

MACRONUTRIENT OUTLINE

Nitrogen (N)

Absorbed as NO_3^- , NH_4^+
Leaches from soil especially NO_3^-
Mobile in plant.

Nitrogen excess:

Succulent growth, dark green color, weak spindly growth, few fruits, may cause brittle growth especially under high temperatures.

Nitrogen deficiency:

Reduced growth, yellowing (chlorosis), reds and purples may intensify with some plants, reduced lateral breaks. Symptoms appear first on older growth.

Action Notes:

In general best $\text{NH}_4^+/\text{NO}_3^-$ ratio is 1/1.
High NH_4^+ under low sugar conditions (low light) can cause leaf curl.
Uptake inhibited by high P levels.
N/K ratio extremely important.
Indoors best N/K ratio is 1/1 unless light is extremely high.
In soils with high CHO/N ratio more N should be supplied.

Phosphorus (P)

Absorbed as H_2PO_4^- , HPO_4^-
Does not leach from soil readily.
Mobile in plant.

Phosphorus excess:

Shows up as micronutrient deficiency of Zn, Fe, or Co

Phosphorus deficiency:

Reduced growth, color may intensify, browning or purpling in foliage in some plants, thin stems, reduced lateral breaks, loss of lower leaves, reduced flowering.

Action notes:

Rapidly "fixed" on soil particles when applied under acid conditions fixed with Fe, Mg and Al. Under alkaline conditions fixed with Ca. Important for young plant and seedling growth. High P interferes with micronutrient absorption and N absorption. Used in relatively small amounts when compared to N and K. May leach from soil high in bark or peat.

Potassium (K)

Absorbed as K^+
Leaches from soil.
Mobile in plant.

Potassium excess:

Causes N deficiency in plant and may affect the uptake of other positive ions.

Potassium deficiency:

Reduced growth, shortened internodes, marginal burn or scorch (brown leaf edges), necrotic (dead) spots in leaf, reduction of lateral breaks and tendency to wilt readily.

Action notes:

N/K balance is important.

High N/low K favors vegetative growth, low N/high K promotes reproductive growth (flower, fruit).

Magnesium (Mg)

Absorbed as Mg^{++}

Leaches in soil.

Mobile in plant.

Magnesium excess:

Interferes with Ca uptake.

Magnesium deficiency:

Reduction in growth, marginal chlorosis, interveinal chlorosis (yellow between the veins) in some species. May occur with middle of lower leaves, reduction in seed production, cupped leaves.

Action notes:

Mg is commonly deficient in foliage plants because it is leached and not replaced. Epsom salts at a rate of 1 teaspoon per gallon may be used 2 times a year. Mg can also be absorbed by leaves if sprayed in a weak solution. Dolomitic limestone can be applied in outdoor situations to rectify a deficiency.

Calcium (Ca)

Absorbed as Ca^{++}

Moderately leachable.

Limited mobility in plant.

Calcium excess:

Interferes with Mg absorption.

High Ca usually causes high pH which then precipitates many of the micronutrients so that they become unavailable to the plant.

Calcium deficiency:

Inhibition of bud growth, death of root tips, cupping of maturing leaves, weak growth, blossom end rot of many fruits, pits on root vegetables.

Action notes:

Ca is important to pH control and is rarely deficient if the correct pH is maintained. Water stress, too much or too little, can effect Ca relations within the plant causing deficiency in the location where Ca was needed at the time of stress.

Sulfur (S)

Absorbed as SO_4^-

Leachable.

Not mobile.

Sulfur excess:

Sulfur excess is usually in the form of air pollution.

Sulfur deficiency:

S is often a carrier or impurity in fertilizers and rarely deficient. It may be absorbed from the air and is by-product of combustion. Symptoms are a general yellowing of the affected leaves or the entire plant.