



PHYTOPHTHORA ROOT AND CROWN ROT OF STONE FRUITS

Phytophthora root and crown rots, caused by *Phytophthora* spp., is among important soilborne diseases of stone fruits. Several species of *Phytophthora*, including *P. megasperma*, *P. cryptogea*, *P. cambivora*, *P. syringae*, *P. cactorum*, *P. cinnamomi*, and *P. citricola* have been reported as causal agents of Phytophthora root and crown rots of stone fruits. Spread of *Phytophthora* spp. within and between orchards and nurseries probably has been facilitated by machinery and irrigation water that are infested with the pathogens. Phytophthora root and crown rot is more serious problem in heavy and wet soils.

Symptoms

Trees affected with Phytophthora root and crown rot often are in the low areas where water tends to accumulate on the surface of the soil and soil drains slowly. Generally, trees are affected 4 to 6 years after planting. Aboveground symptoms of Phytophthora root and crown rot often appear first as insufficient extensions of shoot growth. If

the root system is infected in the fall, aboveground symptoms may not be apparent until the following season. Leaves on affected trees usually become sparse, small, and chlorotic. Fruits may be undersized, highly colored and sunburned. As the disease progresses, shoot and scaffold dieback may occur, often accompanied by sunburn of the exposed bark and secondary invasion by bark-boring insects. Trees often die within weeks or months of the first symptoms (Figure 1).

Proper diagnosis requires removing soil from the bases of declining trees or pulling the affected trees. After the out bark is removed with a knife, necrotic tissue should be observed on the primary

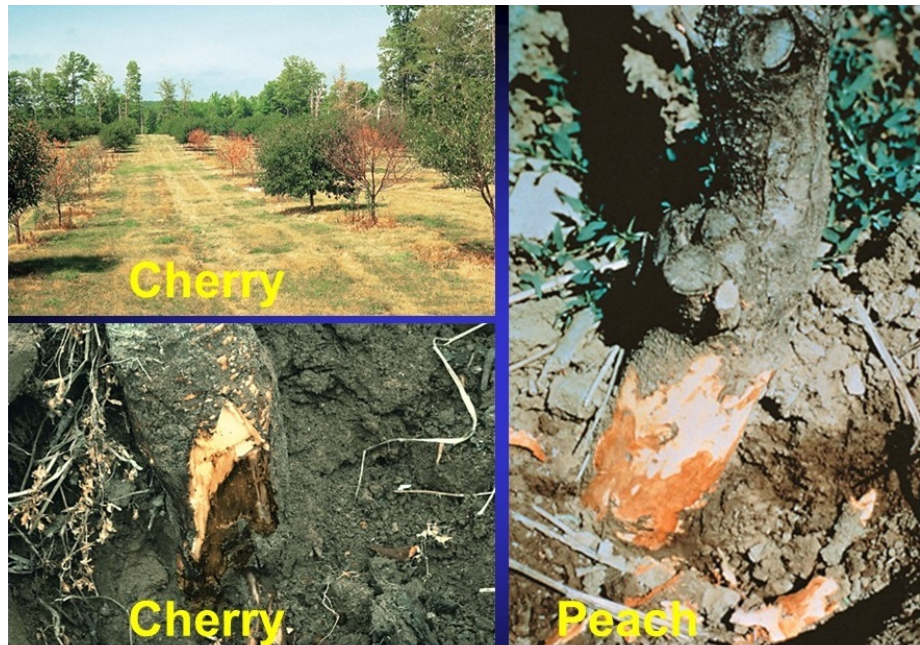


Figure 1. *Phytophthora* root and crown rots of stone fruit crops. (Courtesy American Phytopathological Society).

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or secondary roots of declining trees; necrosis may extend to the soil line but seldom above it (Figure 1). Occasionally infections are associated only with necrotic lesions on the crown. Trees affected with Phytophthora root rot often have few feeder roots.

Life cycle

Phytophthora spp. are soilborne pathogens. Infection usually occurs when the soil is saturated with water. These pathogens are ubiquitous soil inhabitants or may be introduced into an orchard on infested nursery stock. It persists in the orchard for several years, particularly with thick-walled spores (oospores). The oospores germinate when the soil moisture levels are high or saturated and temperatures are favorable. Germinated oospores produce sporangia (reproducing bodies) and zoospores are produced inside sporangia. The zoospores are released, they swim or are moved passively by moving water, and when they come in contact with roots and or crown, they infect them.

Development of Phytophthora root and crown rots in stone fruit crops is influenced by the susceptibility of the host, the virulence of the species of *Phytophthora*, and ambient environmental conditions. Wet and warm conditions are favorable for infection and development of roots and crown rots.

Disease management

Strategies for management of Phytophthora root and crown rots of stone fruits include soil water management, genetically resistant rootstocks, and fungicides. For soil water management, site selection, use of drainage systems, and raised planting beds should be considered. Mazzard cherry rootstocks are more resistant than Mahaleb cherry rootstocks to some species of *Phytophthora*. The effectiveness of resistant rootstocks or fungicides are limited because several species of *Phytophthora* are often present in the same orchard. Rootstocks and fungicides control some species of *Phytophthora* but not others. Phosphorous acid fungicides may be used for control of Phytophthora root and crown rot of stone fruits.