



Fertilizer Planning Considerations Adding Sulfur to Your Plan

In the world of production agriculture we have been taught over the generations that the key components to successful crop growth and high yields have been to focus on three (3) main components from a fertilizer perspective, those being Nitrogen (N), Phosphorus (P) and Potassium (K). A lot of effort goes into sampling soils and calculating previous crop credits in order to determine the optimum rates as well as the best timing of applications to maximize the availability of nutrients for the crops being planted each spring in an effort to achieve the desired yield goals of each respective field and farm.

When producers are making these plans a “Fourth Major” nutrient, Sulfur, is often not considered. Sulfur provides many benefits to all cropping systems. The benefits from sulfur fertilization of crops can be traced to its role in protein development, to improvement of nitrogen (N) use, etc. Historically the availability of sulfur needed for profitable crop production continues to decline. Reasons for the decline is attributed to the increasing amount of sulfur removed from the soil by higher yielding crops along with many fertilizers containing less sulfur. In addition, due to emphasis on improved air quality, the amount of “free” sulfur in the air from industrial emissions has been removed from the equation. Understanding how specific crops utilize sulfur for improved growth and how fertilizer provides crop sulfur needs will help to improve crop yield and profitability.

Benefits that sulfur provides in growing plants are:

1. Improved nitrogen use efficiency
2. Improved protein production as a constituent of two (2) amino acids; those being Cysteine and Methionine
3. Improved seed oil in oil seed crops
4. Activation in enzyme systems and vitamin development
5. Active contributions to chlorophyll formation, essential to all growing plants.

Sulfur uptake varies greatly among major agricultural crops. Crops having high nitrogen needs, corn for instance, also has a high sulfur need due to their mutual functions in plant growth, such as protein formation. Maximizing the availability of sulfur available to the corn plant greatly assists in the plant being able to utilize nitrogen more efficiently and consequently providing it the ability to be able to reach high yield needs. Forage grasses and many vegetable crops require sulfur for achieving high yield as well as quality.

A 180 bushel corn crop takes up nearly 30 lbs of sulfur during the growing season. As stated earlier; the function of sulfur and its influence on plant growth show why sulfur is a full season nutrient. It promotes plant growth from the seedling stage until the crop reaches physiological maturity. Sulfate sulfur is very mobile in soil solution, but is considered immobile within the plant. Elemental sulfur must be converted to the sulfate form in the soil before being taken up by the plant. A severe shortage of sulfur often develops visible deficiency symptoms on new growth. Sulfur deficiency in corn often results in symptoms such as slow growth rate and poor response to nitrogen, pale green coloration of new growth as well as low protein levels from the harvested grain.

Nutrient Uptake by Major Northern Illinois Crop Systems

Crop	#N	#P2O5	#K2O	#S	#Mg
Corn (180 bu/a)	240	100	240	28	41
Soybeans (60 bu/a)	325*	65	140	25	26
Wheat (55 bu/a)	120	45	85	13	15
Alfalfa (8 ton/a)	410*	95	400	40	40

*** Legumes get most of their nitrogen (N) from the air**

Sulfur is a vital ingredient in nutrient management plans designed for high-yield, top-profit crop systems. Nutrient balance involves many nutrients but is especially focused on sulfur with nitrogen and potassium. These three nutrients are essential for protein synthesis, photosynthesis and other plant growth processes. A shortage of any one will restrict the effectiveness of the others. To avoid nutrient imbalance, many researchers and agronomists suggest the use of 20 – 30 pounds per acre of fertilizer sulfur. The impact of sulfur's benefit to high yield cropping systems was evidenced through studies by Iowa State University in 2008. In the study, sulfur applied to coarse textured soils resulted in an increased yield response versus fine textured soil by 13 bu/a. Also, corn responded to a higher rate of fertilizer sulfur (23 vs. 16 lbs/a S) on the coarse textured soils. It is important to remember that sulfur is a mobile nutrient in the soil and the nutrient reservoir is smaller for coarse textured soils. Sulfur fertilizer applied to fine textured soil at 16 lbs/a S resulted in a 15 bu/a average increase in yield, whereas on coarse textured soil 23 lbs/a S resulted in a 28 bu/a average increase.

As you develop your operation's fertilizer plans for Spring 2011 crop production, keep in mind the importance of adding sulfur fertilizer. Two very good sources of sulfur fertilizer to consider would be Ammonium Sulfate (AMS) that we now have the ability to apply in dry form and can be blended with DAP and Potash applications on ground planned for corn. Also, Ammonium Thiosulfate is another fertilizer option especially when applying nitrogen (N) to wheat fields. As you meet with your respective agronomy sales representative discuss how these two fertilizer options will benefit your crop management plans for 2011. Hopefully the information provided in this article will provide you with useful agronomic information that will assist in making sound fertilizer decisions this Fall and next Spring.