



ULTRA GRO

Ag is Life

The Importance of Calcium

Calcium (Ca) is a silvery white alkaline metallic element with an atomic weight of 40 and two positive charges. The name comes from the Latin word Calx meaning quicklime. The double positive charge ions is important, since it permits Ca to replace or push off single charge ions (potassium, sodium, ammonium and hydrogen) in the soil colloid for cation exchange. Because of the emphasis on NPK by makers of commercial fertilizers, Ca as well as another metal, magnesium (Mg), are considered as secondary elements. Actually, both of these elements are of major importance because of their actions in soil and biochemistry in plants. Every agricultural product (plants, fruits, and vegetables) contains certain amounts of Ca and Mg and therefore soils must contain large amounts of both elements in order to meet these requirements. However, they must be in the correct balance and position in order to make good soil, which produces good plants and crops.

Calcium ranks third behind Nitrogen and Potassium in the number of atoms absorbed by growing plants. Calcium should occupy between 65-70% of the Cation Exchange Capacity (CEC) of good soils. Magnesium should have 15-20% of the CEC. Too much or too little of either one represents a soil imbalance. An excess of Ca can cause magnesium, phosphate, and minor element deficiencies resulting in plants out of hormone and enzyme balance: easy prey for bacterial, fungal, and insect attack. On the other hand, excess Mg causes phosphate, potash and nitrogen problems. High Mg and low Ca can bring about alcohol and aldehyde production from decay of soil organic matter. This is lethal to beneficial soil bacteria. Of more importance, this imbalance causes soils to puddle and waste water and to “cement” which excludes aeration. This condition favors weeds over crops.

with rising temperatures. From this it can be seen that neither Calcium Carbonate (CaCO_3) or

Proper Ca levels improve soil texture, expanding the colloid matrix to permit water penetration and retention. It makes phosphorus and micronutrients available, favors micro-organism development and helps both symbiotic and free living nitrogen-fixing bacteria. With good Ca levels plants can develop better root systems, stems, and leaves. All of this leads to improved use of photosynthesis energy, water, nitrogen, and mineral nutrients. Calcium is used to form a stiffening, building material (calcium pectate) which makes stronger cell walls in plants. Fruits and vegetables low in Ca present shipping and storage problems such as bruising and softening. Missing Ca can cause soft and stunted roots and stress problems in newer leaves.

A note of caution: high levels of Ca in soil does not guarantee proper levels of it in the CEC. In alkaline soils, high levels of sodium, magnesium, and potassium can produce a Ca deficiency since they can compete with Ca for positions on the colloid. In acid soils, competition by hydrogen ions can cause the same problem and adding more lime to these soils may not solve the problem.

Calcium is only found in combination in nature. It is the 5th most abundant element and third most plentiful metal. Some of the more important Ca compounds are calcium carbonate, gypsum, and apatite (CaCO_3 , $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$, $\text{Cu}_3(\text{PO}_4)\text{F}$).

Calcium carbonate is nearly insoluble in water but can be dissolved by most acids. When heated to drive off the carbonate it becomes calcium oxide (lime or quicklime). Gypsum is slightly soluble in water (2,400 ppm) but the solubility decreases than equivalent to the Ca derived over a season

gypsum offer a quick solution to low Ca in the CEC of soils.

Apatite was formerly a source for both Ca and phosphate for fertilizers. Calcium cyanamide is also used as a fertilizer in some cases since it has both Ca and N. Dolomite limestone is a mix of Ca and Mg carbonates so care must be used to prevent compounding a Mg problem while trying to add Ca to a soil.

Where Ca stress conditions occur, it is important to use a water soluble source such as calcium nitrate (CaNO₃). Soil applications can be used to prevent problems before they arise. Foliar applications of calcium nitrate are of great value in giving quick benefit. Since calcium often combines to form relatively insoluble complexes in already formed plant structures, foliar calcium nitrate is one of the best means of delivery of Ca to developing fruit and storage organs.

Ultra Gro Soil Treatment and Calcium Complex is totally soluble and is immediately available for uptake into the clay colloid to increase the Ca/Mg ratio in the CEC. Since we use only pure food grade chemicals in making these products, there are no heavy metals or salts in either one.

Soil Treatment has 4 microbes added to assist Ca solubility and uptake as well as increasing Biolife in the soil. The Calcium increases water penetration and holding capacity and opens soil for better aeration.

Calcium Complex has instantly available Ca plus an energy source and a natural surface active agent to increase microbial action in the rhizosphere. It is an excellent chelating agent for both macro and micro-nutrients to make these available for plant use. It brings about rapid growth of beneficial soil microbes and increases aeration in the soil. Because of the difference in solubility between **Ultra Gro's Calcium** and gypsum, 2 gallons/acre of **Soil Treatment** and 5 gallons/acre of **Calcium Complex** would be more combination that provide the wanted results. For healthier soil and plants, both are a must. For more

from 1.5 tons/acre gypsum application. Remember, we are talking Ca entering the CEC rather than Ca existent in the soil but not available to the plant.

The soluble Ca in both Ultra Gro Soil Treatment and Calcium Complex combined with the support material included will build up the Ca/Mg ratio in the CEC. Since Ultra Gro products are in liquid form they can be applied in the drip systems or other methods directly into the root regions.

Benefits of Ultra Gro Calcium Complex Soil:

- Improves air and water penetration.
- Corrects soil acidity and sodium alkalinity.
- Increases available potassium.
- Provides a better environment for soil organisms.
- Improves soil structure by aggregating the colloidal clay and humus particles.

Necessary for:

1. Cell elongation
2. Protein synthesis
3. Normal cell division
4. Uptake of water
5. Uptake of plant nutrient
6. Translocation of carbohydrates
7. Regulates cell acidity and permeability
8. Grain and seed production
9. Root nodule bacteria
10. Terminal growth and bud production

Benefits of Ultra Gro Calcium Soil Treatment:

- Contains over 26 active ingredients.
- Increases bacterial action in the soil.
- Increases water penetration and retention.
- Helps convert locked up nutrients in the soil to make them available to the plant.
- Improves the tilth of the soil.

Made from soluble Calcium Nitrate, Ultra Gro Calcium Complex and Soil Treatment are a powerful

detailed information about these products and the work they can do for your soil and your crops contact your **Ultra Gro Specialist** today.