

JOHN'S CORNER

SOIL AMENDMENTS- GYPSUM

By John Ferguson

Recently we have had a few people asking about gypsum to improve their soils. Gypsum can be a useful soil amendment under certain conditions when used properly. It is not a cure-all as some will have you to believe but another tool in the toolbox to have a beautiful garden.

So, what is gypsum? Gypsum is a common naturally occurring mineral that is made up of the elements calcium, oxygen, and sulfur with some water molecules mixed in. Chemically it is known as calcium sulfate and water ($\text{CaSO}_4 + 2\text{H}_2\text{O}$). Gypsum has 23% calcium and 18% sulfur and its solubility is 150 times that of limestone, hence it is a natural source of plant nutrients.

Gypsum naturally occurs in sedimentary deposits from ancient sea beds. Gypsum is mined and made into many products like drywall used in construction, agriculture and industry. Gypsum deposits are found at various locations around the world. In North America there are gypsum deposits from Canada to Texas and in many Western States.

Mined gypsum is primarily calcium sulfate hydrated with water molecules in its chemical structure and may contain small amounts of sand or clay particles and a few trace elements. The trace elements may be boron or iron to arsenic and lead and varies with each deposit. Many deposits in Canada have arsenic while those in Texas may have very little. Primarily mined gypsum is very safe to use and a great amendment for many soils.



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Gypsum is a good way to add calcium and sulfur to ones soils as it does not change the pH (acidity or alkalinity) of soils. Many soils along the Gulf coast are deficient in calcium. This deficiency can lead to problems in our gardens like blossom end rot on tomatoes. Beneficial fungus in the soil that break down organic matter and prevent many soil diseases require plenty of calcium. Plants and microbes build amino acids and proteins and they require sulfur in their chemical structure so gypsum may help in this area also.

Gypsum can also be used to remove salts such as sodium chloride (NaCl) that cause many of our clay rich soils to easily erode (dispersive soils) due to the sodium in them. Calcium has two positive electrical charges while sodium only has one, hence calcium has twice the attraction than sodium. This allow calcium to replace sodium on clay particles and humus and allow the sodium to be dissolved in water and removed (leached) from the soil.

However, there are other concerns with the use of gypsum if too much is used or if the soil does not require it. If gypsum is applied where it is not needed then it may cause a deficiency of magnesium (Mg) caused by replacement by calcium (Ca), excessive sulfur (S) in the plants, decreased phosphorous (P) availability if used excessively, increased levels of aluminum (Al) in ground or surface waters due to leaching from the soil, and contamination from impurities within the gypsum, such as boron (B) or heavy metals. Hence gypsum should only be applied if a soil chemical analysis indicates that it is needed.

My favorite soil chemistry testing lab is the Texas Plant and Soil Lab as they specializes in organic production techniques and they give the results in two different ways. First they will use a conventional strong acid test which indicates the total nutrients in the soil even though they may not be available to plants (chemically locked up). This is similar to one's money in a savings account.

Secondly they give a very weak acid test that mimics the acidity or rain and groundwater which is what the plant root actually sees and can use. This is similar to a person's checking account where the

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money is easily accessible. Texas Plant and Soil Lab, 5115 W. Monte Christo, (956) 383-0739, Edinburg, TX 78539, <http://www.texasplantandsoillab.com/>

For a more complete and technical discussion of gypsum please see the Nature's Way Resource website:

<http://www.natureswayresources.com/resource/infosheets/gypsum.html>