MAAGCS

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Turfgrass Matters

Mid-Atlantic Association of Golf Course Superintendents

Why Chelates?

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The growing use of micronutrients, and their effect on overall plant health and yield has spawned an increasing amount of misinformation and confusion on the differences between inorganic micronutrient sources. The following attempts to clarify at least some of the major sources of confusion between chelates and sulfates.

Each micronutrient will react, both in fertilizer mixes and in the soil, in different ways. This is mainly due to the inter-reactions in the fertilizer blends of each micronutrient and eventually in the soil. To explain chelation and the advantage of chelates, zinc has been chosen simply due to the widespread use of zinc and the high areas of zinc deficiencies in most states.

Solubility, availability and protection of the zinc molecule are the three key words to chelation. In a gallon of 10% zinc chelate, there are approximately 30 to the 23rd power zinc molecules which are chelated. This protection allows the zinc to remain soluble and available. The zinc will not convert to zinc carbonate, zinc ammonium phosphate or other unavailable forms, because of the chemical shield which surrounds the metal, either in the soil or the fertilizer blend.

Each crop planted requires different levels of zinc for optimum yield. Again to make zinc chelation simple, let's use one crop example of corn, with a crop yield of 150 bushels to the acre.

Many soil labels consider 1.3 to 1.7 ppm or above (using the DPTA extraction test) as sufficient. At .5 ppm or less, a recommendation of 10 lbs per acre of elemental zinc may be given. (1)

Tissue testing would require 10 to 50 ppm in the ear leaf at silk; 20 to 50 ppm in the whole plant at the 30 to 4 leaf stage, to be in the sufficient zinc range for the crop. (2)

Using the same analogy as above, a 150 bushel corn crop would remove approximately .15 pounds of zinc from the soil. Again, not much zinc. (3)

The reason for this point is that it simply does not take much zinc to raise a 150 bushel corn crop, if the zinc is available and water soluble.

But what would cause the zinc to be unavailable? To look at this, we must consider what happens when we put zinc sulfate in the soil.

First, we need moisture to break the granule down. Then the area surrounded by the acid from the sulfate allows the zinc to be available, chemical reactions in the soil start to work and the zinc or a percent of the zinc is converted to zinc carbonate, zinc oxide, zinc ammonium phosphate or zinc phosphate. Thus, a chelate protects the metal from conversion to a source that is not available to the plant. (4)

This is exactly the point about chelates. Chelates are soluble and available to the crop during the season. If we put down one quart of zinc per acre this equates to .29 lbs of soluble zinc per acre, nearly double the amount removed by the crop.

When we take a soil test and receive the report back, it tells how much zinc is in the soild, not how much is soluble or available. For zinc deficiencies to appear, a high soil pH, a soil low in organic matter with a high pH or a cool wet soil may be the reason or a high phosphate level that could cause a zinc deficiency.

Due to the unique ability of chelating agents to protect the zinc molecule in the soil this allows the zinc to become and remain available, while preventing zinc tie up in the clay structure of the soil. It is this ability which allows zinc chelates to be sold on efficiency ration of 1 part chelate to 10 parts inorganic zinc. When we place an

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Maryland Turfgrass Council Scholarship Program

The Maryland Turfgrass Council (MTC) Scholarship Program was established to assist individuals pursuing formal turfgrass-related education.

The Board of Directors of the Maryland Turfgrass Council awards the scholarships annually. The selection criteria for the scholarship are as follows:

1. Applicant must be currently enrolled in a college-sanctioned turfgrass program, in his or her second year or third semester.
2. Applicant must have worked at least 6 months in a turfgrass-related field-golf course, sod farm, etc.
3. The student must have a G.P.A. accumulative of 3.0 or higher.
4. Applicant must be sponsored by an individual in the turfgrass business.
5. Sponsor must write a letter of recommendation for the applicant.

There will be three $1,000 scholarships awarded. Thc Scholarship Committee will recommend applicant(s) to the Turfgrass Council for final approval.

Application deadline for the Fall of 1995 and Spring of 1996 semesters is September 15, 1995. Applications should be mailed to:

R. Wayne Evans CGCS
16473 Old Frederick Rd.
Mount Airy, MD 21771

Any questions concerning the application process can be directed to Wayne Evans at (301) 854-6709.

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inorganic zinc in the soil, the chemistry of the soil begins to attack the zinc, as explained about the zinc sulfate earlier. What percentage of the zinc is really available when the plant needs the zinc? We don't know. This depends on the factors pointed out earlier. A point made many times is that with applications of zinc sulfate, zinc is building up in the soil, no wonder at 10 lbs or more zinc metal per application. 100 lbs of zinc metal in the soil would build it up also, but it may not feed the crop if it is not soluble or unavailable or tied up in the soil.

The last factor is environmental. With many zinc products, we are placing high amounts of lead or other heavy metals in the soil.

Per part CFR 503 sewage sludge technical regulations the monthly application rate of lead is 300 parts per million. For zinc it is 2800 parts per million, cadmium 39 parts per million. How much heavy metals are you spreading on your soild with each micronutrient application? With the current OSHA and EPA laws on record don't you think it is time to ask how much is there?

To summarize the 10 to 1 ratio:

A) Chelates move with the water, to provide season-long nutrients to the plant. The EDTA begins to break down after 6 months leaving carbon, nitrogen, a very weak acid and zinc mol ecules in the soil. None of these would cause problems in the soil, or get into groundwater.

B) There are approximately 30 to the 23rd power molecules of zinc in one gallon of chelate which equals to over 12 million molecules of zinc per acre.

C) They are soluble, available and are free in the soil to move with the soil moisture.

D) They feed the crop all through the growing season.

E) They are cost effective.

F) Lastly, they work and have worked for over 40 years.