



The Plant Doctor's LANDSCAPE TIPS

By David L. Roberts, Ph.D, *Michigan State University*



Photo 1: Virtually all American elms exhibit symptoms of bacterial wetwood and slime flux. This tree grows on the MSU campus.



Photo 2: Slime flux may originate from injuries, imperfections, wounds and in this case on elm, branch crotches.



Photo 3: Slime flux on Populus, emanating from a branch crotch.



Photo 4: Bacterial wetwood discolors the interior wood of trees, devaluing its lumber value and decreasing its integrity. Fungal infections may also cause similar staining.

BACTERIAL WETWOOD AND SLIME FLUX

INTRODUCTION:

Many woody plants develop "ooze" and stains on their trunk and branches. These stains sometimes originate from wounds created when trees are pruned. Others are created after storm injury. Still other stains emanate from areas attacked by insects and diseases or from branch crotches. In many cases, a very noxious odor is associated with the stains.

Wetwood is a water-soaked condition that occurs in branches, trunks (stems) and roots of trees. In some species of trees, for example elm and poplar, bacteria are usually associated with the wetwood, and the condition is known as "bacterial wetwood". When the smelly "brew" bubbles from a wound, the condition is called slime flux. Water-soaked and bacterial infected wood is dead and discolored and contains fatty acids and fermentation products that exhibit smells of sour or rancidity. Bacterial populations in bacterial wetwood may reach as many as one billion cells per milliliter (one-half teaspoon) of fluid.

The foliage of severely slime flux-affected trees sometimes wilts with occasional branch dieback. In most cases, however, particularly in landscape trees, wetwood and slime flux are unimportant for the health of the tree. Most trees live on with the condition without serious health consequences for decades, except from the appearance standpoint, where liquids seep out and discolor the trunk and branches of afflicted trees. In consideration of native elms, slime flux is of no importance compared to the lethal Dutch Elm Disease. Bacterial wetwood often takes years to develop. Virtually all American elms and Poplars have bacterial wetwood (Photos 1-3).

Wetwood and Slime Flux are most serious in the forest industry where lumber from afflicted trees is discolored (Photo 4); such wood is devalued. Wood affected by these conditions is not as strong as normal wood. Wetwood lumber dries more slowly and is often prone to splitting and cracking.

CAUSES OF BACTERIAL WETWOOD AND SLIME FLUX:

There are many bacterial species that are believed to cause bacterial wetwood. *Methanobacter* sp. produces methane in poplars, and *Clostridium* sp. inhabits oaks; these two bacteria are anaerobic (inhibited by oxygen). Many other bacteria that cause wetwood and slime flux are found in the soil and on plant surfaces. Examples of these bacteria include species of *Corynebacterium*, *Bacillus*, *Enterobacter*, *Pseudomonas* (fluorescens) and *Klebsiella*. Many bacteria that cause wetwood and slime flux have not been unidentified.

On plant surfaces where the wetwood slime has leached, other bacteria, yeasts and fungi grow to enhance its slimy texture. Occasionally, insects may also be found in association with the slime flux and misdiagnosed as an insect problem.

Wetwood slime is different from other whitish or alcoholic flux from wounds or sites where various organisms infect shallow wounds or injuries sometimes created through natural stresses or perhaps insects. Such alcoholic flux is nearly colorless and imparts a rather pleasant, sweet smell.

HOST RANGE:

Virtually all mature elms and poplars exhibit bacterial wetwood. The condition is also common in aspen, fir, hemlock, most maples, mulberry, oak and white pine. It is less frequently associated with apple, mountain ash, birch, butternut, red cedar, dogwood, sweet gum, Magnolia, Russian olive, autumn olive, tulip tree and walnut. Many other species of trees can be affected.



Photo 5: This declining oak exudes stain from its trunk (see photo 6).



Photo 6: This flat headed larva was extracted from the source of the stain in the oak trunk from Photo 5. Because the tree was practically dead from other issues, the insect was likely a secondary issue.



Photo 7: Phytophthora bleeding canker is a lethal disease of maple trees; secretions occur at the canker site and may be mistaken from bacterial wetwood infections.



Photo 8: A bubbling stain was reported from many maple trees in Southeast Michigan in June, 2011.



Photo 9: A close-up photo of the bubbling stain which is most likely not bacterial wetwood. There is no rancid odor associated with the ooze.



Photo 10: At one of the sites, this larva was extracted from the ooze. Investigations are still underway to determine the cause of the malady.

MANAGEMENT OF BACTERIAL WETWOOD:

No controls are known to inhibit bacterial wetwood and slime flux. Avoid unnecessary wounding where practical. For cosmetic purposes, to avoid stains on the trunks of trees, drain pipes (plastic) may be installed that enable the slime flux to drip to the ground.

BACTERIAL WETWOOD, PERHAPS NOT!:

Occasionally other maladies may be confused with bacterial wetwood and slime flux. Various attacks by diseases and pests may induce secretions onto the trunks of trees. Some may be serious and others are incidental. Secondary insects often attack declining trees and may also cause staining (Photos 5 and 6). Phytophthora Bleeding canker, often a lethal disease on such trees as Maple and Beech, causes exudates to be released from the canker zone (Photo 7). Phytophthora ramorum, the cause of sudden oak death, instigates similar secretions. As of this writing a number of calls from Southeast Michigan have been received that voiced concerns about bubbles emanating from maple trees (Photos 8-10). This may or may not be slime flux; some larvae of insects have been associated with these wounds and we are seeking an accurate diagnosis of the problem. ■

Development of Landscape Tips was sponsored by MSU and MGIA.



**MICHIGAN GREEN
INDUSTRY ASSOCIATION**

**MICHIGAN STATE
UNIVERSITY**

For more information, please feel free to email David Roberts at robertsd@msu.edu or contact a professional plant health-care provider. The author, MSU and MGIA do not endorse any particular products. If using pesticides, be sure to read and follow label directions.