

PLANT NUTRIENTS

AdvanSix Sulf-N® Ammonium Sulfate**Don't Let Sulfur Hold Your Cotton Crops Back:
Sulfur Boosts Nitrogen Efficiency, Increases Lint Yields**

With cotton prices reaching monumental highs, the race is on to maximize yield. Growers across the Cotton Belt will be paying close attention to their nitrogen, phosphorus and potassium. But David Hardy, Chief of Soil Testing for the Agronomic Division of the North Carolina Department of Agriculture and Consumer Service urges producers to also pay attention to their crop's sulfur needs.

"If you're deficient in sulfur, you're going to have a hard time getting the plant to utilize nitrogen," Hardy explains. "You need both nitrogen and sulfur to form amino acids, proteins and chlorophyll in the plant. The two are really companion nutrients."

In fact, if sulfur is in short supply on an otherwise well-fertilized crop, he notes, the plants may show symptoms of excessive nitrogen – a signal that the crop is accumulating nitrogen without being able to turn it into the proteins it needs to create lint, foliage and seeds. According to Mercedes Gearhart, Senior Agronomist for AdvanSix, which manufactures Sulf-N® ammonium sulfate, cotton plants need one pound of sulfur for every 10 pounds of nitrogen they take up. That's an average figure, she notes; reported sulfur-to-nitrogen ratios range from 1:6 to 1:15.

Sulfur deficiency can cause the same sort of yellowing and stunting in plants as nitrogen deficiency does. However, the yellowing from sulfur deficiency appears in young, upper leaves, while nitrogen deficiency causes yellowing in older leaves.

Proper Ratio

A cotton crop takes up as much as 12 pounds of sulfur per acre for every bale of yield, says Gearhart. The challenge in many Southern fields – especially coarse-textured Coastal Plain soils – is that they are naturally very low in sulfur. Researchers estimate that every one percent of soil organic matter – the main sulfur reserve in soils – is capable of releasing two to five pounds of available sulfur per year. That means sulfur is particularly scarce in sandy, low-organic matter soils. Such sandy soils are also particularly susceptible to having sulfur leached out of the root zone by rainfall.

Years ago, the widespread use of livestock manure delivered sulfur to cotton fields. So did airborne deposits of sulfur emitted by power plants and other industry smokestacks. According to data collected by the National Atmospheric Deposition Program, the amount of airborne sulfur deposits has fallen by three to five pounds per acre per year since the Clean Air Act mandated smokestack scrubbers and the use of ultra-low-sulfur fuel.

The adoption of reduced tillage systems also lowers sulfur availability, notes Gearhart. "In the cooler, moister soils, there is less early-season sulfur mineralization from organic matter," she says. In those minimum-tilled fields, much of that organic sulfur remains locked on the soil surface longer, before becoming available through microbial decomposition. Gearhart adds.

She points out that although sandy soils receive the most attention when it comes to replenishing sulfur, finer-textured soils with low levels of organic matter – such as some silty soils in the Mississippi Delta – may also show markedly low levels of sulfur.

Building Sulfur Yields

A three-year study published in the *Journal of Production Agriculture* in 1998 demonstrated the yield impact of sulfur in cotton. In the trial – conducted in sandy, Coastal Plain soils in south Alabama – cotton yields increased an average of 26 percent following the application of 20 pounds of sulfur per acre.

North Carolina recommendations call for 20 to 25 pounds of sulfur per acre in sandy soils when the sulfur index (S-I) value in the soil is 25 or less. Mississippi recommends eight pounds of sulfur per acre in “major crops when sulfur is suspect,” and Alabama recommends 10 pounds per acre in major crops.

Timing is important, notes Gearhart. Cotton needs sulfur before first bloom to prevent yield loss. Preplant application or top-dressing at matchhead square both work well to deliver sulfur to the crop, especially when the nutrient is in the sulfate form, which is immediately available to plants. She says many cotton producers apply 100 to 300 pounds of ammonium sulfate as a top-dress application to deliver sulfur as well as complete their nitrogen program for the season.

Growers should be careful not to be too early with both nitrogen and sulfur, especially on deep, sandy soils, Hardy notes – both nutrients are highly mobile and could move out of the root zone. As growers gear up for a big cotton season, Hardy reminds them to keep sulfur in mind. “This is not a year when they want to be limiting themselves on yield,” he says.

References

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