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AN OVERLOOKED NUTRIENT… ARE YOU KEEPING TRACK OF SULFUR?

Since S deficiencies are increasing in many areas, the use of this nutrient is becoming more common. The most common forms of S used in fertilizer are elemental S and SO_4. Thiosulfate forms of S are also commonly available in many regions. A review of how S behaves in the soil is useful to get top crop performance.

Sulfur plays two important roles in agriculture…as an essential nutrient required for proteins and enzymes…and as a soil amendment for improving alkaline soils.

Many crops require between 10 to 25 lb of S each year. While this is not as much as some other nutrients, the frequency of crop S deficiency has been steadily increasing since many fertilizers do not routinely contain S and deposition of air-borne S has decreased.

Although S exists in many different chemical forms in nature, plants primarily absorb it in the SO_4 form. The SO_4 molecule carries a negative charge, so it moves freely with soil moisture. As a result, SO_4 concentrations are sometimes greater with increasing depth in the soil below the rootzone. There are several excellent sources of plant-available SO_4 that will provide immediate crop nutrition. These include materials such as potassium-magnesium sulfate, ammonium sulfate, or potassium sulfate.

Elemental S is totally unavailable for plant uptake since it can not be directly taken up by roots. However, when elemental S is added to soil, it gradually becomes converted (oxidized) to the plant-available SO_4 form.

The transformation of elemental S to SO_4 is controlled by many factors. Since this conversion is done by soil microbes, several environmental and physical conditions govern how quickly this change takes place. In general, S oxidation takes place most rapidly in warm and moist soils. But field application should take place some time before the plants have a need for SO_4.

The physical properties of elemental S are also important. Small-sized particles have the most surface area and the most rapid reaction. However, fine particles of S can be difficult to apply. Fertilizer manufacturers have developed useful techniques where very fine S particles are clumped together with expandable clay to form a pellet which disintegrates in the soil.

Elemental S is highly acidifying after it is oxidized in the soil. It is commonly used to treat high-pH soils or to amend calcareous soils loaded with harmful concentrations of sodium. The specific S application rates should be calculated with the aid of a crop adviser.

Thiosulfate has also become a popular source of S nutrition for crops. Thiosulfate generally converts to SO_4 within a few weeks in typical summer growing conditions. Thiosulfate has also been shown to have beneficial effects on N transformations and may offer some unique benefits for plant metabolism.

There is no reason to risk yield loss from S deficiencies. When the need for S is suspected, there are many excellent materials that are available to meet crop needs.

—RLM—

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Abbreviations in this article: S = sulfur; SO_4 = sulfate.