CCS Pipeline™

CALCIUM NITRATE - $Ca(NO_3)_2$ - Foliar or Soil Applied

Calcium Nitrate has an analysis of 15.5% Nitrate Nitrogen and 19% Calcium. It is relatively soluble in cold water at 851 pounds Calcium Nitrate per 100 gallons of water. Calcium Nitrate can be used as a foliar spray or soil applied for most crops.

Foliar applications of Calcium Nitrate should include enough water to adequately cover plant leaves (30 - 40 gal/ac). The rate of use depends upon crop. Crop specific rates are provided below. Do not mix Calcium Nitrate with materials containing Phosphates or Sulfates. A standard practice for foliar application is to apply 10 lbs Ca (NO3)2/100 gallons of water and spray to cover foliage.

SUGGESTED FOLIAR APPLICATION FOR $Ca(NO_3)_2$

CROP	RATE $Ca(NO_3)_2$/Ac	APPLICATION TIMING	Frequency of Application	REASON For Application
Tomato	5 - 7	During Blooming	Weekly	Blossom End Rot
Pepper	5 - 10	During Blooming	Weekly	Blossom End Rot
Cucurbits	5 - 7	During Blooming	Weekly	Blossom End Rot
Citrus	5 - 20	Pre Bloom - Fruit Set	1 - 2 Times	Fruit Set
Cole Crops	5 - 7	Early to Mid Season	Weekly	Leaf Tip Burn
Sweet Corn	5 - 10	Early Silking	1 - 2 Times	Low Ca Soils
Potato	5 - 7	Early Tuber Initiation	1 - 4 Times	Tuber Growth
Strawberry	2 - 4	Pre to Early Bloom	1 - 2 Times	Fruit Set
Turf	5 - 10	Early Growth & Stress	Weekly	Root Growth
Ornamental	5 - 20	Flush or Stress	As Need	Root, Shoot & Bloom
Other	2 - 7	Bloom or Stress	1 - 4 Times	All The Above

About Calcium

Calcium is a basic cation. Calcium will attach to negative exchange sites on soil colloids. It is most available when it occupies approximately 60 - 70 percent of the total exchange sites. Calcium is called a basic cation; however, the increase in soil pH after liming comes from reactions involving carbonates and carbonic acid, and not Calcium itself. Limestone has a direct effect on soil pH; however, other sources of calcium do not. These sources are; Gypsum, Calcium Nitrate and Calcium Chloride.

Calcium moves in the soil mainly by mass-flow. Calcium uptake by plant root systems is a passive process and restricted to the tip of the young roots where the walls of the endodermal cells are still unsuberized (thin). Calcium uptake is reduced when root tips are damaged by insects, nematodes, nutrient excesses or deficiencies (that may limit root growth), and uptake can be reduced when Calcium is chemically altered by Sodium or Aluminum ions. Competitive uptake with ammonium and potassium ions can also cause calcium deficiencies. Water stress (lack of or excess) can limit calcium uptake by damaging root tips. Calcium uptake is affected by many things; therefore, early season analysis of soil and tissue reports coupled with visual inspection of plant roots is essential to avoid crop loss.

Calcium is taken up by root tips and distributed throughout the plant via the xylem transpiration stream. Calcium chelation with organic acids in plant sap facilitates the exchange of calcium within the plant vascular system. The higher the concentration of calcium in the plant sap, the faster it moves through the plant toward the shoot tips or other sinks. Calcium can be transported via the phloem, but is moved in very small amounts. High relative humidity can restrict calcium movement to meristematic tissues, creating deficiencies in growing tips. Calcium does not move very well from older to younger tissue, therefore, avoiding a calcium deficiency is easier than correcting one. Foliar feeding is often the best method to overcome calcium deficiencies. Once growth is restricted a domino effect occurs slowing down nutrient and water movement within the plant. Nutrition programs that do not focus on calcium are on weak foundations.

Calcium is involved in many plant processes. The most obvious role is the bonding with pectin in the middle lamella between adjacent cell walls acting as cement. Calcium is involved with cell elongation in growing points of roots and shoots. The removal of Calcium from the cell wall is an essential part of leaf abscission and fruit ripening. An application of Calcium to senescing leaves reduces the energy consuming affect of cytokinins. Therefore, post-harvest quality and rate of decay in flowers, foliage, fruits and vegetables are affected by Calcium levels. Adequate calcium levels enhance crop quality. Calcium is involved in detoxification within the cell cytoplasm and directly activates several enzymes. Calcium is essential during cell division and enhances pollen tube growth and germination. Calcium is very important from start to finish in crop production.

Calcium Deficiency Symptoms

- Reduction in the growth of meristematic tissues
- First observed in growing tips of young leaves and roots
- Leaves become deformed and chlorotic
- Bitter fruit
- Leafy vegetables show tip burn
- Brown heart of leafy and heading vegetables
- Blossom end rot of cucurbits and tomato

Calcium Interactions

- Effected in decreasing order by Mg, K and Na
- Ca: Mg of 2:1 and Ca: K of 4:1 is optimum for growth
- Nitrate increases Ca uptake (due to release of Ca-organic acid chelates during nitrate uptake
- In acid soil, P favors Ca uptake. If pH>7.0 Calcium Phosphate forms reducing Ca uptake
- Increase in pH (excess lime) induces Fe, Mn, B or Zn deficiencies
- In acid soils pH<5.0, Ca may bind with Al and Fe hydroxides. In the cell, Al toxicity is due to the competition between Al and Ca for binding sites on calmodulin (enzyme activator binding site)
  (Ca uptake by roots is restricted due to competition with Al for uptake binding sites)
- Calcium and Boron have synergistic effects in reducing the incidence of disorders near actively growing points.

SUGGESTED SOIL APPLICATION RATES FOR $Ca(NO_3)_2$

CROP	RATE $Ca(NO_3)_2$/Ac	APPLICATION TIMING	Frequency of Application	REASON FOR APPLIATION
Leafy Vegetables	100 - 150	Early to Mid Season	1 - 2 Times	Root & Top
Most Row Crops	80 - 100	Early to Mid Season	1 Time	Root & Top
Corn	100 - 200	Prior to Tasseling	1 Time	Root & Ear Formation
Potato	80 - 150	Early Tuber Growth	1 - 2 Times	Set, Size & Disease
Golf Green *	5 - 10	Grow-In, Renovation or Stress	As Need	Root Growth
Golf Tee & Fwy. *	5 - 15	Grow-In, Renovation or Stress	As Need	Root Growth
Sod & Other Turf	100 - 200	Grow-In or Stress	1 - 2 Times	Root Growth
Cucurbits	100 - 150	Early to Mid Bloom	1 - 2 Times	Root, Bloom & Fruit
Strawberry	50 - 100	Pre to Early Bloom	1 Time	Root, Fruit & Disease
Ornamental	100 - 200	During Flush Periods	As Need	Root, Shoot & Disease

*(Rates for Golf Courses are in lbs/1000 sq. ft.)

For information on soil and fertility considerations, call Creech Crop Services, LLC.
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