

JOHN'S CORNER

Soil Amendments - Bentonite

By John Ferguson

Recently I was talking to a customer about how to create a natural seal for their pond and the subject of Bentonite clay came up. Since it is a natural organic material and is widely used in many applications including gardening, let's take a look at Bentonite clay.

Bentonite usually forms from the weathering of volcanic ash, most often in the presence of water. Geologically it is an aluminum phyllosilicate material, a type of clay mineral mainly composed of montmorillonite. Montmorillonite clays have a 2:1 lattice structure that can absorb large amounts of water. Bentonite clay is found all over the world in large quantities, it is easy to mine and process hence is relatively inexpensive.

There are several types of Bentonite subdivided into Calcium Bentonite, Sodium Bentonite, Potassium Bentonite, etc. each with different properties. Sodium Bentonite can hold 15-20 times its weight in water and is used for sealing ponds. Bentonite when exposed to water swells enormously hence it is used to seal ponds and even geosynthetic liners. If damaged when used as a liner it tends to be self-healing and very easy to repair. Note: When used as a pond sealer it works best if covered by a layer of sand or soil to help protect it. Sodium Bentonite is also widely used in cat litter. Additionally many of the soils along the Gulf Coast are high in salt (sodium), and as a result we do not want to add any amendment that contains sodium (poultry manure, cow manure, biosolids, etc.).

Calcium Bentonite can only hold 1-5 times its weight in water and is used in gardening as it is more stable. Calcium Bentonite stores and releases water much easier than other types of clays. Bentonite clay has hundreds to thousands of times more surface area than sand particles hence it improves nutrient holding capacity of soils and helps provide a better home for soil microorganisms.



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It is widely used to improve poor soils in gardening in particular sandy soils. Small amounts of Bentonite have been shown to increase growth rates and yields of many plants in sandy soils. It only works in conjunction with other organic soil amendments (compost, manures, native mulches, etc.).

Apply Bentonite to sandy soils at the rate of 2-10 pounds per square yard and till into the soil BEFORE planting to an 8 inch depth (the root zone of most plants). The only time we till any more is to mix amendments together in preparing our beds as tilling kills many of the beneficial microbes that prevent soil diseases. Note: Do not use on clay or other heavy soils.

If there is an existing bed you mix a couple pounds of Calcium Bentonite into a 5 gallon bucket full of water. Stir until the clay is dissolved (a paint mixer on an electric drill works great), then gently pour onto your soil. The earthworms and other soil life forms will work it into the soil. You may have to repeat a few times over a couple months to get the required amount into the soil.

It is also used to cover tree wounds as it prevents infection and insects from attacking the injury. Just take some Calcium Bentonite and make a paste and dap it onto the wound.

Another use is to dissolve small amounts of Bentonite into water and dip the roots of transplants or bare root shrubs and trees into it before planting. It helps plants survive the transplant shock and establish quicker.

Many gardeners have found that dissolving small amounts of Bentonite in water and then spraying on the foliage of their plants protects against insect, disease and sunburn damage. If you do this always mix in a tablespoon of liquid kitchen dish soap per two gallons of water to act as a surfactant.

PROS:

- improves the wettability of soils
- improves soils water holding ability
- increases the CEC (cation exchange capacity) of soils
- prevents leaching of many nutrients
- makes nutrients from fertilizers or other sources more available to plants
- supplies small amounts of calcium, magnesium and potassium
- improves soil structure of sandy soils

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- gives beneficial microbes a place to live (bacteria, fungus, protozoa, nematodes, etc.)
- increased yield of many plant crops
- has no offensive odors
- sealant on tree wounds from damage of pruning
- good sealant for many applications

CONS:

- slippery when wet
- as in all silica rich dusts it may be a breathing hazard (wear a mask)
- for the Gulf coast it must be shipped a moderate distance
- sometime hard to find Calcium Bentonite
- doesn't work well on clay rich soils

Some other uses of Bentonite clay are:

- line the base of landfills
- main ingredient in Fuller's Earth (a cleaning agent)
- drilling mud
- bonding agent to make sand casts for steel and iron industries
- used in making ceramic glazes
- rocket nozzles
- end plugs in fireworks
- absorbents (from kitty litter to wine making, oil and greases, odor control, etc.)
- laxatives and other pharmaceuticals
- remove toxins from animals and humans
- wound dressings
- desiccants (works better than silica gels)
- animal feed