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Crown Rot of Apple Trees

Paul C. Pecknold, Extension Plant Pathologist

Crown rot of apple trees is most frequently a problem in orchards on heavy, poorly-drained soils. Trees on Malling Merton (MM) 104 and MM 106 rootstocks appear to be the most susceptible to attack by the crown rot fungus. The high potential loss from this disease requires added caution when selecting future planting sites or when replanting in areas where crown rot has occurred.

Symptoms: Stem girdling caused by crown rot results in the formation of dark brown cankers at or just below ground level. Affected bark of active cankers is brown and watersoaked, and the inner bark of active cankers generally has a brown to reddish-brown discoloration. Dark streaks are often found near the cambium extending beyond the canker margin.

An apple tree girdled by crown rot, or other causes, will show retarded growth; sparse, yellow foliage; early fruit ripening; and small, highly colored fruit. In late summer, infected trees often have a reddish-bronze coloration of the foliage and premature leaf drop. Symptoms may appear only on branches directly above the canker, while the rest of the tree looks normal and continues to bear fruit.

Cankered area showing discoloration at root-stem junction.
Cause: Crown rot is caused by the soil-borne fungus *Phytophthora cactorum*. High soil moisture is essential for fungal survival, movement, and infection. Consequently, crown rot is most severe in orchards with poorly-drained and/or heavy, clay-type soils.

Control: No single measure can assure control of crown rot; however, a combination of control measures which are appropriate and feasible for your particular orchard will do much to decrease crown rot occurrence.

Water management: Orchard soils should be well-drained and leveled before planting. Obtain the help of the Soil Conservation Service to advise you on what the drainage patterns are, where drainage problems are likely to occur and how best to correct potential problems. If crown rot occurs after trees are planted, improve drainage in the vicinity of the trunk and below the soil level, again ask advice from the SCS.

DO NOT:
- A. Plant trees in areas where surface water or sub-soil drainage is poor.
- B. Plant trees in river or stream bottomlands where water tables are high.
- C. Allow a soil "saucer" to form around the trunk (water should always be channeled away from the trunk and soil placed slightly higher near the trunk).
- D. Place trickle irrigation outlets so that the tree base is flooded during irrigation.

Depth of planting: Shallow planting is preferable to deep planting to avoid crown rot. DO NOT plant the graft union below the soil line. This can result in increased crown rot and may also cause the variety to "strike" roots so that tree uniformity and dwarfing are lost.

Winter injury: Most dwarfing rootstocks, especially MM 106, are prone to winter injury which is believed to increase susceptibility to crown rot. Do not fertilize trees in late summer or early fall, since this can cause late growth and reduce cold tolerance. Follow those practices which will favor early maturity in fall so that growth DOES NOT continue into late fall.

Tree support: If trees are not given proper support, wind "rocking" can occur, resulting in an open ring around the trunk base, increasing susceptibility to cold injury and/or crown rot. Young trees, especially, should have adequate support. For dwarfing rootstocks which do not have good root anchorage, e.g., East Malling (EM) 9, EM 26, EM 7, or where soil is poor for good root penetration, use either a pole or trellis for support and to help in training the tree.

Treatment after infection: If crown rot is present, it can often be checked by early detection and proper care. Remove soil from the base of the tree so that the entire cankered area is exposed. Diseased tissue should be cut away and the trunk area left open to permit drying of the diseased area and prevent further enlargement of the canker. In the fall, fill in around the trunk with good soil.

Rootstock selection: There are no rootstocks commercially available which are completely resistant to crown rot. Without doubt the "average" resistance of any group of seedling rootstocks is higher than that of the most susceptible dwarfing rootstocks.

The East Malling rootstock series is somewhat more resistant than the Malling Merton series. However, the susceptibility of all these rootstocks has not been adequately tested. Field observations show MM 104 and MM 106 to be the most susceptible rootstocks to crown rot; therefore, these particular rootstocks are not recommended where water drainage is a problem or where heavy clay-type soil exists. Rootstocks MM 111, EM 7, EM 9, and EM 26 appear to be more resistant than MM 104 and MM 106; however, caution must be used when considering EM 9 or EM 26 because of their extreme susceptibility to fireblight.

Chemical control: There are no fungicides which will give satisfactory control of crown rot. Bordeaux mixture (16-16-100) applied to the lower trunk has long been a standard practice for prevention of crown rot. More recently, applications of fixed copper fungicides, mane, or mancozeb have been suggested to help reduce crown rot. However, effective chemical control is still lacking, and emphasis should be put on water drainage management and rootstock selection as outlined above.