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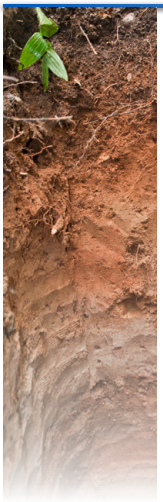

MicroSPEC: A decision philosophy for managing micronutrients

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Deciding when to apply micronutrients [Boron (B), Manganese (Mn), Zinc (Zn), Copper (Cu), Molybdenum (Mo), Iron (Fe), Nickel (Ni) and Chlorine (Cl)] in crop production systems is often a difficult task. Micronutrient fertilizers are sold in a variety of packages and marketed as a low-cost insurance for your cropping system. But, do you need to apply micronutrients? To answer this question, first consider your Soil, then your Plant, then your Experiences, then your Corrective options, referred to as the MicroSPEC philosophy. Information on how micronutrients are affected by soil and cropping systems can be found in several University of Wisconsin-Extension (UWEX) publications. These publications include Nutrient application rates for field, vegetable, and fruit crops in Wisconsin (UWEX pub. A2809) and our Understanding Plant Nutrients series (UWEX pubs. A2522, A2526, A2527, A2528, A3554, A3555 and A3556).

Soil – Soil properties and characteristics govern plant availability of most nutrients. Soil pH, texture and organic matter all control plant available micronutrient concentrations in soil solution. For example, Zn availability decreases as soil pH increases above 6.5 and Cu availability decreases as soil pH increases above 7.5. Also, soil tests have been developed to evaluate the status of some micronutrient concentrations in soil (e.g. Boron, Zinc and Manganese) (see UWEX pub. A2809). Knowing the abundance of the micronutrient, or factors controlling its availability is the first step in evaluating micronutrient need.

Plant – Does your crop have a "high demand" for micronutrients? UWEX guidelines have indicated the relative micronutrient requirements (B, Cu, Mn, Mo and Zn) for all crops grown in Wisconsin (see table 8.3 in UWEX pub. A2809).

Experiences – What are your experiences telling you? Have you observed micronutrient deficiency symptoms on the plant? If so, this should be confirmed with both a soil and plant tissue test. Interpretation of a plant tissue test is specific to each crop and timing of sampling (http://douglas.uwex.edu/files/2010/05/Plant-AnalysisSampling.doc). Photos of micronutrient deficiency symptoms can be found at http://www.agronext.iastate.edu/soilfertility/nutrienttopics/deficiencies.html. It is also important to consider the weather conditions during the growing season. If drought or flooding occurs, this can limit the plants availability to uptake nutrients. Once soil moisture returns to adequate levels, growth and uptake will resume. How have you managed your crop rotation lately? Increasing the occurrence of high micronutrient demand crops in rotation along with increasing yield can lead to greater micronutrient export from your soil system. Have you applied manure? Applying manure to satisfy nitrogen, phosphorus, potassium or sulfur requirements of the crop also applies sufficient levels of micronutrients. Micronutrient

deficiencies are extremely rare in fields receiving annual additions of manure.

Corrective options – If your soil characteristics and soil tests indicate your soil may be deficient in plant available micronutrients, you are growing a high micronutrient demand crop and plant tissue tests indicate less than sufficient levels then micronutrients should be applied. There are several forms of micronutrient fertilizers (e.g. inorganic, chelates, liquid) and methods of application (broadcast, band-applied, foliar-applied) that are available. The recommended application rates with respect to form and method of application are outlined in UWEX pub. A2809. The value of your crop may also influence whether you want to or can afford to apply micronutrients. There is little agronomic or environmental harm in applying micronutrients to high or medium demand crops at UWEX recommended rates. But little, if any, return will be seen on this investment unless a micronutrient deficiency truly exists. Also be aware of the rates that are being applied to ensure that they are below what would be toxic to the plant.

Unfortunately, there is no magic bullet for deciding when to apply micronutrients. But following the MicroSPEC philosophy will allow you to make a reasoned decision regarding your micronutrient applications. It is important to evaluate each micronutrient independently, as each nutrient is affected in different ways by soil, plants and weather. For further information on micronutrients, please visit www.soils.wisc.edu/extension/secondary.php.