

# MANAGING GRAY MOLD OF STRAWBERRY

Bill Turechek, Dept. of Plant Pathology, Cornell University, Geneva, NY

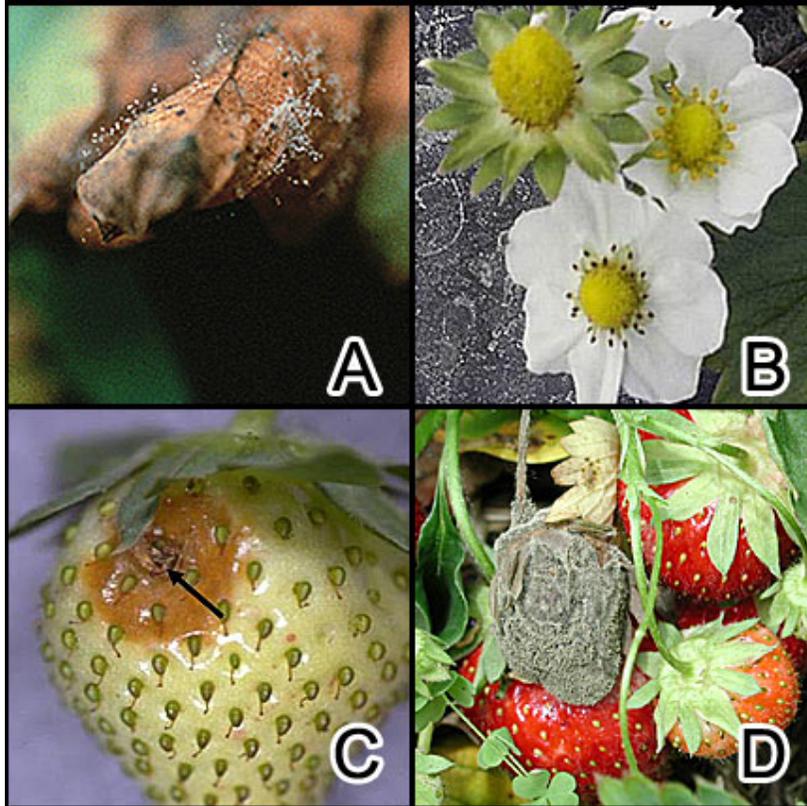


Gray mold is the most common fruit rotting pathogen of strawberry in New York. It is a major problem during bloom and on ripening, mature and harvested fruit, particularly during wet weather. Aside from the direct losses the disease can cause in the field, diseased fruit are unsightly in pick-your-own operations or in pre-picked baskets and may have an adverse affect return customers.

## Disease Cycle

Gray mold is caused by the fungus *Botrytis cinerea*. This fungus is probably the most ubiquitous pathogen worldwide in that it attacks numerous fruits, vegetables, and ornamental plants. *B. cinerea* survives the winter in dead or dying leaf tissue and plant debris. In spring, the fungus produces spores that are disseminated to susceptible plant parts by wind and splashing rain (or irrigation water).

Under cool and wet conditions, fungal spores germinate and infect the blossoms and leaves. Symptoms on leaves are not obvious until leaves begin to die, and for several weeks afterwards the fungus produces spores on the dead and dying leaves (Fig A). These spores serve as the primary source of inoculum for blossom and fruit infection. Blossom and mature fruit infection is possible when rain, heavy dew, or overhead irrigation occurs in combination with temperatures in the range of 40-85 F; the most conducive temperatures for infection lie within the range of 59-77 F. Infection can occur with as little as 6 hours of wetness, and the rate of infection approaches 90% when flowers or fruit are wet for 24 hours or more.



Blossom infection is the primary means in which fruit become infected. Flowers are susceptible once they have opened, but the susceptibility to infection increases dramatically two to three days after opening. The fungus attacks the petals, stamens, and pistils but not the sepals (Fig B). One to several blossoms per cluster (inflorescence) may become infected, and infected blossoms often turn brown, wilt, and die. This is called blossom blight. The fungus enters developing or immature fruit via these individual flower infections where it remains quiescent (latent) until the fruit begin to ripen. Green fruit are virtually resistant to direct infection.

