2004 BELTWIDE COTTON CONFERENCES, SAN ANTONIO, TX – JANUARY 5-9

MID-GRADE AMMONIUM SULFATE – AGRONOMIC BENEFITS AND PROFIT OPPORTUNITIES ON COTTON

Dean J. Collamer and M. Mercedes Gearhart*
Honeywell, Inc.

Abstract

A mid-grade ammonium sulfate (21-0-0-24S) with a mean particle size of 1.5 mm (150 SGN) and high in uniformity (50+ UI) will become available during the second half of 2004. It represents an efficient source of ammonium nitrogen that is not as subject to loss due to volatility as urea and UAN, can improve the uptake of phosphorus and micronutrients and suppress certain soil-borne diseases, like cotton root-rot. Plus it contains readily available sulfate-sulfur. The product has a spread pattern similar to that of granular grade ammonium sulfate or potash, but is a more economical source of plant nutrients.

Introduction

Commonly used as a sulfur source, ammonium sulfate is gaining popularity as a nitrogen fertilizer for spring and summer topdressing because there is less nitrogen loss from volatilization versus urea and urea-containing fertilizers like UAN solution. Mid-grade ammonium sulfate was developed as a more economical ammonium sulfate grade for direct application use, although it may also be blended with similar size fertilizer materials.

Discussion

Honeywell has developed mid-grade Sulf-N® ammonium sulfate (21-0-0-24S), to become available during the second half of 2004. With an average particle size of 1.5 mm (150 SGN) and high uniformity (50+ UI) mid-grade ammonium sulfate is well suited for direct application on cotton, rice and forage, without the double-spreading that is commonly needed for standard grade. In supervised spread-pattern tests by Southern States Co-Op in Virginia mid grade Sulf-N performed comparable to granular grades ammonium sulfate and potash. This gives it an advantage over prilled urea, which is generally known to produce an inconsistent spread pattern. Priced between standard and granular grade Sulf-N, mid-grade will represent an attractive source for direct application of an efficient nitrogen and sulfur source.

From an agronomic point of view, mid-grade ammonium sulfate provides similar benefits as the granular grade: 1) it represents a nitrogen source that is less subject to volatilization loss than urea and UAN, 2) it can suppress certain soil-borne diseases, 3) it can improve uptake of phosphorus and key micronutrients, and 4) it is a source of readily-available sulfate-sulfur.

Less Subject to Volatilization Loss

Using ^{15}N tracer material, the University of Arkansas recently measured 25% nitrogen loss from urea over a 14-day period immediately following application, versus only 5% from volatilization of ammonium sulfate (Figure 1).

May Improve Uptake of Phosphorus and Micronutrients

Plant uptake of ammonium nitrogen creates a desirable acidic rhizosphere (Figure 2), which may improve uptake of phosphorus and micronutrients, improving overall nutrition and making plants more resistant to disease.

Can Suppress Certain Soil-Borne Diseases

A lower rhizosphere pH can suppress several diseases caused by root-infecting fungi. On cotton, studies by Texas A&M University acidifying the rhizosphere pH and making iron and zinc more available resulted in a 25% to 54% reduction in cotton plant mortality resulting from *Phymatotrichum* root rot.

High Ammonium to Nitrate Ratios

In recent Texas Tech testing, a relatively high ammonium to nitrate ratio resulted in a higher number of bolls and higher yield per acre (Figure 3).

Source of Readily-Available Sulfur

Auburn University testing recorded 26% yield increase from the application of 20 pounds of sulfur per acre on Coastal Plain soils (Figure 4). Three-year research work at the University of Florida (Figure 5) showed 35% average yield increase from sidedress ammonium sulfate fertilization on sandy soils. In both studies, the response was especially high when the year was wet, with responses to 40 and 50 pounds of sulfur per acre, respectively. Assuming cotton valued at 55 cents per pound and sulfur cost at 25 cents per pound, average lint yield increase due to sulfur in these two studies would correspond to net returns ranging between $67.60 and $88.50 per acre (Table 1).

References

Heckman, J.R. 1996. Teaching Plant – Soil relationships with color images of rhizosphere pH. J. Nat. Resour. Life Sci. Edu. 25:13-17.

Krieg, D.R. 2003. Does a continuous supply of ammoniacal nitrogen increase irrigated crop production? Fluid Forum Proceedings 20:62-66.

Matocha, J.E. 1995. Personal communication.

Mullins, G.L. 1995. Response of cotton to the rate and source of sulfur on a sandy Coastal Plain Soil. Annual Report for PPI and FAR Supported Projets.

Norman, R.J. 2003. Personal communication.

