Elements needed for Hydroponic plants

With Hydroponics it is essential that the plants are able to access all the elements needed to grow and be healthy. These are the elements needed, as well as a description of there functions to the plants. Carbon, hydrogen and oxygen are absorbed from the air and water. The rest of the elements, called mineral nutrients, are dissolved in the nutrient solution.

Nitrogen

(N) is primary to plant growth. Plants convert nitrogen to make proteins essential to new cell growth. Nitrogen is mainly responsible for leaf and stem growth as well as overall size and vigor. Nitrogen moves easily to active young buds, shoots and leaves and slower to older leaves. Deficiency signs show first in older leaves. They turn a pale yellow and may die. New growth becomes weak and spindly. An abundance of nitrogen will cause soft, weak growth and even delay flower and fruit production if it is allowed to accumulate.

Phosphorus

(P) is necessary for photosynthesis and works as a catalyst for energy transfer within the plant. Phosphorus helps build strong roots and is vital for flower and seed production. Highest levels of phosphorus are used during germination, seedling growth and flowering. Deficiencies will show in older leaves first. Leaves turn deep green on a uniformly smaller, stunted plant. Leaves show brown or purple spots. NOTE: Phosphorus flocculates when concentrated and combined with calcium.

Potassium

(K) activates the manufacture and movement of sugars and starches, as well as growth by cell division. Potassium increases chlorophyll in foliage and helps regulate stomata openings so plants make better use of light and air. Potassium encourages strong root growth, water uptake and triggers enzymes that fight disease. Potassium is necessary during all stages of growth. It is especially important in the development of fruit. Deficiency signs of potassium are: plants are the tallest and appear healthy. Older leaves mottle and yellow between veins, followed by whole leaves that turn dark yellow and die. Flower and fruit drop are common problems associated with potassium deficiency. Potassium is usually locked out by high salinity.

Magnesium

(Mg) is found as a central atom in the chlorophyll molecule and is essential to the absorption of light energy. Magnesium aids in the utilization of nutrients, neutralizes acids and toxic compounds produced by the plant. Deficiency signs of magnesium are: Older leaves yellow from the center outward, while veins remain green on deficient plants. Leaf tips and edges may discolor and curl upward. Growing tips turn lime green if the deficiency progresses to the top of the plant.

Calcium
(Ca) is fundamental to cell manufacture and growth. Soil gardeners use dolomite lime, which contains calcium and magnesium, to keep the soil sweet or buffered. Rockwool gardeners use calcium to buffer excess nutrients. Calcium moves slowly within the plant and tends to concentrate in roots and older growth. Consequently young growth shows deficiency signs first. Deficient leaf tips, edges and new growth will turn brown and die back. If too much calcium is applied early in life, it will stunt growth as well. It will also flocculate when a concentrated form is combined with potassium.

Sulphur
(S) is a component of plant proteins and plays a role in root growth and chlorophyll supply. Distributed relatively evenly with largest amounts in leaves which affects the flavor and odor in many plants. Sulphur, like calcium, moves little within plant tissue and the first signs of a deficiency are pale young leaves. Growth is slow but leaves tend to get brittle and stay narrower than normal.

Iron
(Fe) is a key catalyst in chlorophyll production and is used in photosynthesis. A lack of iron turns leaves pale yellow or white while the veins remain green. Iron is difficult for plants to absorb and moves slowly within the plant. Always use chelated (immediately available to the plant) iron in nutrient mixes.

Manganese
(Mg) works with plant enzymes to reduce nitrates before producing proteins. A lack of manganese turns young leaves a mottled yellow or brown.

Zinc
(Z) is a catalyst and must be present in minute amounts for plant growth. A lack of zinc results in stunting, yellowing and curling of small leaves. An excess of zinc is uncommon but very toxic and causes wilting or death.

Copper
(C) is a catalyst for several enzymes. A shortage of copper makes new growth wilt and causes irregular growth. Excesses of copper causes sudden death. Copper is also used as a fungicide and wards off insects and diseases because of this property.

Boron
(B) is necessary for cells to divide and protein formation. It also plays an active role in pollination and seed production.

Molybdenum
(Mo) helps form proteins and aids the plant's ability to fix nitrogen from the air. A deficiency causes leaves to turn pale and fringes to appear scorched. Irregular leaf growth may also result.

Chlorine
(Cl) deficiencies begin with leaves wilting, then become yellow before the wilted and yellow plant cells begin to die, eventually turning bronze in color. The root tips also become stunted and get thicker than normal.