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COMMON FOLIAR PATHOGENS OF OAKS

Some of the most common and easily noticeable diseases of oak trees include foliar fungi known as leaf spots. These fungi infect the leaves, and in some cases the twigs and buds, of oak trees causing discoloration, spotting, and defoliation. Several fungal species cause leaf spots. Some of the most prevalent are *Tubakia* (*Tubakia* spp.), Anthracnose (*Apiognomonina* spp., *Discula* spp.), tar spot (*Trabutia quercina*), oak leaf blister (*Taphrina caerulescens*), and oak rust (*Cronartium* spp.). Similarities exist across these different species regarding spread, damage, and control. Repeated outbreaks of leaf spots, particularly in combination with other stresses, can lead to tree decline over time.

SPREAD

Fungi reproduce and spread through spores. In most foliar fungi these spores are able to overwinter in the leaf litter that has accumulated beneath an infected tree. During spring, rain and wind can disturb the spores, transporting them onto fresh leaves causing a new infection. Because shade and moisture are more abundant in the lower canopy, most of these pathogens are often noticed first in the lower branches of the tree. They then slowly progress up towards the crown. Most fungi favor damp and warm environments, therefore infestations often peak in the summer following a wet spring. Infestations can vary from year to year depending on the favorability of environmental conditions.

SIGNS AND SYMPTOMS

Generally, foliar pathogens will appear as orange, yellow, black, or brown spots on the surface or underside of the leaf. In some cases, these spots may coalesce into necrotic (dead) patches that spread over the entire leaf surface. Deformity of the leaf itself may be associated with some of the pathogens. In the most extreme cases defoliation can occur.

Exact symptoms can vary depending on the species of oak and the type of infecting fungus. Anthracnose produces necrotic spots associated with veins and cupping or curling the leaves, with infections occurring in early spring. *Tubakia* is most severe in late summer and early fall. Spores overwinter in infected twigs and foliage, and are disseminated by wind and rain-splashing. Leaf spots caused by *Tubakia* are circular and typically surrounded by a yellow halo. A necrotic streak can be observed when a spot reaches a leaf vein and expands very quickly. Spores of oak leaf blister overwinter on the bud and infest emerging leaves during cool and moist conditions at budbreak. Oak leaf blister produces abnormal growth of the leaf, such as cupping and twisting. Tar spot typically occurs in early summer or in the fall, producing black, blotchy lesions on the upper side of leaves. Oak rust produces yellow pustules with spores under the leaves in late springs favored by high humidity. Oak rust spores, which infect both pine and oak, are primarily carried by wind.

PREVENTION AND CONTROL

The damage caused by foliar pathogens does not usually cause major harm to the tree; therefore, extreme control efforts are usually not warranted. The first step in control of foliar pathogens is sanitation through removing infected leaves to break the disease cycle, thereby preventing re-infection of new foliage. Infected leaves and twigs should be raked as they fall and disposed in the trash or by burning. These leaves should not be composted or stored on site as this may perpetuate the fungus. Cultural practices, such as correct irrigation regimes, proper tree spacing, and pruning to improve air circulation and light penetration, will reduce the impact of foliar pathogens. Proper watering practices are crucial. If the tree is overwatered, or if water pools in the area, it can form a favorable environment for fungi to flourish. Similarly, trees should be watered at the base to not splash the leaves. If an infection occurs repeatedly, it may be necessary to prune lower branches, and thin the canopy to aid in airflow and dissipation of the spores. Under the most extreme circumstances where other control measures fail, and when disease pressure is high, it may be necessary to apply a foliar fungicide. Fungicides are applied to buds and leaf surfaces prior to symptom development. Often fungicides will need to be applied in the early spring, and in some cases periodically throughout the growing season. Some common fungicides used in the control of foliar pathogens include chlorothalonil and propiconazole. Manufacturer labels should be checked to identify a product that is permitted for use treating your specific pathogen in oak trees. Since these products must be applied to the entire canopy of the tree, and require proper diagnosis of the fungus, it is usually necessary to hire a professional to perform the work. You can find a list of ISA Certified Arborists at <https://www.treesaregood.org/findanarborist/findanarborist>.



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