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JOHN'S CORNER

Soil Amendments - Sawdust-

By John Ferguson

This past week I was talking with a couple different customers whom were having problems with their plants from yellowing to poor growth. In both cases they had purchased a bagged soil product from one of the box stores. After eliminating other possible causes I asked them about the soil they used. From their descriptions it was a sawdust based product which is the reason it was so cheap as it does not work very well. As a result, today's topic is: sawdust.

Sawdust can be a beneficial soil amendment when used correctly. However it rarely is used correctly. Healthy fertile soil has 30 carbon atoms to every nitrogen atom or what is called a 30:1 (C:N) ratio. All sawdust comes from the logs of various species of trees (pine, oak, redwood, cedar, etc.) and may have a C:N of 500:1 or more! In nature the microbes always eat first. Bacteria have a 5:1 ratio and most fungus 20:1 ratio, hence as they digest the carbon in the lignin and cellulose of the sawdust they require a tremendous amount of nitrogen. The microbes suck up all the soils nitrogen, and there is none left available for the plants which leads to the yellowing. I used nitrogen as an example, but the microbes also need other nutrients which they also use up creating several nutrient deficient problems that lead to insects and diseases not to mention poor growth and unsightly color.

Sawdust contains 40% lignin and 60% cellulose with a little bit of waxes, resins and oils mixed in. It is low in nutrient density, only containing 0.048% nitrogen (N), 0.007 % phosphorus (P), 0.017% potassium (K) and 0.106% calcium (Ca) which varies depending on the wood the sawdust comes from.

Sawdust consists of very small particles of wood which have lots of surface area, thus there is a lot more surface for microbes to attack it (places for them to attach to the wood particles and eat it). This results in a much quicker breakdown of the wood as compared to wood shavings or wood chips as a mulch. Sawdust does break down into humus, creates soil structure, increases aeration (porosity and permeability), increases a soil's water holding capacity, and increases microbial activity after it has broken down. Depending on many factors, this may take months to years.

As fungus species break the wood particles down, they produce weak organic acids that can acidify the soil if too much sawdust is applied at one time. As a result one may have to apply dome from of limestone or dolomite to neutralize the acidity. Hardwood sawdust tends to break down more quickly than conifer sawdust, and sawdust from rot resistant woods like cedar or redwood may take much longer (years).

In general, it takes about 24 pounds of pure nitrogen (240 pounds of a 10-10-10) per ton (3-4 cubic yards if dry) of sawdust, hence it ties up nitrogen for a long time. Eventually after decomposition is complete, the nutrients will be available for plants.

One study on potatoes found that as the amount of sawdust was increased, the yield went down and the number of culls (mis-shapen or bad potatoes) also increased for the first two years, then returned to normal after the sawdust had decomposed.

Another study found that sawdust in a potting mix completely controlled "damping off" (*Rhizoctonia solani)* only if there was 16,000 ppm or more of sawdust in the mix (this is only a few percent). Another study found that sawdust was very effective in breaking down certain fungicides that are used on the leaves of trees once it washes into the soil.

A major source of sawdust used in the discount products found in bags at big box stores comes from the medium density fiberboards (MDF) that is used in making furniture, cabinets, etc. This is an engineered product that uses a urea-formaldehyde resin (UF) to glue the wood particles together and the one that causes so many health problems when it out gasses formaldehyde vapors into ones home. The University of Tennessee has done studies of what happens when it is applied and incorporated into soil. They found that the UF resin is rapidly decomposed to urea and formaldehyde

which is then further decomposed over 12 months by soil bacteria into harmless carbon dioxide, ammonium and water.

Up to 8 tons of MDF sawdust could be applied per acre into the top six inches of soil and have a release rate of formaldehyde into the air that is 28-83 times less than what is allowed for residential soil. However homeowners buy bags of this product thinking it is a potting medium and use it in their homes and gardens where there is no soil with the required microbes to break it down, hence it out gasses formaldehyde and cause plant growth problems.

Another problem that occurs is that oak trees that are dying from Sudden Oak Death (*Phytophthora)* are cut down and sold for lumber. The sawdust then is sold and the disease spores may be spread into your garden.

Summary: Sawdust can be a useful soil amendment if used correctly and enough time has passed before one grows a crop or plant. However, it is tedious for most gardeners and there are better and more economical choices for improving the soil.

PROS:
- good source of organic matter and will eventually degrade into humus
- improves soil physical properties
- increases a soils water holding capacity
- improves a soils aggregation, porosity, tilth and reduces erosion
- relatively inexpensive
- increases microbial activity
- sequesters carbon in the soil
- easy to spread
- easy to walk on if used on pathways
- best usage is a feedstock for making compost
- can be used to bioremediate oil contaminated soils
- can be used as a feedstock to make bio-char

CONS:
- quality and risk varies greatly
- bacterial and fungal pathogens may reactivate when applied
- possible chemicals that can harm our health
- few nutrients
- high carbon content causes a nutrient imbalance causing other nutrients to be tied up and unavailable for months to years
- can blow or wash and become unsightly if used as a mulch
- becomes hydrophobic when dry and hard to rewet and may repel water
- some producers blacken the sawdust before selling it (see article on colored mulch).
- low cost bagged products may contain sewage sludge to darken it and give it more nutrients
- hidden costs from extra fertilizer and liming agents required to loss of one's plants.