

News Column for Use Week of 04/13/2020  
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## **Chloride and Sulfur on Wheat**

### *Chloride*

One main benefit producers get from topdressing with Chloride (Cl) is the improvement of disease resistance. Wheat responds to Chloride with improved color, suppression of fungal disease, and increased yield. It is difficult to predict a yield response without a soil test. More people are moving to add Chloride to their soil test when they are testing for Nitrogen (N), because it is recommended to use a 0-24 inch profile. A deeper core is needed, because they are both very mobile in the soil. Chloride fertilizer is recommended when the soil test is below 6 ppm or 45 pounds of soil chloride. Dry or liquid fertilizer sources for all plants are available now. Potassium chloride (potash) and ammonium chloride are commonly available and widely used fertilizer products, though other products such as calcium, magnesium, and sodium chloride can also be used and are equal in terms of plant availability.

### *Chloride Deficiency*

Chloride deficiency symptoms appear as leaf spotting and are referred to as a physiological leaf spot. K-State has done considerable research on Cl applications to wheat since the early 1980s, mostly in the eastern half of the state. Results have been varied, but there have been economic yield responses in almost all cases where soil test Cl levels have been less than 30 lbs per acre. Deficiencies were most likely found in fields with no history of potash (KCl) applications. Recent studies showed that there are differences in response to Cl and are likely associated with the tolerance of that variety to fungal diseases. For more information, please refer to the KSRE publication "Chloride in Kansas: Plant, Soil, and Fertilizer Considerations, MF2570": [www.ksre.ksu.edu/bookstore/pubs/MF2570.pdf](http://www.ksre.ksu.edu/bookstore/pubs/MF2570.pdf).

### *Sulfur*

Sulfur (S) deficiencies have usually been found in irrigated, sandy grounds. However, with reduced Sulfur from the atmosphere and continued crop removal, finer-texted soils have also shown Sulfur deficiencies. In recent years, deficiencies have been popping up in no-till wheat where cooler soil temperatures slow down S mineralization. It is usually caught when the wheat is in rapid growth, right after jointing.

### *Sulfur Deficiency*

Generally, Sulfur deficiency in wheat is shown by yellowing and stunting of the plant and is in patches across the field especially in areas where there was erosion. Hilltops or side slopes where erosion has occurred and soil organic matter is reduced, or where leaching is more pronounced are common areas for Sulfur deficiency. In terraced or leveled fields, where topsoil was removed or significant cuts were made, commonly show symptoms. Sulfur deficiency is usually mistaken for Nitrogen. However, unlike N deficiency where it shows up on older leaves because it is mobile in the plant, Sulfur will show up in the new growth at the top of the plant. The best way to catch it before symptoms is by doing a soil test. Again, you want to go with the full 0-24 in the soil profile. Sulfur deficiency will show up early spring before the roots can get into the subsoil.

There are many S-containing fertilizer materials. Several dry materials are available that can be blended with dry phosphorus or nitrogen fertilizers for topdressing. However, Elemental S

(typically 90-95 percent S) is a dry material marketed by several manufacturers. Before it becomes available for plant uptake, elemental S must first be oxidized by soil microorganisms to sulfate-S and this can be a slow process when surface-applied. As a result, this material is well suited for pre-plant applications only. Elemental S is not suited for corrective applications to S-deficient wheat in the spring.

Ammonium sulfate, (21-0-0-24S) is a dry material that is a good source of both N and available S. It has high acid-forming potential, however, soil pH should be monitored. Ammonium sulfate is a good source to consider for both pre-plant or topdressing to correct existing sulfur deficiencies.

Gypsum (analysis varies) is calcium sulfate and is commonly available in a hydrated form containing 18.6 percent S. This material is commonly available in a granulated form that can be blended with other materials. Since it is a sulfate source, it would be immediately available and is another good source for spring topdressing.

New N-P-S products, such as Microessentials, 40-Rock, and others, are ammonium phosphate materials formulated with sulfur, and in some cases micronutrients such as zinc. In most of these products the sulfur is present as a combination of elemental-S and sulfate-S.

There are also liquid sources of sulfur fertilizers available: Ammonium thiosulfate, (12-0-0-26S) is the most popular S-containing product used in the fluid fertilizer industry, as it is compatible with N solutions and other complete liquid products. Potassium thiosulfate, (0-0-25-17S) is a clear liquid product that can be mixed with other liquid fertilizers.

Liquid and dry fertilizer sources can be applied in combination with N at topdressing this spring. However, it is important to consider the potential plant availability of each S fertilizer source for this wheat growing season. For more information see K-State publication MF 2264 "Sulfur in Kansas" at <http://www.ksre.ksu.edu/bookstore/pubs/MF2264.pdf>. For estimations of required application rates of S see K-State publication MF-2586 "Soil Test Interpretation and Fertilizer Recommendations" at <http://www.ksre.ksu.edu/bookstore/pubs/mf2586.pdf>.

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