Botany 101
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Elements essential as building blocks for compounds synthesized by plants:

C	**Carbon**	**Mg**	**Magnesium**
H	**Hydrogen**	**Mn**	**Manganese**
O	**Oxygen**	**B**	**Boron**
P	**Phosphorus**	**Cu**	**Copper**
K	**Potassium**	**Zn**	**Zinc**
N	**Nitrogen**	**Mo**	**Molybdenum**
S	**Sulfur**	**Na**	**Sodium**
Ca	**Calcium**	**Cl**	**Chlorine**
Fe	**Iron**	**Co**	**Cobalt**

Nitrogen (N) **Part of proteins, nucleic acids, chlorophyll**

Excess: **Succulent growth, dark green color, weak spindly growth, Few fruits, may cause brittle growth especially in high temperatures**

Deficiency: **Reduced growth, relatively uniform loss of color in leaves appearing first on older growth. Plants, reduced lateral bud breaks.**

Phosphorus (P) **For respiration and cell division**

Excess: **Shows up a deficiency of Zn, Fe or Co**

Deficiency: **Reduced growth, stunted plants, dark green color may intensify, Lower leaves often purplish between veins, thin stems, loss of lower leaves, reduced flowering**

Potassium (K) **Activates enzymes, concentrates in meristems**

Excess: **Causes N deficiency in plants and may affect the uptake of other Positive ions**

Deficiency **Yellowing of leaves beginning at margins and continuing toward center, reduced growth, shortened internodes, marginal burn or scorch (brown leaf edges), dead spots on leaves, reduction in lateral bud breaks and tendency to wilt readily**

Magnesium (Mg) **Part of chlorophyll molecule, activates enzymes**

Excess: **Interferes with Ca uptake**

Deficiency **Reduction in growth, marginal chlorosis, veins of leaves are green but yellow between the veins in some species, reduction in seed production, curling leaves, dead spots appearing saddening**

Calcium (Ca) **Involved in movement of substances thru cell membranes**

Excess: **Interferes with Mg absorption. High Ca usually causes high pH**

Deficiency **Inhibition of bud growth, terminal bud often dead, young leaves**
Appear hooked at tips, death of root tips, tips of leaves appear withered, weak growth, blossom end rot of may fruits, pits on root, Vegetables, apples and pears

Sulfur (S) **Part of amino acids**

Excess **Usually in the form of air pollution**
Deficiency **S is often carrier or impurity in fertilizers and rarely deficient. It may also be absorbed from the air and is a by-product of combustion.**
Symptoms are a general pale green and/or yellowing of the affected leaves, or dead spots, veins lighter in color than the rest of the leaf

Iron (Fe) **Needed to make chlorophyll and in respiration**

Deficiency **Larger veins remain while the rest of leave yellows – mainly in young leaves**

Manganese (Mn) **Activates some enzymes**

Deficiency: **Dead spots scattered over leaf**

Sources:

University of Arizona, College of Agriculture, Cooperative Extension

Introduction to Plant Biology, Kingsley R. Stern, California State University, Chico

www.hiraethgardens.com