

## MULCH CORNER

### TOXIC MULCH SYNDROME PART 2

*By John Ferguson*

In the last issue we started exploring the reasons Brenda's plants died when using cheap mulch. This week we are going to look at a few more issues.

Tip 1: If mulch is piled too deep or if its texture is too fine (i.e. ground pine bark, ground hardwood bark or sawdust) it will easily become compacted preventing the soil from breathing. When this occurs the soil becomes oxygen depleted causing roots and beneficial microorganisms to die. This leads to increased plant stress which we sometimes see as insect and disease problems. Studies at Cornell University have found that soil oxygen depletion under coarse ground wood chips (not bark) is minimal, even when piled as deep as 10-18 inches. Note: Aeration is a function of particle size; coarse ground mulches will breathe better than fine ground mulches and will also allow water to soak into the soil more easily.

Tip 2: Fungal activity is the sign that nature is hard at work releasing the nutrients and energy stored in the mulch, which is required for good plant health. If the appearance of the fungus bothers you, the visible appearance can often be eliminated by raking the mulch layer, blasting it with the water from the garden hose, or both.

However, if there is a lot of raw or fresh wood (high C:N ratio) in the mulch, the fungus can form a hard barrier that is difficult for water and air to penetrate. This is common in cheap mulches like those produced after Hurricane Ike.

Tip 3: Odors are warning signs of low quality and potentially dangerous mulches and composts.

1) Anaerobic organic acids that have a strong odor from putrefying organic matter. The odor varies depending on feedstock or material and what is going on, however they are all very bad. These type organic acids form under conditions

without oxygen (fermentation) which also produce alcohols. Plant roots are very sensitive to alcohols as little as 1 ppm will kill most plant roots.

Acetic acid - vinegar smell, loss of N<sub>2</sub> and P, alcohols present  
Butyric acid - sour milk smell, alcohols present  
Valeric acid - vomit smell, alcohols present  
Putrescine - rotting meat smell, alcohols present

2) Ammonia – implies an immature mulch or compost (phytotoxic) and a loss of nitrogen

3) Rotten egg (H<sub>2</sub>S) - implies an immature mulch or compost (phytotoxic) and a loss of sulfur

4) Color: Is often an indicator of potential problems with mulch or compost and other organic materials. A black color does not occur naturally in mulches or compost under good conditions, only a deep chocolate brown. However, many people believe black is good and some unscrupulous vendors like to take advantage of this idea.

Black organic materials in nature occur when materials decompose under anaerobic conditions (without oxygen). These conditions favor disease and other pathogens and use a different set of microbes to decompose the material. As a result pure “black” compost or mulch does not have good fertility, indicates anaerobic decomposition, pathogens and other problems. The sulfur is gone (out gassed as H<sub>2</sub>S), nitrogen is gone (NH<sub>3</sub>) or in wrong form, and alcohols are usually present. Good composted mulch is a deep chocolate brown when dry.

Industrial wastes are often used to blacken products for marketing purposes. For example, some companies ground up old railroad ties to help darken material (Illegal in some states).

Smelter wastes are sometimes used as feedstock to blacken products. Copper sulfate (CuSO<sub>4</sub>) or other sulfur compounds may be present. As they breakdown

elemental sulfur (S) may be produced which is a natural fungicide that kills the beneficial fungus that helps plants grow and prevents disease.

Boiler ash (bottom ash) is another industrial waste product used to color or blacken products. Boiler ash tends to be high in salts and extremely alkaline. The alkalinity is so strong that it will chemically burn raw wood black in a couple days. The black mulches produced tend to be very alkaline with high



salt, with very high carbon to nitrogen ratios. Some ashes may contain large amounts of heavy metals that contaminate the mulch exceeding federal regulatory levels for safety. These mulch products will often turn a bleached grayish color in a few weeks after exposure to sunlight. These type products are very common in many areas.

Gardeners need to be careful as there are often more bad products than good, as most vendors just want your money and do not care if you get hurt or have bad results. As the old gardening proverb states:

***I have no quarrel with a man whom has a lower price, whom better knows what his product is really worth.***

Or in other words, one gets what they pay for.