BACK TO BASICS—WHAT NUTRIENTS ARE ESSENTIAL?
MATT BOYER | Helena AGIn intellige nce Agronomist

Last year my counterpart, Dr. Kevin Mowles, wrote a great article on phosphorus in the April FieldLink newsletter. Today I thought I would take a step back and quickly define the 18 essential elements and explain the difference between a macronutrient and a micronutrient. Without any one of these essential elements, some aspect of plant development will suffer and no other nutrient will make up for the element that is deficient. This is defined in Liebig’s Law of the Minimum, which is sometimes referred to as the “barrel stave concept” which is pictured below. Imagine the barrel represents yield and the staves are the nutrients. If one stave is shorter than the rest, we’ll never get a full barrel!

The first groups of essential elements are the non-mineral elements—Hydrogen, Oxygen and Carbon. These elements account for the majority of the dry matter found in plants. However, since they are supplied mainly by water and carbon dioxide, they are not considered mineral elements.

The remaining 14 nutrients fall into one of two categories: macronutrients or micronutrients. The difference between macronutrients and micronutrients has nothing to do with their physiological importance within plants; rather, the classification comes from the relative concentration of that nutrient found in the plant tissue.

Macronutrients
Macronutrients are those nutrients required in far larger quantities than micronutrients. They are often divided into one of two categories: primary or secondary. The primary macronutrients are Nitrogen, Phosphorus and Potassium. N, P and K are typically the first nutrients to become deficient in soils, and, as such, are the nutrients typically fertilized for the most. The secondary macronutrients are Calcium, Magnesium and Sulfur. These nutrients are, or were, less likely to become deficient in soils. I say were because the need for supplemental sulfur fertilization is becoming vital (see Dr. Randy Simonson’s article for more information). Many functions of macronutrients in plants revolve around the following processes: photosynthesis, protein and amino acid production, energy storage and transfer, plant transpiration, plant respiration, stalk strength and quality.

Micronutrients
The remaining 9 elements of Boron, Chloride, Copper, Iron, Manganese, Molybdenum, Zinc, Nickel and Cobalt are classified as micronutrients. They are required in much smaller amounts when compared to macronutrients. By small, I mean anywhere from a few pounds, to less than an ounce per acre. However, they are just as important when it comes to plant development. The remaining 9 elements of Boron, Chloride, Copper, Iron, Manganese, Molybdenum, Zinc, Nickel and Cobalt are considered mineral elements. They are often divided into one of two categories: primary or secondary. The primary macronutrients are Nitrogen, Phosphorus and Potassium. N, P and K are typically the first nutrients to become deficient in soils, and, as such, are the nutrients typically fertilized for the most. The secondary macronutrients are Calcium, Magnesium and Sulfur. These nutrients are, or were, less likely to become deficient in soils. I say were because the need for supplemental sulfur fertilization is becoming vital (see Dr. Randy Simonson’s article for more information). Many functions of macronutrients in plants revolve around the following processes: photosynthesis, protein and amino acid production, energy storage and transfer, plant transpiration, plant respiration, stalk strength and quality.

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Back to Basics—What Nutrients are Essential?
Matt Boyer, AGRIntelligence Agronomist

It’s hard to believe the calendar has flipped to 2017! Before we know it, spring will be here and we will be planting another crop to feed the growing world population. Every year is identified by its own set of unique circumstances. For example, the following factors will play a role:

- Challenges from lower net farm income (USD, retailers, and suppliers)
- Exciting new technology introductions across multiple ag platforms (new ag chemical tolerances, precision ag platforms, etc.)
- Minimum, which is sometimes referred to as the “barrel stave concept” which is pictured below. Imagine the barrel represents yield and the staves are the nutrients. If one stave is shorter than the rest, we’ll never get a full barrel!

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to maximizing yield as macronutrients. Even though micronutrients are not required in large amounts, they are very important to certain plant functions and processes such as enzymes that aid in plant metabolism, cell wall structure, hormone systems, chlorophyll functions and processes such as: enzymes that aid in plant metabolism, cell wall structure, hormone systems, chlorophyll metabolism, root nodulation and helping to convert nitrate into amino acids.

Do micronutrient deficiencies ever show up? By looking at the image on the left, you can see that Zinc, Manganese and Boron were below desired levels close to 70% of the time throughout vegetative growth stages in corn. So the answer to the above question is a resounding, “Yes”!

Before we get into the heart of the 2017 growing season make a call to your local Helena Sales Representative and ask what general trends they’ve been seeing in your area. Find out what nutrients have been consistently showing up low or deficient in soil or tissue samples.

Knowing the overall nutrient status of your previous year’s crop will help us prepare a better nutrient management plan in 2017. Let’s make sure there aren’t any hidden hunger limiting yield in 2017!

Both chemists have had a long active ingredient life in agriculture and surprisingly relatively low numbers of weeds that have developed resistance for almost 50 years (dicamba has been used for 40+ years and 2,4-D for 60 years). Currently, there are less than half a dozen weeds resistant to 2,4-D in mainland U.S. and only 6 for dicamba (all but 1 are kochia genus [http://www.weedscience.org]). With no new mode of action introduced into the herbicide market in over a decade, it is this type of innovation which will help us control weeds that are developing more and more resistance to our traditional chemistry approach.

The table below gives a quick comparison of the technologies.

