New study underscores need for sulfur on cotton

A small dose of sulfur made a big difference in cotton yields for three years in a row at the North Florida Research and Education Center.

In a study recently completed by the University of Florida, applying 40 pounds per acre of sulfur increased cotton yields by 100 to 500 pounds per acre.

"The greatest yield increase occurred in 1997 when we had above-average rainfall," reports Dr. Fred Rhoads, a researcher with the University of Florida and coordinator of the sulfur study.

Like nitrogen, sulfur can leach out of the root zone with rainfall, particularly in Coastal Plain soils, which are made up of sand or a sandy layer over clay. Coastal Plain soils stretch across Virginia, North and South Carolina, Georgia, Florida and Alabama.

Years ago, the sulfur requirement for most Coastal Plain soils was easily met when most phosphate fertilizer was applied as normal super-phosphate, which contains approximately 12 percent sulfur. But today, commonly used phosphate fertilizers contain less than three percent sulfur.

There's also less sulfur coming from the atmosphere due to anti-pollution regulations that have reduced the sulfur dioxide content of industrial emissions.

In his studies, Rhoads used gypsum (17% sulfur) and ammonium sulfate (21-0-0-24S) to supply needed sulfur. According to Dean Collamer, agronomist with AlliedSignal Inc., sulfur from fertilizers like ammonium sulfate generally costs about 30 cents per pound. Based on a cotton price of 70 cents per pound, yield increases like those generated by the University of Florida would increase net profit by $58 to $338 per acre.

"Most of the time, growers will see a yellow crop and apply more nitrogen… But they should take a closer look … because the problem could be sulfur deficiency."

Despite the potential pay-off, many cotton growers overlook sulfur because the visual symptoms of sulfur deficiency closely resemble those of nitrogen deficiency. Both show up as a light green to yellowing of plant leaves, explains Rhoads. The difference lies in where the yellowing occurs. When sulfur is deficient, yellowing is more localized in newer, younger leaves. When nitrogen is deficient, yellowing shows up in older leaves.

"Most of the time, growers will see a yellow crop and apply more nitrogen because they know it's mobile and can be lost," Rhoads says. "But they should take a closer look at where the yellowing occurs, because the problem could be sulfur deficiency."

Early-season sulfur deficiencies can be corrected if sulfur fertilizer is applied within four to six weeks after emergence, says Rhoads. But you'll get a greater yield response if you apply sulfur earlier, from pre-plant to three weeks after emergence.

"If sulfur is not available to the plant three to four weeks after emergence, yields will suffer," he explains. To prevent yield loss, he advises growers to take stock of their sulfur needs ahead of time.

"Look at your soil type, and look at the amount of rain that has fallen in the winter and early spring," he advises. Any type with at least 12 inches of sand has the potential for sulfur deficiency.

Sand is naturally low in sulfur and prone to leaching. "If you're farming a sandy soil and you've had a fair amount of rainfall in winter and early spring, then you will probably need to apply sulfur," says Rhoads.

Fine textured soils may also become sulfur deficient if you have been producing high yields and have not fertilized with sulfur in recent years.

Tissue tests can confirm the need for sulfur in cotton, but Rhoads says it's important to pull samples early so that results came back in time for growers to make a corrective application.

In his study, cotton responded to early applications of sulfur every year. But the degree of response varied according to the weather.

In 1996, rainfall was normal and Rhoads recorded an average yield increase of 150 pounds per acre from

sulfur fertilization. The following year, approximately 60 percent more rain fell on the test site and the average yield increase from sulfur fertilization jumped to 500 pounds per acre. Last year, drought conditions prevailed in late May through August, and yield increases from sulfur fertilization averaged 100 pounds per acre.

Reprinted with permission from *Cooperative Farming News*, April 1999.