LOUISIANA PLANT PATHOLOGY
DISEASE IDENTIFICATION AND MANAGEMENT SERIES
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Armillaria Root Rot of Fruit Trees

Armillaria mellea and *A. tabescens*

Armillaria root rot, also called oak root rot or mushroom root disease, is one of the leading causes of premature fruit tree mortality in the Southeastern United States. The disease is caused by two species of *Armillaria*: *A. mellea* and *A. tabescens*. Although both species have been reported in Louisiana, little is known about the varying importance of the two species in terms of disease severity. *Armillaria* can cause disease on almond, apple, apricot, avocado, citrus, loquat, and walnut trees. Blackberries, raspberries, numerous species of deciduous and evergreen trees, shrubs, roses and woody vines are also susceptible to both *Armillaria* species.

Early disease symptoms on fruit trees include leaf curling along the mid-rib (especially on stone fruit trees), leaf bronzing and wilting, downward hanging leaves and branch dieback (Figures 1 and 2). As the disease progresses, large dark colored cankers form on the stems and larger branches (Figure 3). Often resin will ooze from the cankers. Diseased wood tends to be more brittle than healthy wood. Armillaria root rot is relatively easy to identify because the fungus produces three distinct structures that can be observed without the need for magnification: mycelial fans, rhizomorphs, and mushrooms.

- Mycelial fans (Figure 4) are white mats of the fungus that grow through the cambium (the area between the inner bark and wood). The fungus often grows in a fan-like pattern and can be easily seen by scraping back some of the bark near cankers or at the crown of the tree.
- Rhizomorphs (Figure 5) are reddish-brown to black shoestring-like structures that grow through the soil, on the surface of roots, and beneath the bark. They are often confused for small, dark roots, but when they are pulled apart, they have a cottony, whitish to tan colored interior.
- Clusters of mushrooms (Figure 6) often grow at the base of *Armillaria*-infected trees. The mushrooms are brownish or honey colored on top and white to tan underneath. They are short-lived and most



Figure 1. Early symptoms of Armillaria root rot of peach trees. Curling along the leaf mid-ribs and wilting of peach leaves. As the disease progresses the branches with wilting leaves will begin to dieback.



Figure 2. Branch dieback and leaf bronzing from Armillaria root rot on loquat (left) and peach trees (right). The peach tree on the right has been infected for a number of years.



Figure 3. Stem and branch cankers on peach from Armillaria root rot. White mycelial fans can be seen beneath the bark in the image on the right.

frequently observed after a rain during the fall and winter months. Not all mushrooms will be those of *Armillaria*, so confirmation of the disease should be made before implementing a management strategy.

Armillaria root rot is most prevalent in orchards or home gardens planted on newly cleared hardwood forestland where infested soil and infected wood pieces serve as the primary source of infection. The fungus initiates infection on the roots or crowns of fruit trees. It does not survive for an extended period of time above the soil line because it can't tolerate extreme temperatures. *Armillaria* can survive for decades as mycelia and rhizomorphs in stumps and large pieces of dead root tissue. The fungus spreads from tree to tree by mycelia or rhizomorphs growing out from diseased roots and infecting healthy roots of near-by trees. To a lesser degree, the fungus is wind dispersed by spores that are produced during the mushroom phase of the fungus life cycle.

Controlling Armillaria root rot is extremely difficult once it becomes established in the soil. There are no fungicides available for its control, and strategies such as tree or stump burning, applying stump-top chemicals, and increasing tree spacing do not work. The most effective management practice is to mechanically remove diseased stumps and any large roots that remain. Small roots will stay in the soil, but the fungus can't survive for long on these smaller roots. Re-planting in the same location with a susceptible host is not recommended. Fig, some varieties of plum and pear, as well as persimmon trees are moderately resistant to resistant to Armillaria root rot and are good replacement choices in the South.



Figure 4. Armillaria mycelial fans are seen beneath the branch bark of a symptomatic peach (left) and a piece of crown tissue from a loquat tree (right).



Figure 5. Root-like rhizomorphs of Armillaria growing on the outer surface of a large tree root. Armillaria can survive for decades as rhizomorphs in stumps and large pieces of dead root tissue. Photo courtesy of Joseph O'Brien, USDA Forest Service, Bugwood.org.



Figure 6. Clusters of Armillaria mushrooms. Spores produced by the mushrooms are of limited importance in spreading of the fungus. Photos courtesy of Drs. Don Ferrin and John Fleeger, LSU AgCenter.

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Pub. 3467 (online only) 11/15

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