

ONE MISSING NUTRIENT CAN LIMIT A *Winning* SEASON

Micronutrients are key players that carry the ball during important plays

Sports fans know it takes the individual talents and specific roles of each player on a team to ensure a winning season. The same applies to crop production. Crop nutrients interact and work together during different stages of plant growth – if one is missing or deficient, plant growth will be poor, even if the other elements are abundant. Commonly known as “Law of the Minimum,” this 200-year-old concept was formulated by the German scientist Justus von Liebig.

Liebig compared crop yield potential to a barrel with staves of unequal length. The capacity of the barrel is limited by the length of the shortest stave (in the case of farming, the shortest “stave” is water) and can be increased only by lengthening that stave. When that stave is lengthened, another one becomes the limiting factor.

SMALL AMOUNTS, VITAL ROLES FOR MICRONUTRIENTS

Producers know N, P and K are vital for crop growth and regularly supply these to crops. However, secondary nutrients (sulfur, calcium, magnesium) and micronutrients (boron, zinc, manganese, iron, copper) are required in much smaller amounts and have historically been available in the soil. As crop yields increase, uptake of all nutrients increases, and we push the capabilities of the soil. There are often not enough micronutrients remaining in the soil to meet the crop’s needs.

And as we push for higher yields, the importance of these nutrients and their roles in crop production are becoming more evident. For example, a corn crop that runs out of sulfur during the growing season will not be able to efficiently uptake and use nitrogen, even if the supply of nitrogen is quite good.

While each micronutrient may have other roles, these are their primary functions:

- Boron – One of the most commonly deficient micronutrients, boron plays an important role in forming and strengthening cell walls. Low boron levels lead to poor growth of fast-growing tissues and weak plant development. Boron is not easily transported in the plant. It should be applied continuously, especially prior to flowering.

- Copper – Necessary for chlorophyll formation and is the most immobile micronutrient in the plant. Activates enzymes and catalyzes reactions in several plant growth processes.
- Iron – Essential for crop growth and food production. Most iron fertilizer sources work best as foliar spray applications.
- Manganese – Functions with enzyme systems involved in the breakdown of carbohydrates especially needed by soybeans. Manganese accelerates germination and maturity while increasing the availability of phosphorus and calcium.
- Molybdenum – Helps in the use of nitrogen. Molybdenum deficiencies are rare in most agricultural crops.
- Zinc – Essential for the transformation of carbohydrates and regulates consumption of sugars used by grass crops such as wheat and corn, especially during early growth

START WITH SOIL TESTING

Soil testing is the basic starting point in crop nutrition planning and should be done immediately after harvest before the soil freezes. Without soil testing, producers have no way of knowing which nutrient shortages may be limiting yields. For farmers who have not already contacted their local Southern States agronomist, there is still time to do so.

FINE TUNE IN-SEASON WITH IMAGERY, TISSUE TESTING

While grid or zone soil sampling identifies soil nutrient shortages to help develop a pre-season, nutrient application prescription, it’s only a starting point. In-season environmental conditions such as cold, damp soil, may change the soil availability of one nutrient, impacting performance of another and creating nutrient deficiencies in the plant.

In these situations, satellite or aerial field imagery are tools that help us see what is happening and begin the process of diagnosing crop issues. Tissue testing is often the next step and offers a fast and efficient way to identify the problem, usually taking no more than 48 hours to get the results. With the lacking nutrient(s) identified, a foliar treatment may be the solution to putting the crop back on track toward optimum production.