

Willow Fungal Diseases

Willows are popular landscape trees in Arkansas. They grow quickly but have relatively short lifespans. Willows are adapted to wet environments and although they can be overwatered, it is not uncommon for them to suffer from drought stress in the summer due to assumptions that an established tree doesn't need to be watered when the weather is dry. Any sort of stress (too much or too little water, etc.) will make them more susceptible to diseases. Willow trees can get several fungal diseases in Arkansas, including a leaf spot disease (*Pseudocercospora salicina*), willow scab (*Venturia saliciperda*), and black stem canker (*Colletotrichum salicis*).

1. Individual leaf spots caused by *Pseudocercospora salicina*. (Left image)
2. Leaves more heavily infected with *P. salicina* that have irregular browning due to merged leaf spots. Note the darker outer tissue bordering lighter brown tissue within. (Right image)



Photos by Sherrie Smith, University of Arkansas Division of Ag

The fungus, *Pseudocercospora salicina*, causes a common willow leaf spot in Arkansas. Small spots develop on the willow leaves, maturing into brown spots with purple halos. The brown centers of the spots will turn whitish-gray as they age. Being

small, the individual spots tend to grow no larger than $\sim 3/16$ th of an inch wide. That said, several nearby spots can merge into a mass of irregular brown leaf tissue. Some of the original spots will likely be visible within the irregular browning, and the irregular browning itself should appear as lighter brown tissue surrounded by darker, purplish tissue. Eventually severely infected leaves will drop, and in extreme cases, branch dieback may occur.

3. Willow scab on leaves and young stem tissue.



Photo by Sherrie Smith, University of Arkansas Division of Ag

Another fungal disease, willow scab, affects willow leaves, petioles, and the fresh stem/twig tissue produced that year. Infections can start early in the growing season. The causal pathogen, *Venturia saliciperda*, is spread via splashing water, so it can spread more quickly through a tree during wet years such as this one and rapidly defoliate a tree. The fungus infects the main veins of leaves, including the midrib, creating brown blotches on the leaves surrounding parts of these infected veins. The infection will grow into the petiole and from there, create a canker on the young stem tissue. During wet weather, velvety, olive-brown spore masses will grow out of the browned tissue, particularly along the infections of leaf midribs, petioles, and stems. Eventually, the affected leaves and petioles will wither and fall off, but the cankered stem tissue will remain on the tree as a source of infection for any nearby new growth. If the canker grows enough, it can girdle the twig and cause the death of any plant tissue beyond that point. The pathogen will overwinter in the stem canker and be ready to infect new growth

come next spring. Older leaves and twigs are less vulnerable to infection, so precautions early in the growing season can help greatly reduce disease incidence of willow scab.

4. **Black stem lesions caused by *Glomerella miyabeana*.** (Top image)

5. **Dark brown stem lesions caused by *Glomerella miyabeana*.** (Bottom image)



Photo by Sherrie Smith, University of Arkansas Division of Ag

In contrast to willow scab, our third fungal disease, black stem canker, can create dark brown to black cankers on older willow twigs and branches. Black stem canker also tends to establish itself later in the season than willow scab. Since a stressed tree is more susceptible to disease, a tree that already has willow scab will be more susceptible to the causal pathogen of black stem canker, *Glomerella miyabeana*. This fungal pathogen also starts by attacking the leaves, creating irregular brown to black lesions. Unlike the willow scab pathogen, more mature leaves are still susceptible to infection by *Glomerella miyabeana*. Similarly to willow scab, the fungus causing black stem canker will travel

down the petiole and create a darkened canker where the stem tissue meets the petiole. Leaves and petioles will wither and die. The darkened stem tissue will become sunken, and during wet weather, pink masses of spores may appear on the cankered tissue. These spores will continue to spread the disease through the summer and fall with cankered branches remaining as a source of inoculum for the following year. The cankers on the branches can grow large enough to girdle the branch, which will kill the tissue beyond that point.

When it is practical, cankers caused by willow scab or black stem canker can be pruned out several inches behind the canker. The pruned tissue can then be immediately destroyed or double bagged and trashed to deter disease spread. When pruning out diseased tissue, it is important before starting and after each cut to clean off any pruning tools of dirt, sap, and debris before dipping the tool in a disinfectant such as freshly made 10% bleach (1 part household bleach, 9 parts water). Note that 10% bleach, in particular, is only effective for about 2 hours once mixed.

For all three diseases, fallen leaves should be cleaned up before spring and either burned or trashed. Proper watering and fertilization practices will reduce tree stress and reduce the frequency and severity of any diseases the tree might get. Avoid sprinklers hitting leaves. It should also be noted that sprinklers won't penetrate the soil deeply enough to properly water a tree. Even adult trees should be thoroughly watered about once a week during summer droughts, and testing the nutrient and pH levels of the soil every two years or so can help optimize the health of your tree. Unless these fungal diseases cause severe defoliation before late summer/fall, any of these three diseases don't necessarily require fungicide treatments. If defoliation and/or stem cankers are severe, willows in Arkansas can be treated the following year with various fungicides as listed in the [MP 154 Arkansas Plant Disease Control Products Guide](#) for fungal leaf spots (pages 115-117) in conjunction with cultural practices to reduce disease incidence. Fungicides work best as preventatives or when the disease has barely begun on the leaves. Fungicides will not be effective as treatments for branch cankers.

While a willow tree may be infected with any or all of these three pathogens at once, here are some clues to help differentiate these diseases with the naked eye. On the leaves, the *Pseudocercospora* leaf spot disease creates circular spots, and those spots don't have to be associated with a main vein. As the spots grow larger, a darker border will develop around the leaf spots. The other two fungal pathogens create more irregularly-shaped leaf spots. The irregularly-shaped willow scab leaf spots will be associated with main leaf veins. During wet weather, willow scab can also have velvety, olive-brown spores growing out from the diseased leaf midribs (check the undersides of leaves). Willow scab can appear earlier in the season and is typically going to spread only

to relatively newly sprouted leaves and stems. Black stem canker typically appears later in the year and will be able to infect both young and older leaves and stem tissue.

The willow scab and black stem canker pathogens can both cause dark lesions on stems though the willow scab pathogen will mainly only create stem lesions on the young, tender stems. While severe *Pseudocercospora* leaf spot may have stem dieback, it won't produce stem lesions. If the weather is wet, check the stem cankers for speckles of pink spores coming out of the canker to indicate black stem canker or velvety, olive-brown fungal spores to indicate willow scab. It should be noted here that there is a willow bacterial twig blight caused by *Pseudomonas syringae* pv. *syringae* with symptoms such as blackened cankers on stems, leaf wilt, and defoliation. While it can be similar in appearance to the fungal black stem canker disease, the bacterial disease will never produce fungal spores in wet weather. Comparing all of these differences together, one can make a good guess about what is wrong with a willow tree. There are, of course, other diseases, pests, and abiotic issues that could be confused with some of these details, so if you want to be sure, symptomatic samples can be taken your [local county extension office](#) to be checked for diseases.