Rhoads, F. M. 1999. Cotton response to sulphur. Brochure by Florida Agricultural Experiment Stations

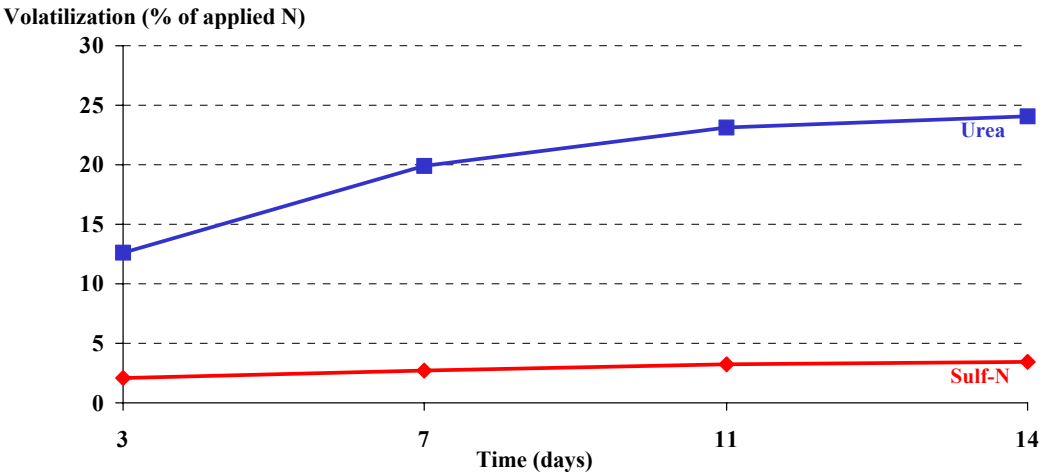

Figure 1. Ammonia volatilization of ^{15}N-labeled urea versus ammonium sulfate over a 14-day period immediately after application. University of Arkansas, 2000/2001.

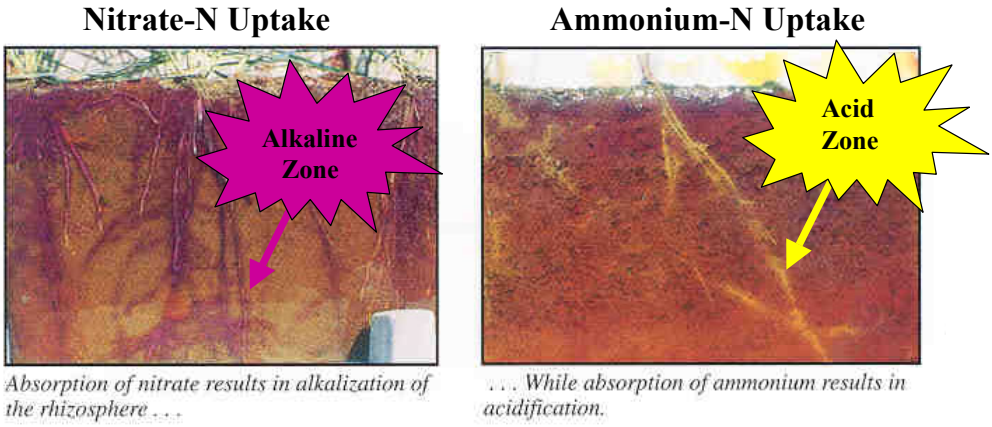

Figure 2. Illustration of how root systems after their environment in response to the form of nitrogen nutrition. Rutgers University, 1996.

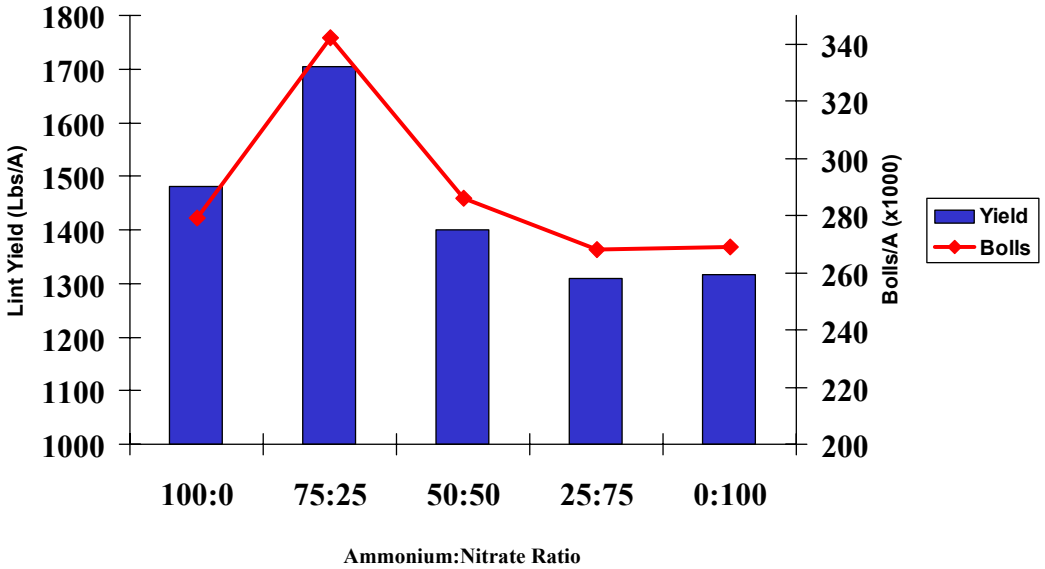

Figure 3. Cotton lint yield and umber of bolls per acre as a function of ammonium to nitrate rations in the fertilizer solutions applied. Texas Tech, 2001/2002.

