Infection and Spread
Verticillium wilt is a most important disease of olives (*Olea europaea*). It affects olive trees in commercial orchards and landscape plantings. This disease is caused by soil-borne fungi, *Verticillium albo-astrum* and *V. dahliae*. Root knot nematode, lesion nematode, and Texas root rot also infect the roots of olive. If the verticillium wilt fungi are present in the soil when one of these three attack, then the verticillium wilt fungi can more easily enter the olive.

Disease Description
As soil-borne fungi, verticillium initially invade the root system of olives when soil temperatures are cool. The fungus does not grow above 86°F (30°C). After penetrating the roots, the fungus grows and moves through the plant in the water-conducting (vascular) tissues eventually invading branches and twigs. This progressive invasion usually occurs in late winter through spring. With the onset of high summer temperatures, the fungus is inactivated. By then, unfortunately, the damage has been done and infected trees begin to exhibit symptoms. The presence of the fungus in the vascular system interrupts and reduces the water movement from the roots to the leaves. Verticillium wilt symptoms are directly attributable to toxins produced by the fungus and blocked water flow from the roots to the leaves.

Symptoms
Symptoms begin to appear in the spring near flowering time. Newer leaves roll inward and lose their deep-green color and waxy luster. They become dull gray...
to brown. Leaf and fruit drop follows, depending upon the severity of the infection and the amount of wind and heat stress present. Flower clusters on affected branches may die and remain attached. The bark may become bluish. Individual branches, large portions of a tree or the entire crown may die in one season. Death of the entire tree, however, rarely occurs. Instead, new growth develops from unaffected portions of the tree and suckering from the crown proliferates. This new growth often becomes infected and the cycle repeats the following year.

The vascular system of verticillium affected trees is characteristically stained. The xylem, new wood inside the cambium or green layer just inside the bark of branches, stems and roots, is streaked green or brown. Vascular discoloration, though not always present, is a distinctive and helpful diagnostic symptom. Olives show less coloration than other species. Cut through and peel back the bark to expose the discolored tissues of affected branches. A laboratory culture is required for a positive identification of the verticillium wilt fungus.

When cool weather returns, the fungi become active again, resume growing and reproducing. Branches are re-invaded each year during cool periods of the year.

**Control**

There are no cures for verticillium-infected trees. Pruning out infected limbs is recommended, but it is not possible to “get below” the infection. It originates in the roots and moves up into the branches. Application of fungicides is not effective, even systematic compounds do little to stop the verticillium wilt fungus.

Of course, avoiding the disease is most effective, but not always possible. Many plants used to feed animals, vegetables and ornamental species are susceptible to the disease. Soils are easily contaminated with the verticillium wilt fungi from former plantings. The disease may survive in soils for several years standing ready to infect newly planted susceptible species when conditions are right.

Pasteurization or heating of moist soil for 30 minutes at 160°F has eliminated the verticillium fungi from greenhouse soils, but is impractical in landscapes. However, solarization is effective in reducing the incidence of verticillium wilt in many landscape plantings. Prior to planting an area suspected of having verticillium-infected soil, irrigate and then roto till the soil deeply. Afterwards, cover the area with clear, four to six mil plastic for six to eight weeks or longer if possible. Seal the edges with soil and place soil at several spots on top of the plastic to keep it secure during windy periods. The site must be in full sun to allow the suns rays to heat up and pasteurize the top foot of soil and reduce the potential for verticillium wilt.
Solarization has been used in commercial olive orchards with some success. Weeds under the trees were controlled, infested limbs were removed, the soil irrigated and six mil plastic secured under and a few feet beyond the canopy of the trees. The biodegradable plastic broke down after two months. Although soil temperatures were very high under the sunny parts of the treatment, the trees showed no adverse symptoms, the level of the verticillium fungi in the soil was reduced and the population of favorable microorganisms in the soil increased significantly. The trees grew well afterwards and were less likely to become infected anew with verticillium wilt, but unfortunately they were still diseased from the original infestations. This technique may or may not work for olives in the home landscape.

Select resistant varieties and avoid ornamentals susceptible to verticillium wilt. Elms, maples and olive are very susceptible, but the disease also occurs in ash, avocado, barberry, brambles, camphor trees, carob, catalpa, cherry and other stone fruits, Kentucky coffee tree, creosote bush, currents and gooseberry, elm, fig, goldenrain tree, grapes, honeysuckle, lilac, black locust, magnolia, nandina, Russian olive, osage orange, Japanese pagoda tree, persimmon, photinia, pistache, privet, rabbitbrush, rose, sagebrush, smoke tree, spirea, sumac, tree of heaven, tulip tree and viburnum to name a few.

Resistant or immune woody plants include: all gymnosperms (cypress, fir, gingko, juniper, pine, spruce and yew); all monocots (bamboo and palm) and many dicots; apple, crabapple, mountain ash, ceanothus, chestnut, citrus, eucalyptus, pyracantha, hackberry, hawthorne, hickory, katsura tree, linden, honeylocust, mulberry, oak, oleander, pear, pecan, plane tree, sycamore, poplar, flowering quince, walnut, willow and Japanese zelkova. Select from those species to reduce problems with verticillium wilt.

Cultural practices such as applying fertilizer, managing irrigation and controlling weeds have been used with varying degrees of success in reducing the affects of verticillium wilt. Most are aimed at increasing plant vigor to mask the disease symptoms. Use these treatments knowing that none cure the disease or remove it from the tree.

References


