Botrytis Fruit Rot (Gray Mold) and Flower Blight of Strawberry

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Botrytis fruit rot (gray mold) is one of the most important diseases of strawberry worldwide. In Florida, this disease causes severe preharvest losses primarily due to infections of fruit and flowers, especially under humid conditions when daytime temperatures are moderate to warm (60°F to 75°F). Botrytis fruit rot is also a major cause of postharvest losses during storage and transit, since the fungus grows at refrigeration temperatures.

Casual Agent and Symptoms

Botrytis fruit rot is caused by the fungus *Botrytis cinerea*. This pathogen infects a wide range of plants including many fruit, vegetable, and weed species. On strawberry, infection begins at the flower stage but symptoms are observed on green or ripening fruit (Figure 1). Fruit lesions are typically found on the stem end of the berry and are frequently associated with infected stamens, or with dead petals that stick to the fruit or become trapped under the calyx (Figure 2). Lesions begin as small, firm, tan spots (Figure 3) that quickly enlarge and become covered with white fungal mycelia and gray to brown spores (Figure 4). *Botrytis* eventually consumes and mummifies fruit that are not harvested (Figure 5). When mummified and severely diseased fruit are disturbed, large numbers of spores can be released and are visible as gray puffs.

Disease Development and Spread

Botrytis fruit rot epidemics are typically started by spores produced on dead strawberry leaves within the field. Young expanding strawberry leaves are colonized by the fungus without producing any symptoms. As the leaf senesces, the pathogen spreads quickly through the dying tissue and sporulates. Spores are dispersed by air, water or harvesting and ultimately infect different floral parts including stamens and petals. After infecting the flower, the fungus eventually invades maturing fruit and causes rot. Direct infection of fruit by spores is not considered important. The fungus can also spread to adjacent fruit by direct contact (Figure 6). As the epidemic progresses, the pathogen sporulates on diseased flowers and fruit, and these become important sources of inoculum. The fruit rot phase of the disease can be particularly severe in west central Florida where plants produce flowers and fruit over several months.
Control

Control of *Botrytis* fruit rot and blossom blight requires a combination of chemical, cultural, and genetic control methods. Although no strawberry cultivars are highly resistant to *Botrytis* fruit rot, cultivars with large clasping calyxes are often more susceptible, because moisture collects between the calyx and the receptacle and encourages the spread of the pathogen from stamens and petals to the developing fruit.

Fungicides dramatically reduce *Botrytis* fruit rot by protecting the flowers and leaves. Effective control of *Botrytis* fruit rot involves protecting the flowers and leaves from infection, or preventing sporulation of the fungus. Effective disease management involves regular applications of a general protective fungicide combined with timed applications of specific fungicides during peak bloom periods. Fungicides labeled for application in Florida are listed in the current issue of the Florida Plant Disease Management Guide (University of Florida, IFAS Publications). Weekly applications of protectant fungicides should begin immediately after overhead irrigation for plant establishment is over, and continue throughout the season. Additional applications of protectant fungicides may be made during periods of rainy or humid weather.

Timed applications of fungicides specifically labeled for *Botrytis* should be made during peak flowering periods. The first two applications can be made at 10% bloom and again 7 days later. It may be best to apply 3 to 4 bloom applications 7 days apart during the second peak bloom period when disease pressure is more severe and large numbers of flowers and fruit are produced. Combine these bloom applications with the standard weekly fungicide applications. The removal of all diseased and unmarketable fruit from within the plant canopy is critical for effective management of *Botrytis* fruit rot, as this fruit is an important source of inoculum that directly infects nearby flowers and fruit. The removal of senescent foliage also reduces inoculum but provides only limited control of *Botrytis* fruit rot.

**Figures**

Figure 1. Symptoms on immature fruit. GCREC-Dover 2000.

Figure 2. *Botrytis* infection that started with the petal in the middle of the lesion. GCREC-Dover 2000.

Figure 3. Young *Botrytis* lesion on immature fruit. GCREC-Dover 2000.
Figure 4. Sporulating lesions on mature fruit. GCREC-Dover 2000.

Figure 5. Mummified fruit consumed by Botrytis. GCREC-Dover 2000.

Figure 6. Spread of Botrytis by fruit-to-fruit contact. GCREC-Dover 2000.