

## Plant Macronutrients

Nutrient / Application	Function	Symptoms of Deficiency	Symptoms of Excess
<p><b>Nitrogen (N)</b> California soils contain little and inorganic forms are rapidly depleted. Mix into soil before planting or apply to surface and water in. Replenish regularly. Nitrate form is very mobile in soil.</p>	<p>Important for many growth and development processes. A constituent of proteins, enzymes, and chlorophyll (needed for photosynthesis).  Stimulates early growth and root formation; promotes seed, fruit, and flower formation.</p>	<p>Slow growth, stunting, and yellow-green color; more pronounced in older tissue; tips and margins turn brown; premature death  Slow growth, stunting, and purplish color on foliage or dark green color; dying leaf tips; delayed maturity; poor fruit or seed development.</p>	<p>Excessive vegetative growth, dark green color, excessive transpiration, reduced yield; delayed maturity; few fruits. Excess can interfere with micronutrient absorption; may mimic Zinc (Zn) deficiency.</p>
<p><b>Potassium (K)</b> Does not move far in soil. Remains near source of application. Mix into soil if needed before planting. Apply around the root zone of established plants. Adequate in most California soils.</p>	<p>Proper growth of fruits and flowers, ensuring good size, color and quantity.</p>	<p>Slow growth; leaf tip and marginal burn (starts on more mature leaves); weak stalks; small fruit and shriveled seeds.</p>	<p>Light green foliage; tendency for Calcium and Magnesium deficiency symptoms to appear.</p>
<p><b>Calcium (Ca)</b></p>	<p>Essential part of cell wall structure, must be present for formation of new cells. Adequate in most San Diego soils.</p>	<p>Reduced terminal growth of shoots (buds) and roots, resulting in plant death.</p>	<p>Interferes with micronutrient availability.</p>
<p><b>Magnesium (Mg)</b></p>	<p>Essential for photosynthesis. Adequate in most California soils</p>	<p>Leaves curl upward along margins; marginal yellowing with green  "Christmas tree" pattern along mid-ribs of leaves.</p>	<p>Interferes with Calcium uptake</p>

<b>Sulfur (S)</b>	Responsible for characteristic odors of plants such as garlic and onion	Reduced growth, delayed maturity. Light green to yellowish foliage on leaves; small spindly plants.	Not known.
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