

Corn Micronutrients

The following article was written by Ed Lentz and Steve Culman, our new Soil Fertility Extension specialist who replaced Dr. Robert Mullen. “Boron, chloride, copper, iron, manganese, molybdenum, nickel and zinc are called micronutrients or trace elements, needed only in extremely small amounts for crop production. Calcium, magnesium and sulfur are called secondary nutrients since the crop needs larger amounts for production compared to micronutrients but considerably less than the primary nutrients of nitrogen, phosphorus and potassium called macronutrients.

Most Ohio soils have adequate amounts of micronutrients for corn production. They also generally have adequate secondary nutrients if proper pH has been maintained with lime and the soil is not sandy with low organic matter. Soil temperature and moisture are important factors. Cool, wet soils reduce the rate and amount of micronutrients that may be taken up by crops. As soil pH increases, the availability of micronutrients decreases, with the exception of molybdenum.

Zinc may be needed for corn production on high pH soils and low soil test zinc levels. Soil pH generally needs to be above 6.6 and the soil test zinc levels below 4 ppm before a yield response would be expected from additional zinc. Zinc rates may be found in the Tri-state Fertilizer Recommendations for Corn, Soybeans, Wheat, & Alfalfa (<http://ohioline.osu.edu/e2567/index.html>).

Corn may respond to supplemental sulfur on sandy soils low in organic matter. Research has NOT shown a yield response to supplemental sulfur applied to fine-medium (clay-silt) textured soils with organic matter above 2%. Sulfur is a component of several enzymes that regulate photosynthesis and nitrogen fixation. The vast majority of sulfur is converted to available mineral form by the action of soil microorganisms. Ammonium sulfate and calcium sulfate (gypsum) are often used as sources for sulfur or even potassium sulfate (0-0-50). Moderate applications of animal manure or compost will generally result in adequate soil sulfur levels.

Generally lime will meet the need for any calcium or magnesium. However, there have been cases of magnesium deficiencies in soils where a producer has used only “hi-cal” lime exclusively for a long period of time, particularly on lower CEC (sandy) soils. Magnesium and phosphorus together control plant metabolism. Magnesium is the center atom in chlorophyll, a vital substance for maximizing photosynthesis. If magnesium levels are low and lime is required, dolomitic lime (rich in Mg) will be recommended. If Mg is low and lime is not required, Epsom salts (magnesium sulfate) may be recommended.

For the other micronutrients, there has been no documented reason for using them in a fertilizer program for corn production on most mineral soils in Ohio. In recent years the industry has been talking about boron. Boron started to appear when the corn prices were high. Ohio has not had a history of boron deficiency nor have we seen any private or public Ohio research showing yield

responses to boron. There is no evidence or reason to believe that the nutritional needs of modern hybrids have changed so much that the soil cannot still provide adequate levels of boron. Alfalfa grown on sandy or weathered, low organic matter soils is the only crop in our area that research has shown a response to boron fertilizer.

If a micronutrient is needed, a starter band is probably the most efficient way of getting that nutrient to the plant. However if micronutrient deficiency has never been identified or confirmed for a field, then a micronutrient package is likely unnecessary. Also, keep in mind, if you did not need a particular micronutrient before the period of higher corn prices, you probably do not need them now.

There are certain conditions where a micronutrient in a starter may provide an economic gain, which were discussed above. However, if that condition, situation, or soil type does not exist in your field, adding the micronutrient will not improve your bottom line and the money may be better spent in other areas of your farm operation.” (Lentz and Culman, CORN newsletter, 2014-11).

Keeping nutrients levels in balance is an important concept to remember. When one nutrient level gets too high, it tends to tie up other nutrients. For example, high phosphorus levels tend to tie up zinc, copper, and boron. If a micronutrient problem is suspected, take a plant tissue sample to determine if a deficiency exists and a micronutrient fertilizer is required. Micronutrients are expensive to purchase, and avoid over applying micronutrients, because they can become toxic when applied at too high of a rate.