IPNI Plant Nutrition TODAY
Better Crops, Better Environment...through Science

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DON'T OVERLOOK THE POTENTIAL OF ZINC

It has been estimated that nearly half of the world's cultivated soils are affected by low levels of plant available zinc (Zn). A 2010 IPNI soil test summary available at http://ipni.info/soiltestsummary included an evaluation of Zn levels on approximately 1.4 million samples from across North America (NA). Of this NA total, 37% tested below the general critical level of 1 ppm Zn. The percentage of soil samples having low Zn levels (<1 ppm) was substantially higher in states such as Texas (79%), Oklahoma (71%), Kansas (75%), Colorado (60%), and Nebraska (44%). While these figures do not address a specific farm or field, they do indicate that Zn nutrition should be on the radar, especially for sensitive crops.

Some crops are more sensitive to Zn deficiency than others. Crops that are listed as highly sensitive include corn, soybeans, rice, citrus, pecans, and onions. Sorghum, cotton, wheat, alfalfa, and sugar beet are in the mild sensitivity category.

Soil conditions that favor Zn deficiency are alkaline or calcareous conditions; low soil organic matter; high clay content; acid, sandy soils; subsoils that have been exposed by land leveling or erosion; soils very high in available P; and some organic soils. Although other factors may come into play, the effect of soil pH and calcium carbonate are the most noteworthy in the Great Plains and western U.S.

Most micronutrient and Zn fertilizer sources fall into one of three general categories: 1) inorganic sources (e.g., sulfates, oxides, oxysulfates, chlorides, and nitrates), 2) synthetic chelates (e.g., EDTA), and 3) natural organic complexes (e.g., lignosulfates). Several factors affect Zn source selection for specific conditions. These factors include Zn concentration, cost, water solubility, soil type, and method of application. Method of application considerations include whether it will be soil or foliar applied, and if soil applied then whether it will be banded or broadcast. Zinc application rate generally varies from <1 to 10 lb/A depending on source, application method, and objectives.

Zinc sulfate is the most commonly used of the Zn fertilizer sources because of its high water solubility and relatively low cost. Oxysulfates are a mix of Zn sulfate (water soluble) and Zn oxide (mostly insoluble). The more Zn sulfate in the oxysulfate mix the higher the solubility, and vice versa. It is generally recommended that oxysufates be at least 35 to 50% water soluble to be effective in the season of application. One Kansas study (Seymore, D. and D. Leikam, 2009. Fluid Journal, Vol. 17, No. 1, Issue 63) evaluated oxysulfates of differing solubility along with Zn sulfate (100% soluble) to determine source and rate effects on soil test Zn level one and two years after application. The work was done across differing production systems and soil types. They concluded that the water soluble (sulfate) fraction of the materials was 3x more effective in increasing Zn soil test level (DTPA) than was the non-water-soluble (oxide) fraction. They further noted that it took about 5 lb water soluble Zn to increase soil Zn (DTPA) by 1 ppm, while it took 15 lb non-water-soluble Zn to effect the same change.

Some relatively new and noteworthy technologies have been developed to help overcome some of the physical and chemical factors affecting Zn performance. One such product incorporates Zn and elemental S in granules of ammoniated phosphate fertilizer. This product provides four nutrients in each granule and thus eliminates segregation problems associated with bulk blends. The elemental S also creates an acid environment around the granule (in the soil) to help keep Zn and P available.

This brief publication is not meant to provide a complete coverage of Zn nutrition and fertilization, but rather to encourage evaluation of the potential for Zn.

– WMS –

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Abbreviations: P = phosphorus; S = sulfur.

Note: ***Plant Nutrition TODAY*** articles are available online at the IPNI website: www.ipni.net/pnt