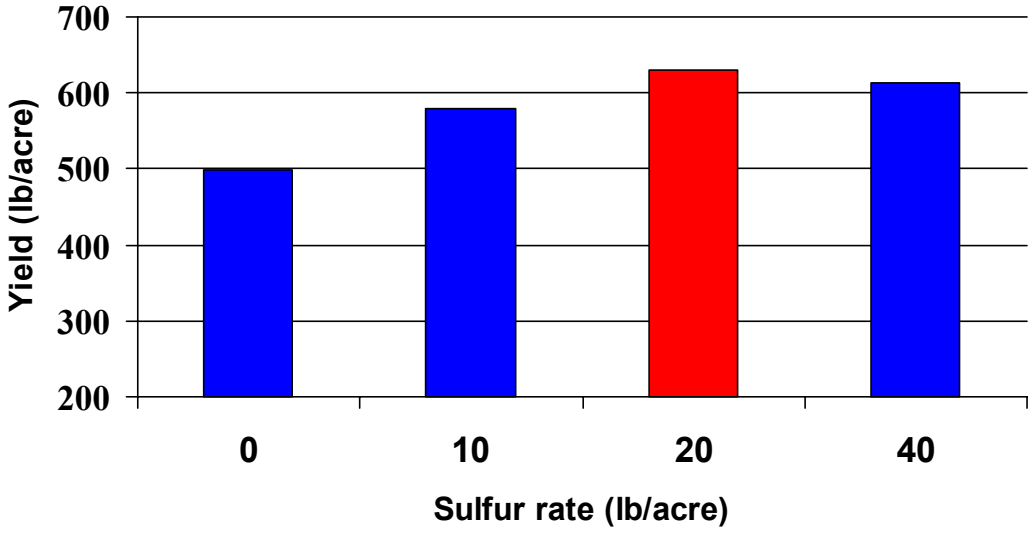

Figure 4. Cotton lint yield response to sulfur rate on Coastal Plain soil. Auburn University, 1993/1995.

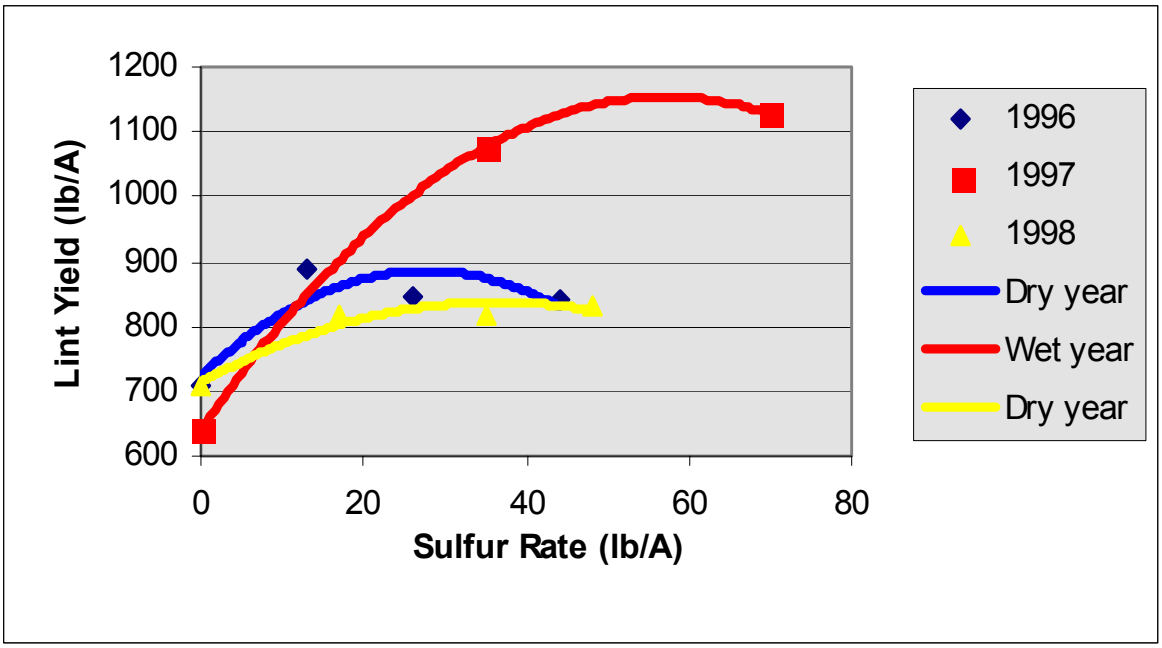

Figure 5. Cotton lint yield response to sulfur rate on Coastal Plain soil. University of Florida, 1996/1998.

Table 1. Net return on sulfur based on two Coastal Plain studies and assuming a cost of 25 cents per pound of sulfur.

Yield Increase/A @20 lbs S/A	Crop Value	Net $ Returned/A	Data
170 lbs/A	$0.55/lbs	$88.50/A	FL, '96/'98
132 lbs/A	$0.55/lbs	$67.60/A	AL, '93/'95