

# Plant Injury From “Sour” Wood Mulch

James Robbins  
Professor and  
Horticulture Specialist -  
Ornamentals

Stephen Vann  
Assistant Professor -  
Urban Plant Pathologist

## Introduction

In general, mulching is considered a standard and desirable practice in landscape management. The benefits of mulching include 1) moderating extremes in soil temperature, 2) reducing moisture loss from the soil, 3) suppressing weeds, 4) stabilizing soil components and 5) enhancing the aesthetics of landscapes.

Mulch materials range from inorganic (rock, textiles, etc.) to organic (bark, straw, etc.) sources. Pine bark chunks and shredded hardwood are the most common types of mulch in Arkansas.

For coarse bark mulch, a depth of 3 to 4 inches (after settling) is typically recommended for most landscape installations. The creation of mulch “volcanoes” around woody ornamentals and trees is often seen in many commercial landscapes. This practice creates a favorable environment for rodents and insect pests, can lead to other plant stresses and has been shown to have a negative impact on plant growth.



**Figure 1. Volcano mulching causes problems.**

When using hardwood bark mulch, be aware of a rare but destructive problem called “sour mulch.” Most of the time, hardwood bark is stored in piles that have adequate oxygen present so that aerobic microbes can help with normal decomposition. When storage conditions favor anaerobic microbes, significant problems can develop, leading to plant injury and death.

## Predisposing Factors

When a hardwood bark pile becomes too large or waterlogged from overhead water, microbial activity within the pile shifts from an aerobic to an anaerobic (low oxygen environment) condition. This activity can lead to heat generation in the depths of the pile. When conditions favor anaerobic fermentation by microorganisms in the bark pile, waste products such as acetic acid, methanol, ammonia gas and hydrogen sulfide can begin to accumulate. In addition to heat damage, these waste products can also cause direct plant injury. When an unsuspecting gardener or landscaper applies this sour mulch around plants, toxic vapors from these waste products are released, which may result in plant injury. Newly planted trees, shrubs and herbaceous bedding plants tend to be the most sensitive. Low-growing shrubs can also be damaged.

## Damage Symptoms

Damage to sensitive plant material can occur within 24 hours after exposure to the sour mulch. Symptoms include leaf scorch, bleached leaves, defoliation, and in the case of some herbaceous plants close to the ground, plant death. Damage symptoms may

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**Figure 2. Lower skirt of leaves on holly damaged by sour mulch.**



**Figure 3. Bleaching of hosta and total death of bedding plants.**

often resemble drought stress, pesticide misapplication or fertilizer burn. Damage to woody plants is most evident on the bottom skirt of leaves closest to the toxic bark.

Sour mulch is easily identified by the presence of a pungent odor similar to vinegar, rotten eggs or ammonia. Vapors often dissipate quickly after affected mulch is spread out in a shallow layer. When spreading sour mulch, you may even experience a burning sensation in your eyes. Hardwood bark may also develop an exceptionally black, tar-like appearance and feel very hot to the touch. As a result of anaerobic activity, the mulch may become very acidic (pH 1.8 to 2.5) as compared to normal composted organic materials (pH 6.0 to 7.0). While the vapors can cause damage to plants, they are usually not harmful to people or pets. The vapors are simply an irritant to people.

## Management

When spreading hardwood bark, home gardeners and commercial landscapers should check the mulch for the presence of a foul or pungent odor. Application should stop immediately if any bark is suspected to be sour. There is no need to dispose of sour mulch. If bark has been spread, immediately remove the bark away from plants, especially those with low-lying foliage or near herbaceous plants. If the bark is still in a pile, either turn the pile several times or spread the mulch out away from plants to vent any toxic gases. Sour mulch that has been properly aerated should be usable again in a few days. Water drenches may also help to leach toxic materials out of the mulch. Sour mulch seems to be restricted to hardwood bark and not to pine bark.

To prevent mulch from becoming sour, simply monitor circumstances (i.e., large pile size, waterlogged bark) that favor anaerobic conditions. Suppliers should



**Figure 4. Bleaching of lower hosta leaves.**

avoid storing mulch in piles over 4 feet high. For taller piles, periodic turning will allow for some level of aeration. Mulch should also be stored in a well-drained area to prevent water accumulation. Gardeners and landscapers should not buy, spread or allow the application of mulch with a foul odor or mulch that is hot. Good mulch should have a fertile compost or fresh cut woody smell.

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**DR. JAMES ROBBINS** is professor and horticulture specialist - ornamentals and **DR. STEPHEN VANN** is assistant professor - urban plant pathologist. Both are with the University of Arkansas Division of Agriculture, Cooperative Extension Service, Little Rock.

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