ULTRA GRO

Ag is Life

Micro Nutrients

Beside the major and secondary plant nutrients, there is a third group of nutrients. These are termed micro nutrients or trace elements, and there are two divisions within the micro nutrients. The six so-called primary ones are: Iron, Manganese, Zinc, Copper, Boron, and Molybdenum. Without exception plants require these elements for nutritional support and all are vital for certain physiological functions such as building enzymes or co-enzymes. Enzymes are materials that cause the conversion of elements into complex organic molecules such as proteins, sugars, starches, cellulose, etc within plants. The second group of trace elements has aluminum, chlorine, sodium, iodine, cobalt, and silicon. These six play a role in the growth of and health value of some but not all plants.

Why the term micro nutrients? Because these are used by plants in very small amounts (ppms or less) and the difference between deficient, optimal, and toxic levels is small. The effect of deficiencies usually is felt in new growth or fruiting of plants. Interest in these micro nutrients is increasing because farmers are seeking higher crop yields. Higher level NPK fertilizers contain less micro nutrients and are not replacing those lost by cropping and leaching of soils.

Boron (symbol B) has 3 positive charges, and is a common element in many waters in the west. It has many functions in plants but it is not readily mobile in them. Therefore, an adequate supply is needed during the growing season.

Boron aids transport of sugars across cell membranes, prevents excess conversion of sugars into starch, and thus influences cell elongation and development by its control of polysaccharide formation. Because of the role in the making of cell wall components it helps in the elongation of primary and lateral roots. This aids general nutrient and water uptake by plants. Boron ph(>7.0) soils: low organic soils, high applications of nitrogen and potassium, and drought. increases calcium efficiency in plants and makes for increased pollen viability and good seed set. It also aids nitrogen assimilation into plant protein.

Boron has to be converted with the borate ion in order to be available. This process is carried out by soil microbes. Boron is best available at a ph range of 5 to 7, over 7 its availability is restricted. Boron will leach out of sandy, loose, and acid soils so it becomes deficient after heavy rains. If Boron is low it should not be applied until the soil calcium in the CEC is at least 60%. This could cause boron toxicity, therefore, adjust calcium first then apply boron. In corn, low phosphate levels can cancel the effect of B and produce low ear fill. Boron also has a function in legume nodulation, making it vital in alfalfa and beans, etc. Crops require a steady supply of B, so as it is taken up into plants it must be replaced. Several applications in a season are better than one large one. Remember boron by itself has been used as herbicide in large amounts. Also, keep in mind, low Ca can bring about Boron toxicity or burn. When B gets above 2 ppm it is excessive for most crops. Legumes in the seedling stage will take up excess B and kill themselves. Once out of the seedling stage the danger is past. Another element which can cause a B deficit is high potassium.

When applying boron either in soils or foliar, find out the actual B content in your product: Solubor is 21%, Borate 44G is 14%, and Borax is 11% boron.

One special supplemental boron application appeared in 1995 when scientists recommended foliar sprays of 2-5 pounds of solubor /100 gals on pistachios in the late dormant stages. However, know your soil and tissue B levels before proceeding. And know how your crop and B get along. Soil conditions which may cause Boron to become deficient are: acid, sandy, eroded soils, or deep plowed areas, plus over limed or high manganese deficiency shows first in new leaves at the top of the plant. Manganese in most soils should be

Iron is a heavy silvery metal which exists in either a double or triple positive charge ion. It is the most abundant element on earth but is also one of the least available to plants in soil. This is because it is the least soluble of all soil minerals.

Because (Fe) ion can vary between two and three charge state, it plays a major role in the plants oxidation-reduction reactions. Fe is a catalyst (starter) in chlorophyll formation, a component of respiratory enzyme systems, symbiotic nitrogen fixation in legumes, and many energy producing reactions in plants.

One major symptom of iron deficiency is chlorosis (yellow or white leaves or veins in plants) caused by chlorophyll deficiency. No chlorophyll equals no photosynthesis and this means no sugar.

Besides the chelated iron sources, there are two sulfates of iron which can be used: Ferric sulfate and Ferrous sulfate. Both can be used as soil iron sources, but only ferrous sulfate can be applied as a foliar spray. Ferric sulfate foliar causes plant damage and death. Too much iron can reduce phosphate availability and also can produce a manganese deficiency. Manganese is similar to iron chemically, so too much of one can overpower the other in plant metabolism. Also long term copper use in acid soils can cause Fe to be deficient. Excessive liming will also cause iron tie-up in soils, particularly in high ph areas.

Manganese (symbol Mn) as mentioned resembles iron chemically and has a role in chlorophyll production and many electron transfer reactions. It aids the oxidase enzyme in carrying oxygen and plays a major role in carbohydrate metabolism and seed formation. It activates calcium, phosphorus and iron, but may be fixed by these same elements. It accelerates germination and maturity.

Manganese solubility increases 100 fold for each unit drop in ph; so much so that it can be toxic at acidic ph levels. Manganese is concentrated mainly in leaves and stems. Foliar Mn is very rapidly assimilated (a few hours). This is very helpful in Mn sensitive plants such as soy beans and dry beans, oats, both types of beets, lettuce and citrus. Manganese deficiency shows up as yellow or white leaves except for the veins which stay green. This mimics as magnesium deficiency, except between 40 and 200 ppm, but remember the ph factor. A ph of 5.5 can bring manganese toxicity while at over ph 7.0 you can be deficient.