



# Gypsum (Calcium Sulfate)

## The MANY Advantages to Using Gypsum

### **Gypsum Improves Soil Structure**

Gypsum provides calcium, which is needed to flocculate clays in acid and alkaline soil.

### **Gypsum Helps Reclaim Sodic Soils**

Where the exchangeable sodium percentage (ESP) of sodic soils is too high, it must be decreased for soil improvement and better crop growth. The most common economical way is to add gypsum, which supplies calcium. The calcium replaces the sodium held on the clay-binding sites. The sodium can then be leached from the soil as sodium sulfate to an appropriate sink. Without gypsum, the soil would not be leachable.

### **Gypsum Prevents Crusting of Soil and Aids Seed Emergence**

Gypsum can decrease and prevent the crust formation on soil surfaces, which result from raindrops or from sprinkler irrigation on unstable soil. It can prevent crusting that results when acid soils are limed; the gypsum is co-applied with the lime.

### **Gypsum Improves Low-Solute Irrigation Water**

Gypsum is used to increase the solute concentration of low-solute water used for irrigation. Irrigation water from rivers that no longer have sources of leachable salts either penetrates poorly into soil or causes soil particles to degrade which results in low-water penetration. The problem can be corrected with surface-applied gypsum or application to the irrigation water.

### **Gypsum Decreases Heavy-Metal Toxicity**

Calcium also acts as a regulator of the balance of particularly the micronutrients, such as iron, zinc, magnesium and copper, in plants. It also regulates non-essential trace elements. Calcium prevents excess uptake of many of them; and once they are in the plant, calcium keeps them from having adverse effects when their levels get high. Calcium in liberal quantities helps to maintain a healthy balance of nutrients and non-nutrients within plants.

### **Gypsum Increases Value of Organics**

Gypsum adds to the value of organic amendments.

### **Gypsum Improves Fruit Quality and Prevents Some Plant Diseases**

Calcium is nearly always only marginally sufficient and often deficient in developing fruits. Good fruit quality requires an adequate amount of calcium. Calcium moves very slowly, if at all, from one plant part to another and fruits at the end of the transport system get too little. Calcium must be constantly available to the roots. In very high pH soils, calcium is not available enough; therefore, gypsum helps. Gypsum is used for peanuts, which develop below ground, to keep them disease free. Gypsum helps prevent blossom-end rot of watermelon and tomatoes and bitter pit in apples. Gypsum is preferred over lime for potatoes grown in acid soils so that scab may be controlled. Root rot of avocado trees caused by *Phytophthora* is partially corrected by gypsum and organics.

### **Gypsum is a Source of Sulfur**

Gypsum is a source of fertilizer sulfur.

### **Gypsum Helps Prepare Soil for No-Till Management**

A liberal application of gypsum is a good procedure for starting a piece of land into no-till soil management or pasture.

### **Gypsum Decreases Bulk Density of Soil**

Gypsum-treated soil has a lower bulk density compared with untreated soil.

### **Gypsum Decreases the Toxic Effect of NaCl Salinity**

Calcium from gypsum has a physiological role in inhibiting the uptake of sodium by plants.

### **Gypsum Multiplies the Value of Other Inputs**

Gypsum can improve the response to all other inputs including fertilizers.

### **Gypsum Can Decrease pH of Rhizosphere**

Increased calcium uptake by roots when gypsum is applied can decrease the pH of the rhizosphere.

### **Gypsum Keeps Clay Off Tuber and Root Crops**

Gypsum can help keep clay particles from adhering to roots, bulbs, and tubers of crops like potato, carrots, garlic and beets.

### **Gypsum Makes Water-Soluble Polymer Soil Conditions More Effective**

Gypsum complements or even magnifies the beneficial effects of water soluble polymers used as amendments to improve soil structure.

### **Gypsum Makes Excess Magnesium Non-Toxic**

In soils having unfavorable calcium magnesium ratios, such as serpentine soils, gypsum can create a more favorable ratio.

### **Gypsum Corrects Subsoil Acidity**

Gypsum can improve some acid soils even beyond what lime can do for them. Surface crusting can be prevented. Gypsum is now being widely used on acid soils.

### **Gypsum Can Enhance the Values of Liming**

Addition to soil together with lime increased crop yields. The combination also decreased leaching losses of potassium and magnesium.

