EARLY ROT IN WISCONSIN

Special factsheet from the University of Wisconsin-Madison

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What is early rot of cranberry?
Early rot is a cranberry disease that causes leaf spots, premature leaf drop, and fruit rot (see photos below). Early rot is caused by the fungus *Phyllosticta vaccinii*. A related fungus, *Phyllosticta elongata*, causes a minor berry speckle symptom and is common in healthy cranberry plants.

Where does early rot occur?
Although early rot can be severe in New Jersey, and occurs to a lesser extent in Massachusetts and Michigan, it historically has been rare in Wisconsin. In August and September of 2005, however, early rot was found at four sites on the variety HyRed and in established plantings adjacent to HyRed. Scouting of the more than twenty other sites where HyRed is planted have not revealed problems, however, growers have been advised to be especially vigilant.

What conditions favor early rot?
P. vaccinii thrives at temperatures of 84^{o}F or greater, which is why the disease is worse in warmer conditions. Plantings with a sparse canopy or pockets of poor growth are especially susceptible to early rot, because the temperature within the canopy is relatively high.

Where did early rot come from?
Early rot first was identified in Wisconsin in the 1970s on introduced vines, but the disease did not persist, possibly because *P. vaccinii* could not withstand our cold winters. In 1997, early rot was again discovered at a site in central Wisconsin, where the grower had planted vines from New Jersey and the University of Wisconsin breeding program planted test plots. The disease occurred at that site again in 1998, but was not detected in 1999 or 2000. It is possible that plant material used to propagate HyRed became contaminated with undetectable levels of the pathogen, and then the pathogen was spread on HyRed transplants. It is also possible that *P. vaccinii* is present throughout Wisconsin at low levels, but that new HyRed plantings were especially vulnerable if the conditions were favorable for the disease.

What are the symptoms of early rot?
Symptoms occur on leaves, flowers, stems, and fruit (see photos below). Where early rot has been observed on the variety HyRed, leaf symptoms are prevalent; but the disease also causes fruit rot. Leaf spots are tan to brown and sometimes have reddish margins. Tiny, black pycnidia (fungal fruiting bodies) form on the upper leaf surface. Affected flowers turn brown and may be covered with pycnidia. Immature fruit shrivel, turn brown and become covered with pycnidia. By late August and September, early rot on fruit appears as a soft, watery spot, usually with a distinct margin. The spot is often lighter in color than the healthy tissue surrounding it. Sometimes dark, concentric rings develop giving the spot a bull's eye appearance. Many different fungi can rot cranberry fruit, and the symptoms they cause can be similar.

Where does *P. vaccinii* overwinter and survive?
P. vaccinii apparently overwinters on leaves and stems of cranberry plants. It does not overwinter in fruit, and probably does not survive the winter in soil or water. The role of leaves

in the “duff” layer is unclear, but dead leaves are probably not as important for overwintering as leaves attached to the plant. In addition to cranberry, *P. vaccinii* infects blueberry and possibly related plants in the genus *Vaccinium*, however, it is not known to infect weeds common in Wisconsin cranberry beds.

When and how does early rot develop?
In the spring, pycnidia become visible on older leaves. Spores are released from pycnidia following leaf wetting and are spread by rainsplash and wind-driven rain. Mature pycinidia can be found on leaves from spring through fall, suggesting that spores are available throughout the growing season. Young leaves and berries are more susceptible to infection than older tissues, although symptoms might not appear until the leaves and berries are mature.

How does the disease spread?
Within a cranberry bed, spores are spread by rainsplash, irrigation water, and wind-driven rain. Spores probably do not move from bed to bed by wind. Transfer of spores on feet or machinery is possible if vines are wet. However, emergence of the disease requires not just the movement of spores, but plants in a susceptible state. Therefore, the risk of spreading the disease is probably greater when there are young, susceptible tissues present. Movement of cranberry vines for propagation can spread the disease among beds on a marsh and over greater distances (e.g., between states).

Will early rot spread from HyRed to other varieties?
The disease has been observed to spread in Wisconsin from affected plantings to adjacent established plantings, even where HyRed was not the source. Adjacent to new HyRed plantings with severe leaf symptoms, fruit rot has developed in established plantings containing the varieties Ben Lear, Searles and Stevens. In both cases this spread was typically limited to the areas within a ten to twenty foot distance from these plantings and the open space associated with them. Young plantings of Franklin and Stevens adjacent to affected HyRed plantings have also shown moderate to severe leaf symptoms. In New Jersey, early rot occurs equally on Ben Lear, Early Black and Stevens. Spread from bed to bed has not been observed in Wisconsin, but this possibility cannot be ruled out.

Will fungicides control early rot?
In New Jersey, where early rot is a common problem, growers control the disease by applying fungicides. The most effective fungicides are mancozeb (Dithane) and chlorothalonil (Bravo). Effective fungicides should be applied at full bloom and again during late bloom; sometimes a third application is made. Chlorothalonil has a 50-day preharvest interval and mancozeb has a 30-day preharvest interval. Abound (azoxystrobin) has not been fully tested on this specific disease. Copper fungicides are ineffective for controlling early rot. An application of Abound or Bravo is approximately $25 to $30 per acre, while mancozeb is about half that price, not including the cost of equipment, fuel, and labor. Note that Dithane can reduce fruit color development at harvest and chlorothalonil can cause damage to the flowers, especially when the canopy temperature exceeds 90^{o}F.

Are there any cultural practices for preventing early rot?
First, do not establish vines from a planting known to harbor early rot. If there is any doubt about the vines, it would be prudent to treat new plantings with fungicides until the canopy closes. In hot years, new plantings might benefit from daytime sprinkling, to reduce the temperature and

minimize heat stress. It is not known how long vines must stay wet for infection to occur. However, sprinkling for 15- to 20-minute intervals on hot, breezy, sunny days does not provide a long enough period of wetness for most fungi to infect. To the extent possible, movement of floodwaters from a bed with early rot to other beds should be minimized. Since movement of vines is the most effective way of spreading disease, clean vines from beaters and other equipment before moving between beds.

Is this pathogen harmful to humans?
P. vaccinii is not pathogenic to humans or animals and is not known to produce any harmful toxins or air-borne spores.

What should I do if I detect early rot symptoms?
You or your pest consultant should contact the University of Wisconsin Extension fruit pathologist, Patty McManus (608-265-2047 or psm@plantpath.wisc.edu) to determine if the problem is in fact early rot. University of Wisconsin Horticulturists Brent McCown (bhmccown@wisc.edu, 608-262-0574) and Eric Zeldin (elzeldin@wisc.edu, 608-262-0517) can answer questions about management of HyRed.

Symptoms of Phyllosticta vaccinii infection in a young planting. Leaf spots are tan to brown and sometimes have reddish margins. Note that other problems may give similar appearances. Generally the vines themselves are not killed and beds in New Jersey have been established successfully despite high Phyllosticta vaccinii pressure.

Tiny, black pycnidia (fungal fruiting bodies) form on the upper leaf surface.

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