



# DISEASES

## Bacterial Wetwood

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### Quick Facts...

Bacterial wetwood is a common disease that affects the central core or bark of many shade and forest trees.

Slime is the exudate generated from wetwood and is toxic to growing areas of the tree.

Several insects commonly feed on this slime.

Wetwood-infected tissue does not greatly alter the wood strength of most trees.

Prevention of tree stress is the best management approach. Effective control measures do not exist.

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Bacterial wetwood (bacterial slime, slime flux, alcohol flux) is a common disease that affects the central core of many shade and forest trees. In Colorado, the disease is most prevalent in aspen, cottonwood, elm and willow. The disease also affects species of apple, ash, birch, cherry, fir, honeylocust, linden, maple, oak, sycamore, plum, and poplars.

### Causal Organism

Several bacteria, including species of *Enterobacter*, *Klebsiella* and *Pseudomonas*, often are associated with wetwood. It has not been conclusively demonstrated that these bacteria cause the disease, but they are directly involved.

### Symptoms

Symptoms of this disorder include a yellow-brown discoloration of the wood, generally confined to the central core of the tree. This affected wood is wetter than surrounding wood and is under high internal gas pressure. The gas pressure and high moisture content cause an oozing or bleeding of slime, from pruning cuts, through bark cracks and branch crotches. The ooze often is foul-smelling, slimy, and colonized by yeast organisms when exposed to air (Figure 1). When the slime dries, it leaves a light gray to white crust on the bark (Figure 2). Orange shiny ooze coming from a single point on aspens is usually from insect borer damage not wetwood.

Wetwood slime is toxic to the tree's cambium, the tissue between the inner bark and wood that produces new cells. Slime can prevent or retard callus formation when the tree has been wounded or destroy the cambium at the base of a pruning cut (Figure 3). Foliage, young shoots and grass die if slime flux drips on them. Root tissue also can exhibit wetwood symptoms as brown streaks extending from the diseased trunk into the center core and sometimes the outer wood of roots. Radial cracks may also occur in wetwood-affected trees (Figure 1). These cracks probably develop during winter months. If the cracks extend to the cambium, they serve as avenues for slime and gas to escape. The slime will also kill the surrounding cambium.



Figure 1: Wetwood slime.



Figure 2: Dried slime.



Figure 3: Retarded callus formation.

Alcohol flux or wetwood-like symptoms can occur just under the bark as dark streaks in the cambium or current season's wood or as a discoloration extending from the infested core of the tree to the killed cambium. White foam is commonly seen in affected areas. These disease symptoms are called by various names including alcohol flux, cambial wetwood or surface wetwood and is common on drought-stressed trees especially cottonwoods and globe willows.

The buildup of gas pressure is a by-product of bacterial activity. In elms, it consists mainly of methane and nitrogen. The highest gas pressure occurs in elms from May through August.

Wetwood-infected tissue slightly alters the strength properties of the wood. However, it inhibits the development of wood-rotting fungi, which are unable to grow in the affected wood because of lower oxygen content. Wetwood also causes warpage and splitting problems when boards cut from affected trees are dried.

## Transmission

Bacteria associated with wetwood are common in soil and water and probably enter trees through root wounds. Where oozing occurs, the bacteria could be transferred to a new stem or branch wounds. Wetwood also may occur in seedlings that develop from infected seeds or from infected parent material in vegetatively propagated plants.

## Management

No effective methods exist to eliminate wetwood disease. Preventing damage and stress to a tree's roots and stem is the best way to avoid a serious wetwood problem. Drought conditions increase wetwood problems, so it is important that the tree receives adequate water, especially during spring and summer months.

Recently transplanted trees may ooze slime if roots are not established and cannot supply adequate water. Fertilizing wetwood-infected trees is recommended if the tree shows nutrient deficiencies.

To help prevent disease spread within an infected tree, keep any injection holes shallow so they do not reach the inner wetwood core. If they do reach this core, the bacteria can spread outward. Drain tubes can help release pressure in those trees where wetwood is confined to inner cores — the slime oozes out the tube instead of somewhere else. However, this creates another wound that allows the bacteria to spread outward. This practice also introduces more oxygen into the tree's system and can possibly allow wood decay. Thus, drain tubes are not recommended.

In trees affected with cambial wetwood just below the bark, cut away the dead bark areas to allow for better wound closure. Remove discolored bark down to the wood and margins of the healthy yellow-green cambium. If this area exceeds 40 percent to 50 percent of the trunk circumference, the tree may not close the wound or be an aesthetically pleasing tree. If, however, the area is small, shape with clean, smooth edges.

## Associated Insects

Several insects commonly visit the oozing slime and feed on it. Various flies and sap beetles often are seen on the slime. Larval stages of these insects may develop within the wounded area. Among the most striking insects that visit oozing slime are bumble flower beetles, a hairy species of June beetle that sometimes clusters in large numbers. None of the insects that visit slime flux wounds are known to transmit the bacteria and there is no need to control them.