

# Leather Rot of Strawberry

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Leather rot of strawberry has been reported in many regions of the United States. In many areas, it is considered a minor disease of little economic importance. However, excessive rainfall during May, June, and July can lead to severe losses in fruit yield and quality resulting from leather rot. Commercial growers in Ohio have lost up to 50 percent of their crop to leather rot. The leather rot fungus primarily attacks the fruit, but many also infect blossoms.

## Symptoms

Leather rot can infect berries at any stage of development. Where the disease has been a problem in Ohio, infection of green fruit is common. On green berries, diseased areas may be dark brown or natural green outlined by a brown margin. As the rot spreads, the entire berry becomes brown, maintains a rough texture, and appears leathery. The disease is more difficult to detect on ripe fruit. On fully mature berries, infection may result in little color change or discoloration ranging from brown to dark purple. Infected ripe fruit are usually softer to the touch than healthy fruit. When diseased berries are

cut crosswise, a marked darkening of the water-conducting system to each seed can be observed. In later stages of decay, mature fruits also become tough and leathery. Occasionally, a white moldy growth can be observed on the surface of infected fruit. In time, infected fruit dry up to form stiff, shriveled mummies.

Berries that are affected by leather rot have a distinctive, unpleasant odor and taste. Even the healthy tissue on a slightly rotted berry is bitter. This presents a special problem to growers in pick-your-own operations. An infected mature berry with little color change may appear normal and be picked and processed with healthy berries. Consumers have complained of bitter tasting jam and jelly made with berries from fields where leather rot was a problem.

Leather rot is observed most commonly in poorly drained areas where there is or has been free standing water, or on berries in direct contact with the soil.

## Causal Organism

Leather rot is caused by the fungus, *Phytophthora cactorum*. The fungus survives the winter as thick-walled, resting spores, called oospores, that form within infected fruit as they mummify. These oospores can remain viable in soil for long periods of time. In the spring, oospores germinate in the presence of free water to produce a structure called a sporangium. A second type of spore, called a zoospore, is produced inside the sporangium. Up to 50 zoospores may be produced inside one sporangium. The zoospores have tiny flagella and can swim in a film of water. In the presence of free water on the fruit surface, the zoospores germinate forming a germ tube



Figure 1. Leather rot on green fruit. Infected fruit is brown and leathery compared with healthy green fruit.



Figure 2. Leather rot on ripe fruit. Note the light, off-colored area on the fruit.

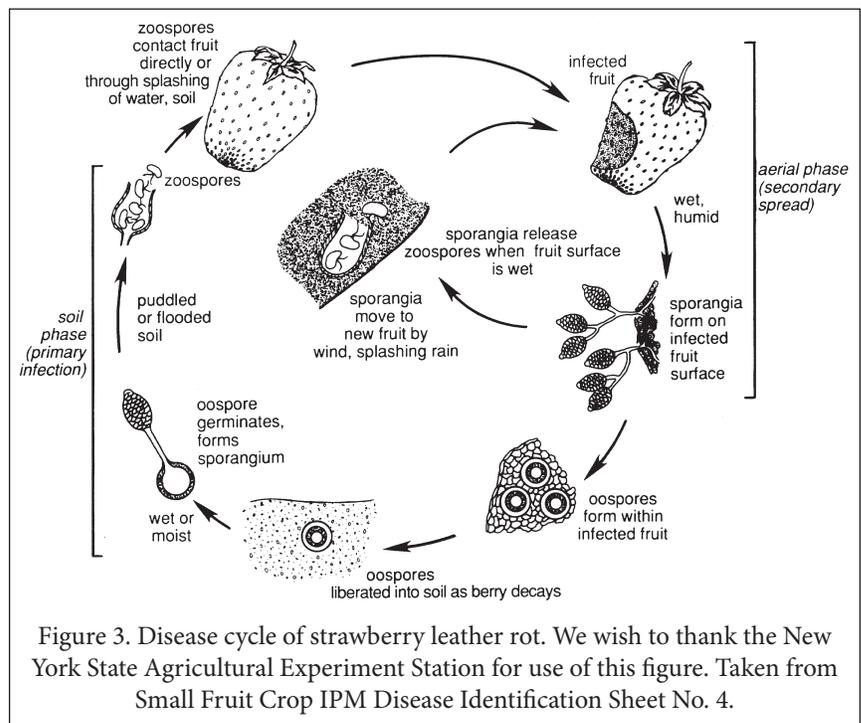
and infect the fruit. In later stages of infection, sporangia are produced on the surface of infected fruit under moist conditions. The fungus is spread by splashing or wind-blown water from rain or overhead irrigation. Sporangia and/or zoospores are carried in water from the surface of infected fruit to healthy fruit where new infections occur. Under the proper environmental conditions, the disease can spread very quickly. A wetness period (free water on fruit surface) of one hour is sufficient for infection. The optimum temperatures for infection are between 62 and 77 degrees F (17-25 degrees C). As the length of the wetness period increases, the temperature range at which infection can occur becomes much broader. As infected fruit dry up and mummify, they fall to the ground and lie at or slightly below the soil surface. Oospores formed within the mummified fruit enable the fungus to survive the winter and cause new infections the following year, thus completing the disease cycle.

### Control

1. Select a planting site with good soil drainage and air circulation. Good soil drainage is critical. Sites that drain poorly or are subject to periodic flooding are ideal for leather rot development.
2. Plants should be exposed to direct sunlight (avoid shade). Plant rows with the direction of the prevailing wind to promote faster drying of foliage and fruit.
3. Mulch strawberry plants with straw or other material that reduces fruit contact with soil. Research in Ohio has shown that a good layer of straw mulch is very beneficial in controlling leather rot.
4. Proper spacing of plants and timing of fertilizer applications are important. Excessive applications of nitrogen fertilizer can produce excessive amounts of dense foliage. Shading of berries by thick foliage prevents rapid drying of

fruit during wet periods and creates ideal conditions for disease development.

5. Pick fruit frequently and early in the day (as soon as plants are dry). Cull out all diseased berries, but **do not** leave them in the field.
6. When combined with the above mentioned cultural practices, fungicides can be beneficial in control. Fungicide use for controlling leather rot is generally not recommended in backyard fruit plantings. Homeowners are encouraged to use the previously described cultural practices to eliminate the need for fungicides. For the most current spray recommendations, commercial growers are referred to Bulletin 506-B2, *Midwest Commercial Small Fruit and Grape Spray Guide*, and backyard growers are referred to Bulletin 780, *Controlling Diseases and Insects in Home Fruit Plantings*. These publications can be obtained from your county Extension educator or the Extension Publications Office; Ohio State University Extension; 216 Kottman Hall; 2021 Coffey Road; Columbus, OH 43210-1044.



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