As the berries begin to ripen, the fungus becomes active and begins to colonize the fruit. Symptoms start as a discoloration and typically at the calyx end (Fig C). If the infected berries do not fall to the ground, they shrivel, dry and eventually form a "mummy". In the process, the fruit become covered with the grey powdery fungal spores that are easily dispersed by wind and splashing rain (Fig D). Additional fruit infection from these spores is possible, but considered to be of minor importance compared to those initiated through blossom infection. However, mature fruit do become infected when they are in direct contact with rotten fruit, particularly when wet weather occurs through the harvest period.

### **Disease Management**

Several cultural practices can help minimize disease development. Because prolonged wetting events significantly increase the risk of infection, any practice that facilitates good air circulation through the canopy and rapid drying of fruit can diminish the amount of infection. This includes proper plant spacing within and between rows and weed control. Gray mold is often most severe within the canopy where the air circulation is poorest. Another practice that helps reduce the risk of infection is to remove the dead and rotting tissue from the planting. It is these rotting tissues where the fungus produces the majority of the infective spores. Although, the fungus can attack many plants, it appears that outside sources of inoculum play a small role in the overall development of the epidemic relative to local sources of inoculum. Mature fruit are very susceptible to infection, especially if they have been bruised during picking. Therefore, fruits should be handled gently during picking and packing. If wet weather is prevalent during harvest, fruits should be picked promptly to avoid additional infection in the field.

In New York, gray mold can be controlled usually with two well-timed fungicide applications during bloom. The first application should be made at early bloom (5-10%) followed by another 7 to 10 days later or at full bloom. Remember that early blooms (king bloom) typically produce your largest and best quality fruit, so protection needs to be started early. Under wet conditions or during prolonged bloom periods more than two sprays may be necessary. When these conditions occur it will be important to provide fungicide protection throughout bloom. The number of bloom sprays required depends upon the weather. If it is hot and dry, no fungicides are required. If it is very dry and overhead irrigation is used for supplemental water, irrigation can be applied in early morning so that plants dry as fast as possible. Keeping plants dry reduces the need for a fungicide application. Most years are not this dry and fungicides are generally applied as discussed above or on a 7-day schedule through bloom. If it is extremely wet, a shorter interval (4-5 days) may be required in order to protect new flowers as they open.

Many products are labeled for use on strawberry. Elevate 50WG or Captevate 68WDG and Switch 62.5WG are the most effective fungicides for disease management during bloom. For resistance management, no more than 2 consecutive sprays of Elevate or Switch should be applied. Therefore, in years when wet weather prevails during bloom (i.e., when more than two sprays are needed), a broad-spectrum fungicide such as Captan (50WP, 80WP, 80WDG or Captec 4L), Thiram 65WSB, or Topsin-M 70WSB should follow the use of Elevate and Switch. These fungicides also have some activity against the foliar diseases leaf blight and leaf spot.

### **Anthracnose and Leather Rot:**

Although gray mold is the primary disease of concern during bloom, we should also be thinking about managing anthracnose. In the pre-bloom period, Captan should be applied if the weather is particularly wet and warm to reduce the build-up of anthracnose spores. During bloom the "new" fungicide Captevate (a prepackage mix of Captan and Elevate) will provide excellent control of gray mold and will have some efficacy against anthracnose. Switch is labeled for control of both gray mold and anthracnose. This fungicide is excellent against gray mold but the jury is still out on how well it works against anthracnose. Once the berries begin to develop, a different class of fungicides will be used to manage anthracnose fruit rot. This will be covered in next month's edition of the NYBN.

Aliette 80WDG is labeled for control of Red Stele and Leather Rot. For Leather Rot, apply 2.5 to 5

lb/A. Apply as a foliar spray between 10% bloom and early fruit set, and continue on a 7-14 day interval as long as conditions are favorable for disease development. Applications can be made the same day as harvest (PHI=0 days). Aliette has no activity against gray mold, so this fungicide should be included in mixture with your gray mold fungicide

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