continued in the afternoons if drying conditions are encountered or the plants wilt when water is withdrawn. If hot weather is expected after overhead irrigation is withdrawn, consider spraying the beds with Surround®, which reduces heat stress by coating the plants and plastic with white kaolin clay. Surround was the only product that significantly increased early season yield in one of the tests mentioned above.



Figure 1. Root necrosis symptoms (few functional roots).
Credits: UF, GCREC

Literature cited

Freeman, S., and Katan, T. 1997. Identification of *Colletotrichum* species responsible for anthracnose and root necrosis of strawberry in Israel. *Phytopathology* 87:516-521.



Figure 2. Root necrosis symptoms (root lesions). Credits: UF, GCREC



Figure 4. Stunted plants due to root necrosis. Credits: UF, GCREC



Figure 3. Basal crown rot caused by *Colletotrichum acutatum*. Credits: UF, GCREC



Figure 5. Petiole lesions caused by *Colletotrichum acutatum*. Credits: UF, GCREC

Table 1. Products labeled in Florida for control of root necrosis.

Trade Name	Active ingredient	Type	REI* (hours)	Comments
Abound	azoxystrobin	strobilurin	4	Pre-plant dip in 5 to 8 fl oz of 2.08 lb flowable formulation per 100 gal water.
Oxidate	hydrogen peroxide	oxidizer disinfectant	**	Pre-plant dip in 64 fl oz of 27% formulation per 100 gal water. Higher rates (e.g., 128 fl oz) may cause stunting or phytotoxicity.
Switch	cyprodinil + fludioxonil	pyrimidine + pyrrole	12	Pre-plant dip in 5 to 8 oz of 62.5WG formulation in 100 gal water. One-year plant back restriction.
Surround	kaolin clay	stress reducer	4	Add 25 to 50 lbs to 100 gal water and spray over tops of beds. Gradually washes off plants and plastic during subsequent rains.
<p>* PHI = Post harvest interval. REI = Restricted entry interval. ** After the application has dried. Recommendations: Follow label instructions closely when dip treating transplants. To avoid possible phytotoxicity, carefully monitor treatment times, and set the transplants as soon as possible after dipping. Recommendations given in this fact sheet are based on experimentation and statements from the manufacturer. Consult your product label for specific use requirements and restrictions.</p>				