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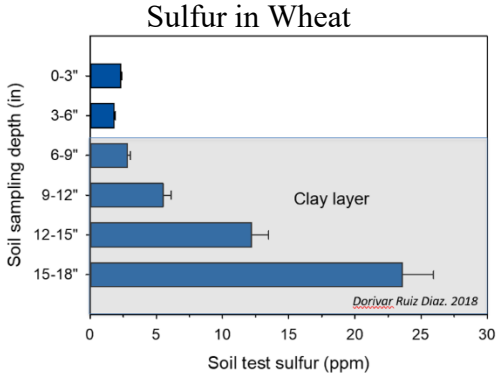
Nitrogen's Amigos: Sulfur and Chloride

The need for nitrogen in wheat is well known, but often farmers forget about the other two mobile soil nutrients; sulfur and chloride. Sulfur deficiency looks a lot like nitrogen deficiency and chloride deficiency looks just like a fungal disease, that is if either can be seen at all. While commonly associated with sandy soils, sulfur and chloride deficiency is possible in our heavy clay soils. No-till fields tend to have more trouble with sulfur. Besides wheat and corn, sulfur and chloride are needed in fescue pastures as well. Fescue forage yields have been shown to increase 500 to 800 lbs. in some research fields top-dressed with sulfur in addition with nitrogen compared to nitrogen alone.



The need for sulfur in wheat starts slow in the fall and early spring, but then takes off shortly after green-up. Sulfur deficiency looks like nitrogen except the yellowing occurs in younger leaves rather than older leaves. The wheat will be stunted and spindly with slowed growth and fewer tillers.

Sulfur is generally half as mobile in soil as nitrogen, but will eventually move down in lower soil profiles. There it can collect on the heavy clays. It is quite possible that sulfur amounts can increase with soil depth. Sulfur deficiencies can follow plow pans, tire tracks, or any other feature that restricts root depth.
Most biological soil sulfur is mineralized from organic matter and is therefore biologically tied to anything that slows down soil microbes. In early spring, cold soil temperature is the main culprit for lack of biological sulfur.

Saturated soil is another common microbial limiter due to the lack of oxygen required to break down organic matter. Saturated/unsaturated soil cycle can also convert sulfate to gaseous forms much the same way as denitrification. Our cold and saturated heavy clay soils can mean less mineralization during a time when wheat starts to green-up. In some extreme cases, excess nitrate can reduce the plant uptake of the sulfate that is available.

Ideally, top-dressed sulfur needs to go on before Feekes 5, which is green-up. Concern needs to be taken with leaf burn for sulfur liquid fertilizers combined with nitrogen fertilizers. Application rates are generally 10 to 15 lbs. S per acre.

It's important to keep in mind that mineral forms of sulfur, like gypsum or elemental sulfur, dissolve slowly over a long period, often a couple of years. These sulfur fertilizers need to be applied at twice the rate of chemical sulfur forms but half as often. A good sulfur plan is to apply around 30 lbs. of gypsum or elemental sulfur along with the pre-plant corn fertilizer. This should supply sulfur for the full corn, wheat, and soybean rotation.

Chloride in Wheat

Chloride is an anion like sulfate and nitrate. It will move through soil and has a gaseous form. However, it is more elusive than the other two as deficiency is often hidden. The benefits and yield improvement from top-dressing chloride are variable but can be important for suppression of fungal diseases and enzyme production. Chloride deficiency looks very similar to a fungal problem with yellow spotting on the upper and lower leaves.
In Southeast Kansas. deficiency is less common but only because potash (potassium chloride) or poultry litter are common fertilizer applications. Fields without these applications can be easily susceptible to hidden chloride deficiency. Application rates of 15 to 25 lbs. Cl per acre is usually plenty. Ammonium chloride is a liquid that can be applied top-dressed and mixed with the sulfur and nitrogen application. Potash is 45% chloride.

When top-dressing wheat this spring, remember all three of the mobile nutrient amigos; nitrogen, sulfur, and chloride. Each has their role in wheat development and can improve grain yields.

Usually, sulfur and chloride are fairly affordable because they are needed in small quantities, and they can be parts of other fertilizers. Remember that soil testing for mobile nutrients requires a full depth soil sample, as close to 24” as possible, with at least 10 soil cores per sample.

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