



PHYTOPHTHORA ROOT ROT

Phytophthora cinnamomi

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This disease is caused by a soil-borne fungus that thrives in poorly drained areas in beds. The pathogen *Phytophthora cinnamomi*, was probably not native to Massachusetts but was brought in on plant material imported from one of the southern states. It is a subtropical fungus that does not normally survive our winters. It is able to survive on beds because they are flooded during the winter, and this protects the fungus from severe cold temperatures that would normally kill it. It is possible that the fungus has adapted to the colder climate and may survive without the winter flood.

The fungus causes plant dieback in the lower spots in the bed where water accumulates after prolonged rainfall, irrigation, frost protection, or flooding. Root systems on infected plants are poorly developed with few feeder roots. Plants are stunted, leaves are fewer in number, and off-color. They may turn red prematurely in the late summer. Few berries are produced on infected plants, and these will be small in most instances. If the outer periderm layer of the underground runner is scraped off, the internal tissue may be discolored olive-green to dark-brown.

Phytophthora can produce numerous spores during its life cycle. It probably overwinters as hyphae in infected root systems, and produces sporangia that contain sporangiospores in early spring during the last part of the winter flood and in the fall when the bed is flooded for water-harvest or for a trash flow (if it is a dry-

harvested bed). These spores disseminate readily to areas in the same bed that are uninfested. When these spores come in contact with susceptible plant roots, they infect the plant and invade the root system thoroughly. Other beds that utilize the same source of water may also become infested.

To date, no cultivar appears to be resistant to the fungus, although certain cultivars appear to be less susceptible to attack by the pathogen.

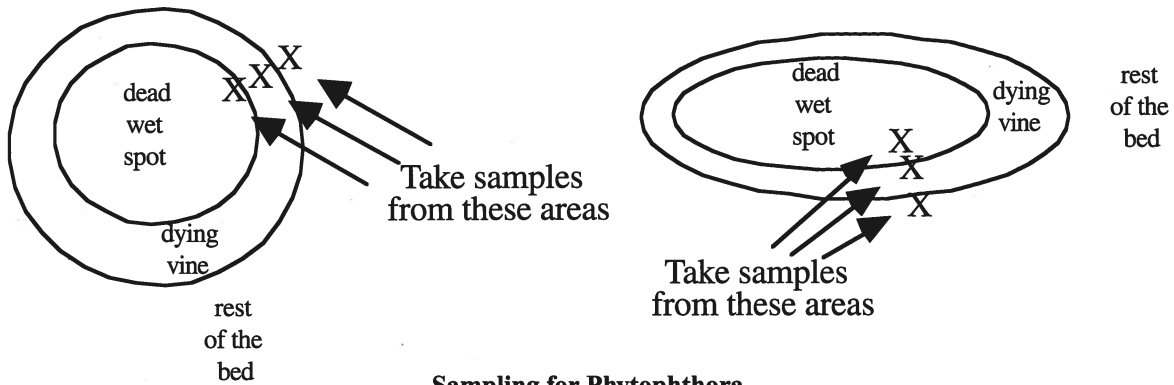
Phytophthora Root Rot Control

Control of the disease can be achieved only through implementation of several integrated strategies. It is essential that drainage be improved in these low areas of the bed. Drain tile, crushed stones or other materials can be utilized to improve drainage. New lateral ditches can be dug and already existing ditches should be maintained to the proper depth. Areas of dieback should receive enough sand to get the areas up to grade with the remainder of the bed. Stressed plants on the margin of dieback areas should be given an extra dose of fertilizer to stimulate root growth. Vapam or Basamid can be used to renovate particular sections if necessary. It is important to realize that once renovated beds are flooded, the fungus may be re-introduced.



1) Typical areas of *Phytophthora* damage 2) Early stages of symptoms expressed in August 3) Root symptoms of a diseased (left) and healthy plant (right) 4) *P. cinnamomi* growing out of a diseased root on culture medium.





Sampling for Phytophthora

Ridomil should be applied in late April - early May, July, and after harvest (3 applications per season) at least until the vines have completely re-colonized the bare spots in the bed. If a bed has only a few localized areas, spot treatment of the fungicide is adequate. Once this has been achieved, only a single spring application should be necessary. See current Chart Book recommendations for available formulations and rates.

Check Spread of the Pathogen

Precautions should be taken to avoid spread of the pathogen from infested beds to uninfested beds. Machinery, equipment, footwear, etc., should be sterilized using steam, bleach (10% Clorox solution), or alcohol before going from infested to uninfested beds. Spread of the pathogen can be prevented through the judicious use of water when flooding several individual beds for water harvesting. If possible, the sequence of flooding the beds during water-harvest should be adjusted to flood heavily infested beds last. When vines are purchased from other growers, the grower should be certain that they have not come from infested beds. Though very few roots are present in such vine deliveries, it only takes a few infected roots to initiate infection in a new location.

Root Rot Control Failures

If you have a cranberry bed where Phytophthora root rot was confirmed awhile ago, and despite regular Ridomil treatments, the vines have not recolonized the dead areas

or the dead areas have expanded, it is possible that the fungal pathogen has developed resistance (or tolerance) to the fungicide. Any location where Ridomil is not affording good control is a situation worth investigating. Keep in mind that Ridomil, by itself, will not control the disease. Drainage must be improved and the low spots must also be sanded to rejuvenate the vines.

Sample Submission Guidelines

If you want roots analyzed for Phytophthora root rot, a sample of at least 40 infected vines (containing both uprights and roots) is necessary. To determine if the fungus is present, at least 40 root segments from the same number of underground runners must be plated. When possible, pull the vines up as opposed to cutting them out with a shovel, because the roots are the most important part of the sample. These plants should be gathered from the area of stressed vines adjacent to the dead vines. Do not sample dead vines because they will be useless. If several dead spots occur on a section of bed, sample from at least 10 areas and combine into one bag.

If you want several bog units analyzed, keep the vines of each unit in separate bags and label them. If you sample a bed that has two different varieties, keep the sample from each variety separate. The vines will be analyzed separately. If these guidelines are followed, it will be possible for the lab to make a quick diagnosis.



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