

Calcium Sulphate (Gypsum) Version 1.4 19 June 2012

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Introduction

Calcium sulphate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) (23% Ca, 18% S) commonly known as Gypsum can help solve the problem of needing calcium in alkali soils without raising alkalinity or pH. Check for the reason of the alkalinity. It can be low organic matter, high potassium and/or high sodium. Gypsum supplies calcium without increasing the pH because it has no carbonate which is the item in agricultural lime that increases the pH.

Being very fine and water soluble, gypsum can move down into tight compact soils to help loosen them. Avoid applying or doing anything that causes tight soils and apply lime-plus to decrease hardpans. See Soils and Elements > Calcium.

It forms in lagoons where ocean waters high in calcium (Ca) and sulphate evaporate and are replenished with more sea water, or where earth movement cuts off an outlet and the water evaporates. This can happen many times over centuries resulting in thick beds or layers of sedimentary rocks. These are in about 90 countries and in 19 USA States. All are slightly different.

Gypsum can be toxic. Some consultants recommend feeding it to animals! Beware of those consultants, they are dangerous. See 'Safety' below.

It has many names and uses, depending on its type and application. It also varies between sources, so, before buying any, ask for a complete mineral and toxin analysis. If an analysis is not available, don't buy it. Just because an item is a naturally mined mineral doesn't make it safe, and an excess of anything can be toxic.

The water soluble sulphur in gypsum can leach other elements with it, such as sodium, selenium and potassium.

Insufficient calcium causes leaves to wilt which is hard to identify in grass leaves, but farmers notice that pastures in adequately limed soils don't show drought stress symptoms as soon as in Ca deficient soils. Clover leaves are smaller, tomatoes can have black spots and its leaves wilt, and broad bean leaves wilt, indicating that more lime should have been dug in to the soil. Wilting in tomato and broad bean leaves is easy to identify. See photos in the Garden chapter. In most cases these can be prevented with agricultural lime, which is the favoured way. Gypsum should be only used in alkaline soils, so to sum up, don't use gypsum if agricultural lime can correct the problem, even if it takes a little longer.

Gypsum can penetrate fine clay soils and loosen them, and also enter tight high magnesium soils, allowing air and moisture spaces to eventually (after several applications over several years) loosen and improve the soil structure. Earthworms can do a better and faster job, but both may be required because earthworms need Ca. See Soils > Earthworms.

Gypsum is usually white or grey, but can be shades of brown, red or yellow. Colours can be from impurities, but because of the way it is formed, there is a substantial variation in purity, which can vary from layer to layer, and neither colour nor texture are accurate indications of purity. Tests in Australia have shown that mined gypsum can be between 1 and 100% gypsum.

Gypsum is usually very fine and dusty. 120 micron gypsum dissolves too quickly, while 2 mm grains act for longer. In some areas it is granulated for easier spreading.

The best results for loosening soils can be organic matter from poultry, animal and/or barnyard manure. Earthworm numbers will increase after applying these. Growing forage crops to graze is another way of improving soils.

Application rates

When needed for the above reasons, it can replace agricultural lime, but doesn't replace normal phosphate based fertilisers.

Gypsum can be applied at any time of the year, but not before calving or lambing, is best just before rain, because it does nothing until washed in. Applying it to pastures to be grazed by cows before calving because can increase the incidence of milk fever. See Animal Health > Milk fever.

Don't apply more than is needed because it can induce magnesium deficiency, and because sulphates leach other elements. Normal rates are 1,000 kg to 2,000 kg per ha (880 to 1,760 lb per acre), but firstly do quantity trials from 500 kg per hectare up. It may not need much.

100 kg spread per 500 m² (22 m by 22 m or 30 by 17, etc.) in dirty dams or ponds can clear the water.

Safety

Wear goggles, a mask and gloves and don't inhale it.

It has been claimed to be non-toxic to animals, but both sheep and cattle have died after consuming gypsum, so, depending on its analysis, don't apply it to pasture or crops before grazing. Always make sure that it is well washed off plants with as much as 50 mm (2 inches) of heavy rain (fine drizzles, even if over a long period, won't achieve this).

Don't leave it where animals can eat it. I repeat, gypsum comes from many sources, so varies in analyses. High fluoride content was one cause of deaths that occurred gradually over 18 months when gypsum was being fed to cattle. Analysis of the animals' bones showed fluoride to be much higher than normal. The illnesses and deaths were originally believed to be caused by a disease, but bone density was significantly reduced and most bones became porous.

Some farmers feed gypsum to animals to supply calcium, which I would not recommend, because many reports state that most gypsums contain impurities. There are better and safer sources of calcium such as legumes and their hays being the best. Some gypsums contain magnesium, but some don't.

If calcium and boron pasture levels are optimum, they should be adequate in animals.