

Calcium Chloride *Market Reviews*

Industrial Uses

6 Crop Applications

Both ionic components of calcium chloride (CaCl₂) - calcium (Ca) and chloride (Cl) - are essential for plant nutrition and health and can appreciably improve yields. CaCl₂ is thus used in fertilizer manufacture and on farm, orchards and other agricultural endeavors.

DESCRIPTION

Chloride

Most plants require Cl for growth and reproduction and have Cl concentrations of 0.1% to more than 1%, dry weight basis. While potassium chloride is the usual Cl source in fertilizers, CaCl₂ can be used for this purpose.

Chloride is readily leached from soils, so most of the world's chloride is found in oceans or salt deposits. Soils and crops near continental margins receive Cl carried inland by rain and snow, but Cl content diminishes rapidly with distance from the sea. As a result, many crops need supplemental Cl to improve yields and suppress disease.

- It activates photosynthesis and enzymes, including those involved in starch utilization (which then affects germination and energy transfer).
- It helps transport such nutrients as potassium, calcium and magnesium to maintain electrical charge balance.
- It aids the movement of water into cells and the ability of cells to retain water, which is especially important when plants are under moisture stress.
- It is involved in the opening and closing of stomata guard cells on leaf surfaces. High concentrations cause guard cells to swell, closing stomata and controlling water loss.
- Its presence in soil may help plants use ammonium by limiting the conversion of ammonium nitrogen to nitrate in soil.
- It can temporarily suppress many root and leaf crop diseases, especially those caused by fungi and those that involve small grains.
- It can help small grains form heads earlier and complete head emergence.
- It helps suppress common diseases in wheat, barley, corn, potatoes, celery and other widely planted grains and vegetables, for example:

Location	Crop	Suppressed disease
Idaho, Oregon	Winter wheat	Take-all
Montana, North Dakota, Kansas	Winter wheat	Tan spot
Oregon	Winter wheat	Stripe rust
Texas	Winter wheat	Leaf rust
Saskatchewan	Winter and Spring wheat	Common
Montana, Idaho	Spring wheat	Take-all
South Dakota	Spring wheat	Leaf rust, tan spot septoria
North Dakota	Spring barley	Common root rot, spot blotch
Montana	Spring barley	Fusarium root rot
Alberta, Saskatchewan	Spring barley	Common root rot
Saskatchewan	Spring barley	Spot form net blotch
North Dakota	Spring durum	Common root rot
New York	Corn	Stalk rot
Oregon	Potatoes	Hollow heart, brown center
California	Celery	Fusarium yellows

Plant often respond to Cl where disease pressure is high and soil Cl is low, but yield increases do not always relate to disease suppression. For instance, Cl fertilization has increased wheat yields 3 to 8 bushels/year and advanced winter wheat maturity by 5 to 7 days and spring wheat maturity by 2 to 5 days. Plants low in Cl may be wilted or stunted and have marginal leaf scorching, delayed maturity, more fungal diseases and lower yields.

Some plants are sensitive to Cl, especially as seedlings, but varietal substitution can correct the situation. Excessive Cl may occur in: poorly drained soils that receive runoff from other areas, especially in coastal zones; soils irrigated with high-chloride water; and confined soils such as in greenhouses. High water tables and capillary movement of Cl into the root zone also affect Cl levels.

Calcium

CaCl₂ is an excellent soil conditioner where Ca concentrations are low, although calcium carbonate is often the material of choice to provide Ca. Calcium can significantly increase the growth of plant roots and shoots and aid phosphorus uptake. It should be properly placed for the crop, e.g., in the tuber zone for potatoes. Calcium deficiency can decrease yields for such crops as soybeans, corn and cereals and may cause:

- Blossom and rot in tomatoes, peppers and melons
- Black heart in celery
- Bitter pit and softrot (storage quality) in apples
- Tip burn in lettuce
- Lack of kernels ('pops') in peanut hulls
- Internal rust spot, sprout subapical necrosis and soft rot during storage in potatoes
- Berry drop in grapes
- Cracking in carrots

Fruit trees tend to need more calcium than other mineral nutrients. Calcium chloride has been used to provide sufficient Ca and prevent bitter pit in Delicious apples and alfalfa greening and cork spot in Anjou pears. Calcium may also improve cold tolerance in fruit trees, e.g., CaCl₂ has improved winter hardiness of Delicious apples and Anjou pear trees by 2 to 8°F. Leaf application of CaCl₂ also has delayed postharvest ripening and mold development in strawberries.

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