

PLANT NUTRIENT GUIDE

What each nutrient does - and what excess or deficiency can look like

MACRONUTRIENTS

ELEMENT	WHAT IT DOES	TOO MUCH	TOO LITTLE
Nitrogen (N)	Required in large quantities for the synthesis of proteins, chlorophyll and enzymes. Active, rapid growth requires more nitrogen.	Succulent, dark green growth; weak, spindly stems; few fruits; brittle growth, especially in high temperatures.	Reduced growth; chlorosis; intensified reds and purples; early flowering; leaf drop; reduced lateral branching. Appears first on older growth.
Phosphorus (P)	Improves root water uptake; helps resist cold and disease; supports blooming and fruiting; helps nitrogen uptake; promotes early, rapid root growth. Bone meal is a bioavailable source.	May appear as a deficiency of zinc, iron or cobalt.	Reduced growth; deep green leaves; chlorosis followed by necrosis; long, sparsely branched roots; brown or purple mottling; thin stems; lower-leaf loss; reduced flowering.
Potassium (K)	Crucial for root formation. Performs many of the same functions as phosphorus.	May cause nitrogen deficiency and affect uptake of other positively charged nutrient ions.	Rapid necrosis; reduced growth; shortened internodes; marginal burn or scorch; necrotic spots; reduced lateral branching; wilts readily.
Magnesium (Mg)	The central atom in the chlorophyll molecule. May be supplied with Epsom salts or as a weak foliar spray (1 tsp per gallon). Dolomitic limestone is another supplement.	Interferes with calcium uptake.	Reduced growth; interveinal chlorosis followed by mottling; reduced seed production; cupped leaves.
Calcium (Ca)	Fundamental to cell division and root development. Bone meal is a source.	Interferes with magnesium absorption. High calcium raises pH, which can make micronutrients unavailable.	Curling, chlorosis and necrosis of young leaves; incomplete flowers; fewer petals; distorted or dying flower buds; tissue breakdown; tomato blossom-end rot; apple cork spot; shortened primary and secondary roots.
Sulfur (S)	Combines with nitrogen to make protoplasm.	Excess may result from air pollution.	Rarely deficient. General yellowing; uniform chlorosis over the whole plant; stunted growth; necrosis; faded flowers; red pigmentation in leaves or internodes.

Symptoms can overlap and may also be caused by pH, drainage, root damage, temperature or disease. Use this chart as a diagnostic starting point, then confirm with a soil or tissue test.

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Micronutrients are needed in small amounts, but shortages or excesses can still affect plant health.

MICRONUTRIENTS

ELEMENT	WHAT IT DOES	TOO MUCH	TOO LITTLE
Iron (Fe)	Needed for chlorophyll formation. Add in chelated form.	Rare, except in flooded soils.	Interveinal chlorosis on new growth, progressing from yellow to white. Associated with poor drainage, poor oxygenation, nematode attack, and soils high in calcium, manganese, phosphorus, copper or zinc.
Boron (B)	Promotes crop maturity, water balance, flower set and yield; fixes ascorbic acid in root tips.	Blackening or death of tissues.	Failure to set seed; death of apical buds; incomplete flowers; collapsed tulip stems; rosetted or distorted shoot tips; short internodes; thick, brittle or corked leaves; aborted leaves and flowers.
Zinc (Zn)	Acts as a catalyst in the use of other nutrients.	Appears as iron deficiency and interferes with magnesium.	"Little leaf"; smaller leaves; short internodes; distorted or puckered leaf margins; interveinal chlorosis; rolled or curled leaves.
Copper (Cu)	Works with iron in chlorophyll formation.	Appears as magnesium deficiency and may occur at low pH.	Small or misshapen new growth; wilting; rolled or curled leaves; variable chlorosis; rapid necrosis of young leaves; smaller, paler flowers or no flowers. May occur in peat soils.
Manganese (Mn)	Acts as a catalyst in the use of other nutrients.	Reduced growth; brown leaf spots; appears as iron deficiency; associated with acidic conditions.	Interveinal chlorosis followed by brown spots, producing a checkered red effect.
Molybdenum (Mo)	Essential for nitrogen fixation in legumes and nitrogen metabolism in other plants. The cabbage family has been studied most closely. Deficiency resembles iron chlorosis.	—	Interveinal chlorosis and twisted leaves.
Chlorine (Cl)	Trace levels help with root rot.	Salt injury; leaf-tip burn; increased succulence.	Leaves wilt and bronze, then become chlorotic and die.
Cobalt (Co)	A transplantation aid; needed for nitrogen fixation.	—	—

Before adding a micronutrient, check soil pH. A nutrient may be present but unavailable to the plant because the pH is outside the useful range.