### **Gypsum Improves Water-use Efficiency**

Gypsum increase water-use efficiency of crops. In areas and times of drought, this is extremely important. Improved water infiltration rates, improved hydraulic conductivity of soil, better water storage in the soil all lead to deeper rooting and better water-use efficiency. From 25 to 100 percent more water is available in gypsum-treated soils than in non-treated soils.

### **Gypsum Creates Favorable Soil EC**

Gypsum, being readily soluble, results in proper buffered solute concentration (EC) in soil to maintain soil in a flocculated state. It is better environmentally and cost wise to maintain the needed EC with gypsum than with excess application of fertilizers.

### **Gypsum makes it Possible to Efficiently Use Low Quality Irrigation Water**

Use of reclaimed municipal wastewater is important of conservation of natural resources. Reclaimed water can be satisfactorily used if

amendments, such as gypsum and water-soluble polymer, are also used.

### **Gypsum Decreases Dust Erosion**

Use of gypsum can decrease wind and water erosion of soil. Severe dust problems can be decreased, especially when combined with use of water-soluble polymers.

### **Gypsum Helps Plants Absorb Plant Nutrients**

Calcium, which is supplied in gypsum, is essential to the biochemical mechanisms by which most plant nutrients are absorbed by roots. Without adequate calcium, uptake mechanisms would fail.

### **Gypsum Improves Compacted Soil**

Gypsum can help break up compacted soil and decrease penetrometer resistance. Combination with organic amendments also helps, especially in preventing return of the compaction.

### **Gypsum Makes Slightly Wet Soils Easier to Till**

Soils that have been treated with gypsum have a wider range of soil moisture levels where it is safe to till without danger of compaction or deflocculation.

### **Gypsum Stops Water Runoff and Erosion**

Gypsum improves water infiltration rates into soils and also the hydraulic conductivity of the soil.

### **Gypsum Decreases pH of Sodic Soils**

Gypsum immediately decreases the pH of sodic soils or near sodic soils from values often over 9 but usually over 8 to values from 7.5 to 7.8. These values are in the range of acceptability for growth of most crop plants.

### **Gypsum Increases the pH of Acidic Soils**

One mechanism is which gypsum can increase soil pH is some acidic soils to sufficiently decrease the level of soluble aluminum to grow crops satisfactorily is replacement of hydroxyl ions from some clay lattices by sulfate ions.

### **Gypsum Improves Swelling Clays**

Gypsum can decrease the swelling and cracking associated with high levels of exchangeable sodium on the montmorillonite-type clays. As sodium is replaced by calcium on these clays, they swell less and therefore do not easily clog the pore spaces through which air, water and roots move.

### **Gypsum Prevents Water-logging of Soil**

Gypsum improves the ability of soil to drain and not become waterlogged due to a combination of high sodium, swelling clay, and excess water.

### **Gypsum Can Help Remove Excess Boron from Sodic Soil**

More boron was leached from sodic soils when gypsum was applied than when the soil was leached without gypsum.

### **Gypsum Increases the Stability of Soil organic Matter**

Gypsum is a source of calcium, which is a major mechanism that binds soil organic matter to clay in soil which gives stability to soil aggregates.

### **Gypsum Decreases Loss of Fertilizer Nitrogen to the Air**

Calcium from gypsum can help decrease volatilization loss of ammonium nitrogen from applications of ammonia, ammonium nitrate, urea, ammonium sulfate, or any of the ammonium phosphates.

### **Gypsum Can be a Source of Oxygen for Plants**

The sulfate that is taken up by the plants and metabolized releases the associated oxygen, which is a source of oxygen to plant roots although a limited source.

### **Gypsum Helps Earthworms to Flourish**

A continuous supply of calcium with organics is essential to earthworms that improve soil aeration, improve soil aggregation and mix the soil.

### **Gypsum Can Increase Water Retention in Soil**

Gypsum when applied to sodic soil decreased levels of exchangeable sodium resulted in a large increase in water retention at a given tension compared with controls. Dry matter and seed yield were increased as a result.

### **Gypsum Can Increase Crop Yields**

Gypsum for various combinations of the above effects can substantially increase crop yields from 10 to 50 percent.