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CALCIUM & MINERALS

Calcium is the fuel that feeds the microbes in our soils, allowing their numbers to increase in the billions, when soil conditions are congenial. (Moisture, temperature, decaying matter, etc)

Calcium keeps the soil alkaline, which is the most common state for all plant life except for the species which have adapted to acidic conditions.

Calcium is the chemical element with the symbol Ca and atomic number 20. It has an atomic mass of 40.078 amu. Calcium is a soft gray alkaline earth metal, and is the fifth most abundant element by mass in the Earth's crust. Calcium is also the fifth most abundant dissolved ion in seawater by both molarity and mass, after sodium, chloride, magnesium, and sulfate.

Calcium is essential for living organisms, particularly in cell physiology, where movement of the calcium ion Ca^{2+} into and out of the cytoplasm functions as a signal for many cellular processes. As a major material used in mineralization of bones and shells, calcium is the most abundant metal by mass in many animals.

Calcium is available to the home gardener in a number of forms, garden lime, hydrated lime, dolomite, gypsum, crushed egg or sea shells and bone flour.

The importance of calcium and its influence in the gardens cannot be under estimated as I have learnt over the years of gardening.

Every now and then a gardener will approach me with a problem that basically is; the garden shows little vigour, plants don't grow as well as they used too, even though I feed them and tend them well.

I ask a simple question when did you last lime the garden. The answer is invariably, 'not for years'.

Thus they are told to lime the soil with a quick acting soft lime and a few months later they contact me to say it worked.

Garden Limes sold come in two forms, powdered lime from limestone which is a hard, gritty lime that can take up to 10 years to break down and become available to the soil life and plants.

Then there is soft lime that comes from either sea shell deposits found in the hills or chalk which is a type of limestone in a powdered form; these limes when placed between moist fingers and rubbed has a soft, smooth texture and becomes a slurry quickly.

This makes it quickly available to plants and soil life soon after it has been broadcast.

Garden lime increases the alkalinity of the soil and should not be used near acid loving plants.

It is vital to spread it over decomposing organic matter such as mulches of cut green crops and into compost bins. A sprinkling now and then into your worm farm is a great advantage especially if you place citrus peelings into the bin.

Calcium hydroxide, traditionally called slaked lime, hydrated lime, slack lime, or pickling lime, is a chemical compound with the chemical formula $\text{Ca}(\text{OH})_2$. It is a colourless crystal or white powder, and is obtained when calcium oxide (called lime or quicklime) is mixed, or "slaked" with water. It can also be precipitated by mixing an aqueous solution of calcium chloride and an aqueous solution of sodium hydroxide. It is

also a fast acting lime with a burning effect. Used in aiding the decomposing of bodies and other organic materials. Great in compost bins. If used on the garden there should be a reasonable rest period before seeds or seedlings are planted out.

Dolomite is a naturally occurring material containing 39% magnesium carbonate (of which 11% is elemental magnesium) and 57% calcium carbonate (of which 24% is elemental calcium). It is sourced from Golden Bay in the Nelson region and is ground to a yellow-brown powder.

Primarily used for dairy farming as both a magnesium source and liming source. It is also used in some horticultural situations where magnesium and calcium inputs are required. Dolomite is often used as a source of magnesium, as the availability of the magnesium is increased, relative to Magnesium Oxide, by its finely ground nature. It is also pH neutral so can be used anywhere.

Gypsum (calcium sulphate di-hydrate) is an abundant natural mineral. It originates from the drying out of ancient seas and is quarried (or mined if deep) in many parts of the world. Gypsum does not occur in New Zealand. Winstone imports our gypsum from Australia.

Gypsum enjoys a growing application in agriculture and horticulture. It is used as a 'clean green' soil conditioner and also as a fertiliser. Gypsum has an advantage over certain other minerals, being pH neutral.

Gypsum is particularly useful for treating heavy (clay) soils where it is used to improve the soil's texture, drainage and aeration. Gypsum also has applications in the remediation of soil that has been damaged through compaction (heavy stock, machinery), in the recovery of sub-soils exposed by earth movement (contouring, slippage) and in soils affected by salinity (estuarial berms, dairy effluent).

Gypsum is an important natural source of calcium and a number of other elements all of which are of great benefit to our soils and plants. Below is the chemical analysis of Gypsum:

NB: Quantities are stated in ppm unless otherwise specified:

Sulphur 18% : Calcium 23.26%

Aluminium 300 : Antimony < 4 : Arsenic < 1.0 : Cadmium < 0.2 : Chlorine 1315 :

Copper 93.8 :

Fluoride 100 : Iron 80 : Lead < 10.0 : Magnesium 93.8 : Mercury < 0.05 :

Phosphate < 19 :

Potassium 50 : Selenium < 0.5 : Silicon 800 : Sodium 820 : Tin < 4 : Zinc 5 .

I favour the mixing of the three products together, soft garden lime, gypsum and dolomite in equal amounts and sprinkling over empty garden beds prior to planting out and then lightly raking to work into the soil. Light side dressings can be applied over existing planted beds and lawns and then watered in. This can be done as often as every 3 months. In areas where acid loving plants are, just use the gypsum and dolomite, which includes where potatoes and tomatoes are to be grown.

For a fuller spectrum of minerals and elements use **Rok Solid** 6 monthly, (or at planting time) **Ocean Solids** once a year. Then two to four weekly sprays of **Magic Botanic Liquid** and **Mycorrcin** combined.

Avoid chemical fertilisers and chlorinated tap water.

Do this and you will be amazed how great your gardens will become with really healthy

plants and lot of your garden problems will be reduced or disappear.
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