



# Most Asked Agronomic Questions

## Bulletin 760

### Chapter 5

#### Micronutrients

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#### **1. Should micronutrients (Zn, Mn, etc.) be used with corn and soybeans? Is the use of micronutrients an economic advantage?**

Although most Ohio soils contain adequate quantities of micronutrients, some soils are deficient in these nutrients. Table 23, page 17 of *Tri State Fertilizer Recommendations for Corn, Soybeans, Wheat & Alfalfa*, Ext. Bull. E-2567, gives the crop and soil conditions where micronutrient deficiencies might be expected to occur in Ohio. In general, a micronutrient should only be applied to a crop if a need for that micronutrient has been demonstrated. Plant analysis is usually the best tool for establishing nutritional deficiencies.

Application of micronutrients will be an economic advantage if a deficiency exists that is limiting yield or crop quality. If micronutrients are added to plants that have not shown a need for such additions, there is a low probability of getting a return on the investment. In fact, one can actually run the risk of reduced profits due to toxic levels of these nutrients. Soybeans are particularly sensitive to excess Mn. Toxicity of this element has been demonstrated in some acid soils in eastern Ohio.

#### **2. What are the deficiency symptoms of the various micronutrients? Can soil and leaf analysis help determine if micronutrients need to be added?**

Few micronutrients exhibit distinct, easily recognizable deficiency symptoms in the field. Instead, most micronutrient deficiencies show up as a general stunting of plant growth, and thus it is hard to determine which micronutrients are actually present in inadequate amounts. Refer to the book entitled *Hunger Signs in Crops* for a discussion of the visual signs of micronutrient deficiencies in various crops.

A far more reliable index of micronutrient health is leaf analysis. Soil tests can also be used as an indicator if leaf analysis is not readily available.

Reference: Sprague, Howard B., ed. *Hunger Signs in Crops: a Symposium*. 3rd ed. New York: David McKay Company, Inc., 1964.

### **3. Discuss the need for supplementation of S, B, and Zn on agronomic crops (corn, soybeans, alfalfa).**

Crops vary in their responsiveness to the different micronutrients. Corn appears to be most responsive to addition of zinc and boron while alfalfa is most responsive to sulfur and boron. The soybean plant is generally a good feeder of all three nutrients (Zn, B, and S). Refer to the Micronutrients section of *Tri State Fertilizer Recommendations for Corn, Soybeans, Wheat & Alfalfa*, Ext. Bull. E-2567, pages 17-21, for further information on crop responses to micronutrients on organic soils.

### **4. When should I apply S, Zn, B, and other minor elements?**

Mobile elements such as sulfur and boron should always be applied immediately before the cropping year in a pre-plant, direct application.

Immobile elements (Zn, Mg, etc.) are usually adequate in most Midwestern soils. If, however, specific soil conditions cause restricted uptake of these elements, a direct application (preplant or starter) should be used.

### **5. What is the best way to apply Mn on soybeans - granulated or spray?**

To prevent a manganese deficiency in soybeans, we recommend a foliar application of 4 to 8 pounds of manganese sulfate when the plants have two or three trifoliolate leaves. If soybeans are planted in rows wider than 20 inches and the planter is capable of applying a row fertilizer, then an alternate method to prevent Mn deficiency would be the use of an acid-forming row fertilizer such as 200 pounds of 0-20-20.

### **6. Should sulfur be applied as a micronutrient?**

Most Ohio soils receive approximately 10-15 pounds S per year from rainwater. This amount varies greatly, fields close to coal burning industrial plants can receive several times these levels from the rainwater. This amount alone is inadequate for plant growth. The primary source of sulfur is normally the weathering of soil organic matter. On soils having low organic matter (<2%) or on soils which are coarse textured and have been heavily leached, there is a high probability that the sulfur content of the soil is low. The best way to determine if a sulfur deficiency exists is through plant analysis. When analysis demonstrates a need for S, a crop response to sulfur supplementation is likely.

### **7. What effect does sulfur have on wheat yields?**

Wheat is a crop that typically requires a relatively high amount of supplemental sulfur. One reason for this need is that wheat experiences its most rapid growth during early spring when the rate of S release from soil organic matter is quite slow. On coarse, sandy soils, especially those low in organic matter, wheat can be expected to have a yield response to added sulfur.

### **8. What are the factors affecting zinc availability? Is it economically profitable to apply Zn on corn?**

The availability of Zn has been found to be directly related to 3 soil factors: (1) the amount of Zn supplying minerals (2) the amount of available phosphate and (3) soil pH. In general, Ohio soils have an adequate Zn supply; however, on soils having both high pH values and high levels of phosphate, a large amount of the available Zn is complexed to form ZnPO<sub>4</sub>. When Zn is found precipitated in this form, it is relatively unavailable and Zn deficiencies can occur. Zn levels can also be inadequate on acidic, sandy soils where most of the available Zn has been leached away. In addition, organic soils often have low Zn reserves.

Grass crops such as corn are normally more sensitive to Zn deficiencies than are forage crops such as alfalfa. Use of supplemental zinc for corn is recommended whenever zinc availability in the soil is restricted. A profitable yield response to zinc should be expected under such circumstances.

### **9. What are your findings about the proper zinc to phosphorus ratio?**

Research from many sources indicates that the P to Zn ratio in leaf tissue should be 100-150:1. Whenever the P content of a plant increases, so must the Zn concentration in order that this ratio be maintained.

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