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JOHN'S CORNER

Soil Amendments - Paper Sludge -

By John Ferguson

This week I want to mention another wood waste product that is used in horticulture and agriculture. Sludge is a generic term for several types of residues from pulp and paper making. In general the paper mill sludge's are highly fibrous containing a lot of cellulose and lignin. After reading over 50 technical papers and going through many textbooks on soil amendments, I found that there is a large variety in the sludge's produced. Some sludge's were very beneficial to plant growth while others were harmful and polluting.

The sludge's today are much better than a couple decades ago where PCB's (sludge's that used carbonless copy paper), or dioxins were often found.

Chlorine was used for many years to bleach the fibers white. Today many companies are using hydrogen peroxide which breaks down quickly in the environment to harmless components. The inks used to be petroleum based with heavy metals but today they are mostly vegetable oil based. Other ingredients include clay fillers, coating agents, inks, etc.

Historically paper sludge's were disposed of by land filling, incineration or dumping into the ocean. Due to the current laws regarding air and water pollution the last two methods are not a viable option. Landfill rates are often over $100/ton in many areas of the country hence a very expensive option for companies producing paper products. Thus the paper industry is looking for less costly ways to get rid of paper sludge. Public Relations firms were hired and nice sounding names are given to the sludge's similar to sewage sludge being renamed "Biosolids".

There are two basic types of sludge's, a primary or fresh sludge and a secondary sludge that has undergone some form of treatment (usually biological). They have very different properties and values. Fresh sludge's tend to have a very high C:N ratio that causes many forms of nutrient tie-up when applied to soils resulting in poor growth of plants. The secondary sludge's have often gone through a biological treatment where many nutrients (nitrogen, potassium, phosphorous, calcium, iron, etc.) have been added so the microbes can grow and break down the cellulose and lignin into more useful forms of carbon (humus like) and lower the C:N ratio to a useable range. Most studies with secondary sludge's have yielded positive results in agriculture and horticulture. However, it costs companies more money to treat the sludge hence fresh and treated are often mixed together before applying to a field.

For the gardener, the fresh dewatered sludge often get used as filler in many bagged soil products similar to sawdust. It is a raw wood fiber with a high C:N ratio and creates many problems when used in ones garden. It is sometimes found in the low cost bagged products sold by big box stores or discount nurseries.

Some modern paper sludge's has been found to be useful in: sylviculture, agriculture, horticulture, potting media, mine soil reclamation, landfill cover, making cement, asphalt, animal bedding, ethanol production, bio-char production. Other sludge's have been harmful, so it has to be evaluated on a case-by-case basis. Paper sludge is a special purpose product and its use should be left to experienced soil scientists.

PROS:
- source of organic matter and will eventually degrade into humus
- improves soil physical properties
- increases a soils CEC
- increases a soils water holding capacity
- improves a soils aggregation, porosity, tilth and reduces erosion
- increases microbial activity
- sequesters carbon in the soil

- easy to spread
- feedstock for making compost

CONS:
- quality, type, and risk varies greatly
- often has strong odors for months (smell of vomit or sewage are common)
- possible chemicals that can harm our health (naphthalene, phthalates, chloroform, PCB's, dioxin, etc.)
- nutrient content varies from none to significant
- high carbon content causes a nutrient imbalance causing other nutrients to be tied up and unavailable for months to years
- hidden costs from extra fertilizer and liming agents required to loss of one's plants