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WHEEL OF FORTUNE™—I’LL BUY AN “E”

GREG WILLOUGHBY, Ph.D. | Technical Manager NBU

Enlist®, Engenia®, Xtend® (okay it sounds like an E). Do we win? Well, maybe, first let’s sort through these. First we are going to focus on sulfonylureas. Some of these new herbicide/treated technology (or its related chemistries) are labeled for other crops, however we will only focus on soybeans for this discussion. We must break this into the two competing chemistries. Enlist® is 2,4-D based and is marketed by Dow®. Xtend® is dicamba based and marketed by Monsanto® while Engenia® shares the dicamba base and is marketed by BASF®.

The choice of these two chemistries is the uniqueness they share. Each have over 200 weeds they control. See Table 1 for the “takedown” except for the 2016 OH, IN, IL Weed Control Guide. Post control tables are not available yet.

Companies have spent many research dollars getting the necessary data for approvals of the unique technology which brings these new technologies to the farmers. Not all of these traits and chemistries are available currently, but are expected within the next 12-18 months depending on foreign market approvals and EPA. Please consult a representative for exact usage and availability.

In ALL herbicide applications (current and future), residual chemistry will be the KEY to maintaining the longevity of the technology as well as the efficacy of its control. One CANNOT rely on just the treated chemistry as their sole weed control program like they may have done with the Roundup Ready® technology in the past, which has led to the many challenges we now have in resistant weeds. Mixing older herbicide chemistry with newer trait technologies is our best hope for maintaining weed control until the industry and the EPA introduce new modes of action, hopefully sooner rather than later.

So did we win? In short, yes, we have a new tool in the ever shrinking tool box. Will it be needed? In some areas, yes, because resistance is king. In other areas, no, it’s just another tool. Just because you have the technology does not mean you have to use it, but it is really nice to have!
Back To Basics Continued

IS YOUR CROP BEGGING FOR SULFUR?

Dr. Randy Simonson | Helena Agrilntelligence Agronomist

As Matt discussed the difference between macronutrients and micronutrients in his article, I want to focus on one critical macronutrient that we have seen decline in recent seasons: Sulfur.

Sulfur levels are low in about 50% of our fields. The EPA cleaned up our smokestacks, taking most of the sulfur out of the air. This process left a void in our plants where they were previously able to get that sulfur from the air for free. The new norm is adding sulfur to your application plan every year.

Sulfur deficiencies are one of the principal problems in production agriculture today. These activities contribute to this nutrient loss: high yields, Sulfur leaching from soils, and little to no sulfur materializing from the air. These factors have led to more free sulfur. The new norm is a sulfur application every year, much like we apply nitrogen to non-legume crops every year.

Sulfur is very important for creating plant proteins, which are made up of amino acids. Two amino acids, methionine and cysteine, contain Sulfur. It is also essential for chlorophyll formation, crop oil production, and nitrogen metabolism. In addition, Sulfur has fungicidal properties that can lessen some crop diseases.

The main Sulfur sources are ammonium sulfate, ammonium thiosulfate, 90% elemental sulfur, and gypsum. Some of the Helena Products that contain sulfur include TraFix® Zn, Nucleus® 0-0-21-13S, and Zepia®. The main Sulfur sources are ammonium sulfate, ammonium thiosulfate, 90% elemental sulfur, and gypsum. Some of the Helena Products that contain sulfur include TraFix® Zn, Nucleus® 0-0-21-13S, and Zepia®.

Sulfur is beneficial in starter fertilizer applications and can be added when sidedressing corn, or topdressing wheat. However, to get enough Sulfur in the plant, we need to apply it with the preplant fertilizer. One of the best ways to apply it is by using TrueFlex® Blends.

The reason we need to apply Sulfur every year is because the SO4²⁻ form of Sulfur just like the NO³⁻ form of nitrogen, is an anion which means it has a negative charge. This means it will leach through the soil profile and not allow us to build soil test levels like we can do with P and K. So, we need to start thinking about Sulfur applications just like we think about Nitrogen.

How do you know if your crop needs Sulfur? A soil test using the Helena CoreMax® program, or a tissue sample with Slico™ will determine whether the crop is low in Sulfur, as well as other critical crop nutrients.

Contact your Helena Representative today to see how a soil test, tissue sample and Helena Product can help get Sulfur back to sufficient levels in your crops!

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Both chemistries have had a long active ingredient life in agriculture and surprisingly relatively low numbers of weeds that have developed resistance for almost 50 years (dicamba has been used for 40 years and 2,4-D for 60 years). Currently, there are less than half a dozen weeds resistant to 2,4-D in mainland U.S. and only 8 for dicamba (all but 1 are kochia genus). With so many herbicides now a part of our crop year round, it is this type of innovation which will help us control weeds that are developing more and more resistance to our traditional chemistry. Companies have spent many research dollars getting the necessary data to prepare for the unique soil conditions that will result in the future. We’re predicting that the yield will be 5% less than what we’re seeing now.

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INDUSTRY UPDATE

KURT SIEREN | Helena Area Manager

One last notable I would like to highlight is that 2017 also represents the 60th Anniversary of Helena Chemical Company. We believe that Helena can and will play an important role in the industry not only as a much needed stabilizer, but also a driving force of innovation and added value. When we are allowed to partner with you, our customer, and utilize our PEOPLE, PRODUCTS & now 60 years of KNOWLEDGE for your benefit—increased profitability is the result. We call this approach BIG HIT.

In conclusion, some undeniable truths remain: change will continue to accelerate and Helena Chemical will be by your side helping you maximize your profitability and success in 2017.

February 2017

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