	FUNCTION	DEFICIENCY SYMPTOMS	TOXICITY
N	• Important in protein synthesis and integral part of all amino acids • Promotes vigorous growth of stems and leaves • Component of chlorophyll, thus aids photosynthesis • Increase leaf size and quality	• Stunted, slow growth • Uniform yellowing of lower leaves, progressing upward • Smaller fruit, and/or lowing yields	• "Eagle clawing" of new leaves • Stunted growth • Dark green colour
P	• Promotes strong root development • Promotes sturdy structural growth of plant • Enhance seed germination • Stimulate tillering • Enhance bud set and stimulate blooming • Improves size and yield of fruit, flower and seed	• Dark green leaves progressing to purple coloration in petioles, stems, veins on underside of leaves, starting at bottom of plant progressing upwards • Stunted growth • Poor root development	• Interferes with micronutrients and Nitrogen absorption, so can appear as micronutrient deficiency
K	• Essential for fruit and flower production • Important in production of plants food (photosynthesis) • Improves plants tolerance to heat, cold, drought stress conditions and insect attack • Makes stiff straw and reduce lodging	• Chlorosis of young leaf edges, moving inward leaving green veins with interveinal browning and spots of necrosis • Potassium deficient plants are susceptible to diseases	• Competes with Nitrogen uptake, causing a Nitrogen deficiency
Ca	• Promotes plant vigour and strong plant tissue (resistance to insect attack) • Promotes early root formation and seedling growth • Aids in the uptake of all other nutrients • Balances soil chemistry (pH of soil) • Increase fruit set	• Poor root growth • Premature shading of blossoms and buds (eg blossom end rot on tomatoes) • Deformed terminal leaves or dead terminal buds • New shoots "clump", leaves cup	• Creates a high pH crisis, which locks out many micronutrients • See Magnesium toxicity below
Mg	• Essential element in the formation of Chlorophyll • Formation of sugars • Carrier of Phosphate and starches through the plant • Promotes the formation of oils and fats. • Vital for healthy growth • Increase iron utilization in plants	• Interveinal chlorosis and necrosis, accompanied by red/purple petioles • Drooping leaves • Excessive premature fruit drops	• Blocks Calcium update (Mg/Ca balance determines how "tight" soil is. The two cations make up the bulk of bound nutrients in the colloidal component of your soil. Calcium flocculates (opens) soil, and Magnesium coagulates (closes or tightens) soil).
S	• Increased root development • Helps to maintain the dark green colour • Stimulates seed production • Necessary for protein production • Flavour and odour component in many fruits and vegetables	• Entire plant yellows rapidly from bottom up. Looks like Nitrogen deficiency, but with pinkish veins. • Plants are stunted • Delayed maturity • Unlikely unless you are growing in very sandy soils	• Almost unlikely as deficiency
B	• Promotes early root formation and growth • Improves plant vigour and sturdiness • Increases yield and improves quality of fruit and vegetables • Necessary for proper pollination and fruit & seed setting	• Leaf blades may be distorted, and stems may become brittle and crack (blackening of tissue) • Shorter intermodal length, retarded growth or necrosis of the terminal buds and youngest leaves • Reduction or failure to seed and fruit. Malformation of fruit	• Marginal leaves scorch
Cu	• Needed for chlorophyll production • Catalyst for several plant reactions • Necessary for oxidation and production of protein • Intensifies colour • Improve flavour of fruits and vegetables • Affects storage ability of fruits	• Curling, wilting and new growth chlorotic and stunted. • Necrotic spots may appear • In grains and grasses, seed production is reduced, and seed heads may be white and empty	• Very rare, but in low pH, it appears a iron deficiency
Fe	• Oxygen carrier • Enhances chlorophyll formation • Metabolizing RNA • Enhances green colour of produce	• Interveinal chlorosis quickly spreading down from younger leaves (top) to older leaves (bottom)	• Bronzing of leaves
Mn	• Activates many metabolic reactions • Increases absorption of calcium, magnesium and phosphorus • Speeds up seed germination and plant maturity • Aids in chlorophyll synthesis	• Reduced nodulation on legumes • Poor growth, pale leaves	• Brilliant yellow, orange or purple colour
Zn	• Essential for enzymatic reactions in cells (Amino-acid and Chlorophyll production) • Promotes plant growth • Aids in seed formation • Increase disease resistance of plants	• Stunted growth • Interveinal chlorosis, puckering, followed quickly by pitting. Veins remain green • Twig die-back	• Severe stunting, reddening
Co	• Needed in nodules of legumes for nitrogen-fixing bacteria (rhizobium, soyabean and alfalfa) • Stimulates growth, transpiration and photosynthesis	• Small root nodules on legume species. • Uniformly pale green – yellow leaves, most severe on old leaves. • Some crops may develop red leaves, stems or petioles. • Stunted growth – tops may be less leafy. • Grain or seed production may be retarded	• leaf fall • Inhibition of leaf greening • Discoloured veins • Premature leaf closure • Reduced shoot weight
Cl	• Involved in photosynthesis and chlorophyll production • Stimulates enzyme activity • Helps control water loss and moisture stress	• Practically impossible	• Scorching • Increase in succulence
Mo	• Enhances absorption of nitrogen by plants • Aids in the formation of legume nodules • Required to convert in-organic phosphates to organic forms in plants	• Reduced nodulation on legumes • Poor growth, pale leaves	• Brilliant yellow, orange or purple colour
Na	• Water regulation function • Photosynthesis	• Exceedingly unlikely	• Wilting and scorching plants (Na competes with K for uptake)