


SULPHUR

A photograph of corn plants at sunset, with the sun visible through the leaves. The sun is a bright orange circle in the lower center of the frame, partially obscured by the dark silhouettes of corn leaves and stalks. The sky is a gradient of orange and pink. The word "SULPHUR" is printed in large, bold, orange capital letters at the top of the image.

ARE MIDWEST CROPS GETTING ENOUGH?

*"As we continue to clean up the air,
we suspect that sulphur deficiencies will
become even more of a problem, especially
for our corn growers."*

*Dr. Bob Hoelt
University of Illinois*

SULPHUR

The Fourth Major Nutrient

Back in 1960s and '70s, few farmers in the Midwest went out of their way to include sulphur in their fertilizer programs.

Not many dealers promoted it. Extension agronomists rarely recommended it. And few soil or plant-tissue samples indicated a need for the nutrient.

But today, progressive farmers are re-evaluating their need for sulphur—or what many agronomists call “the fourth major nutrient.”

Without adequate sulphur (S), crops cannot possibly reach their full potential in terms of yield, quality or protein content. Nor can they make efficient use of other important elements—such as nitrogen (N) and phosphorus (P).

In addition, research has shown that feeding sulphur-deficient hay can limit production in beef and dairy cattle.

“If a sulphur deficiency is suspected, an on-farm evaluation is suggested to determine if a response can be obtained from a sulphur fertilizer addition . . .”

*Dr. Reggie Voss
Iowa State University*

Why the growing interest?

Sulphur's importance in crop and livestock production is not something new. But in recent years, record yields and more intensive land use—along with the absence of sulphur in today's high-analysis N-P-K fertilizers—have caused S deficiencies to appear where they have not before.

In addition, the heavier farm equipment used today may create hard traffic pans on soil, which impedes and sometimes even prevents crops from tapping rich sulphur reserves in the subsoil. The addition of new "sulphur-hungry" crops such as canola may also cause more soils to run short on sulphur.

Pollution-control regulations have also caused marked reductions in the amount of "free" S that crops receive from the atmosphere. For many years, smokestack industries and utilities throughout the region emitted significant amounts of S in the form of sulphur dioxide. Clean-air regulations enacted since 1970 have reduced this source of "free" sulphur by at least one-third—and more reductions are anticipated. For example: New clean-air laws stipulate that high-sulphur diesel fuel be limited to off-road use only. In addition, the EPA has proposed a 70 percent, or 120,000-ton, cut in emissions from pulp and paper mills by 1998. These developments will eventually require sulphur supplements in many fields.



Where it's needed

Sulphur deficiency has been seen on clay and clay-loam soils, but it is most likely to show up in fields that have been fertilized repeatedly with materials such as urea, triple superphosphate, DAP, conventional N solutions or anhydrous ammonia. These fertilizers—unlike more traditional fertilizers such as ammonium sulphate (21-0-0-24S), single superphosphate (0-20-0-12S), potassium sulphate (0-0-46-13S) and various nitrogen-sulphur solutions—contain little if any sulphur.

Fields with coarse-textured, sandy soils that are low in organic matter are also strong candidates for S deficiency. This is because sulphur—like nitrogen—is very mobile in the soil and easily leached by rain or irrigation.

In addition, fields that have not been fertilized with manure in recent years may be extremely vulnerable to S deficiency.

How much to apply—and when

Sulphur fertilizer requirements hinge on target yield and how much incidental sulphur the soil receives from other sources—whether it be from precipitation, irrigation water, crop residues, fertilizers or other agricultural chemicals. Soil sulphur losses from leaching and erosion also must be considered.

A soil test can provide a general indication of the nutrient's availability, as long as samples are extracted from the topsoil and subsoil.

An early-season plant analysis, or tissue test, is an even more accurate means of assessing S requirements. Generally, a N:S ratio of 15:1 or greater suggests a sulphur deficiency. The only problem with plant analysis is that it pinpoints the nutrient deficiency *after* the crop has suffered a loss in yield potential.



To prevent unexpected yield losses on soils that are likely to run short on sulphur, soil specialists often recommend making maintenance applications of 10-20 pounds S per acre in fields susceptible to S deficiency.

Where there is some doubt about sulphur, an on-farm test plot can provide a good indication of sulphur's need and economic return.

Several application options

Sulphur-containing fertilizers are available in dry and fluid forms, so they're easy to incorporate into virtually any fertilizer or "feed and weed" program.

Farmers with irrigation equipment can apply sulphur almost anytime they water. For optimum efficiency, however, applications should be made with no more than one acre inch to prevent the nutrient from leaching into the subsoil, beyond the reach of crop roots.

On dryland corn, sulphur can be put on with routine nitrogen applications. To reduce fertilizer losses and to protect groundwater, it may be a good idea to apply one-third of the crop's total nitrogen and sulphur requirement at planting and sidedress the balance when the crop is two feet tall.

To nurse seedlings along in cool, moist soils—especially on early planted crops or in conservation tillage situations—S can be used in the starter fertilizer.

On alfalfa and small grains, S can be applied at planting or topdressed as needed.

Winter wheat can be fertilized with sulphur anytime nitrogen is applied.



Talk to a specialist

Specific sulphur fertilizer requirements vary from crop to crop, soil to soil, and sometimes from season to season. For best results, talk to your fertilizer dealer, crop consultant or local extension specialist about testing procedures and the most cost-effective way to incorporate the "fourth major nutrient" into your operation.

If a sulphur deficiency is detected, a small investment in a sulphur-containing fertilizer could yield handsome returns at harvest.



"We've had a long-standing recommendation to use sulphur fertilizers for both corn and alfalfa production on our sandy soils . . ."

*Dr. George Rehm
University of Minnesota*

"We've been getting more calls about potential sulphur deficiencies than we've ever had before. . ."

*Dr. Jay Goos
North Dakota State University*

"On some very coarse sands, we have some corn that would just die without sulphur. . ."

*Dr. Jay Johnson
Ohio State University*



Additional information about sulphur in agriculture can be obtained by contacting:



The Sulphur Institute
1140 Connecticut Avenue, NW, Suite 612
Washington DC 20036, USA
Telephone: +1 (202) 331-9660
Facsimile : +1 (202) 293-2940
E-mail: sulphur@sulphurinstitute.org