Ultra Gro Plant Food
Quality and Performance Creating Value

GROWERS BULLETIN

ULTRA GRO PLANT FOOD COMPANY

Micro Nutrients Part II

Zinc (symbol Zn) is a metal with 2 positive charges and it has functions similar to manganese and magnesium. It has roles in many plants enzyme systems where it serves as a metallic prosthetic group. Most of these enzymes are involved with energy production and making storage materials such as starch and sugar. It controls indoleacetic acid, an important plant growth regulator.

Zn is absorbed as the ion (Zn++). Many western crops, citrus, other trees, grapes, tomatoes, cotton, and rice usually require zinc fertilization. Zinc can be absorbed by clay particles, binds with organic matter, form complexes with other minerals or remain in solution in soil water. For many reasons banding of zinc materials is better than broadcasting since it does not move easily in soils. This is the reason Zn deficits can occur in heavy compacted soils or in areas where root growth is restricted. This means that Zn can be short in stems and leaves when the plant can't take up enough for newer growth, since Zn is strongly held in the roots.

In such cases foliar applications are best. Sources of Zinc are the sulfates, an ammonium nitrate complex and chelates. Deficits show up as shortening of stems and rosetting of leaves, reduction in bud formation, mottling of leaves and die back of twigs after the first year.

Zn levels over 200 parts per million can cause reduced root growth and stop leaf expansion followed by yellowing. Zn levels which are too high can interact and produce deficiencies of iron, manganese, or phosphate.

Copper (symbol Cu) can have one or two positive charges. In general, Cu is insoluble and immobile between soil layers due to its strong binding properties. High pH and liming of soils also decrease the availability of Cu. Because of these facts, copper must be incorporated into the soil to make it available to the roots since its movement is very limited. Copper is taken up as the ions (Cu+ and Cu++) and is moved in the plant complexed with nitrogen compounds. Cu is a metal component in carbohydrate and nitrogen enzymes. Since it is fairly immobile in plants, young organs (buds, etc) and newer growth suffer first from Cu deficit. Flowering and fruiting are very sensitive to lack of copper.

Copper can be supplied as the sulfate, carbonate, oxide, or in chelates. The sulfate and chelates are used in foliar treatments. In grapes and other crops, a blend of copper, Bourdeaux mixture is used as a fungicidal spray.

In cereal crops where growth is being forced by nitrogen fertilization, Cu deficit can cause lodging. This is due to lack of stiffening carbohydrate production.

Excess Cu can cause iron deficit, stunt root growth and damage membranes in lateral roots. Legumes seem to be the most sensitive to high Cu effects.

Sodium (Na) is a single charged cation and is the most common carrier for chlorine as in salt (Na Cl). Salinity is a major problem in soils and is due to the use of high-salt containing irrigation water.

Some sodium has a function in the soil since it is

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closely related to potassium in many roles. It is reported as one of the major cations in soil reports. However, when Na and K on the CEC near 10% there is a problem in that soil. Soil with calcium base saturation over 60% can be leached of excess sodium by water penetration. If sodium is in excess most crops have water problems and will wither and/or die. Na is one of the major causes of high soil pH.

Some crops, such as sugar beets, cabbage, cauliflower and barley respond to soil sodium levels over 0.5% and under 3.0%. Since sodium governs osmotic pressure in cells and fluids it can cause wilt and loss of firmness in plants and fruits when it is too high.

Chlorine (Cl) is usually thought of as a negative rather than a micronutrient.. However, in the right amounts it has positive functions.Cl is needed tosplit water in thephotosynthesisprocess and helps in electron transfers. Chlorine deficiencies are rare although it has been linked to some fungus and soot diseases in small grains, chiefly wheat and oats. A range of 50-200 ppm is acceptable in plants. As Cl gets higher plants can yellow and leaf tips burn. Leaves can fall prematurely and plants become blasted. This is due to water stress.

Excess Cl can be leached from soil by proper water usage. Since Cl has a negative charge it is not absorbed by soil colloids and can be flushed below the root zone. However, all of this can be undone if deep plowing is done on fields. This is one of the major causes of failure in new orchards that we have encountered.

Molybedenum (symbol Mo) is a component of two major enzyme systems, nitrogenase and nitrate reductase. Both of these are vital to the plants ability to use nitrogen and nitrogen-fixing bacteria in legumes can't function without Mo. It also plays a role in the uptake of organically bound phosphorus in plants. Molybedenum is one of the leastplentiful micro nutrients in the soil and is more available in higher pH soils. For this reason, acid soils are often deficient as are easily leached areas. We have found many fields to be Mo deficient after the last two rainy years and next spring is likely to be the same. Soils high in other metal oxides alsocause problems with Mo availability.

When alfalfa and clover shows general chlorosis and stunting, a quick checking is root examination. If no nodules are present or they are light colored, you need moly. No more than 3 ounces of the sulfate per acre need be applied prior to an irrigation. When Mo is too high (over 5 ppm) in the plant it can cause problems for ruminant animals.

Cobalt (symbol Co) is involved with the fixation of atmospheric nitrogen by bacteria in legumes. It also seems to stimulate the growth of many kinds of soil bacteria. Because it plays a part in the same process as Mo, we recommend it at one ounce per acre of the sulfate at the same time moly is being applied. Many soil laboratories do not routinely test for Mo and Co. For this reason, Ultra Gro has been doing these tests on soils where we feel it is indicated. The tests are quick and we can get answers the day the samples are taken.

Unlike all of the other micro nutrients, Mo and Co are best applied to the soils when they are found to be deficient. The roots are their main area of effectiveness. All other are best supplied foliar.

Selenium (symbol Se) is a largely unknown actor in plants and soils because of very little research. However, the high levels of Se in some valley waters are starting to create more interest. Selenium can cause livestock disorders both in ruminants and fowl. Grazing on soils with high selenium can cause "blind staggers" or "alkali disease". And yet too little selenium in forages can cause white muscle disease.