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Subject: Testing New Fertilizers and Fertilizer Additives

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Specialty Fertilizer Products, LLC is currently marketing two products through Southern States Cooperative, Nutrisphere-N and AVAIL (more than 1 formulation each). We have had many questions about these two fertilizer additives – Avail (for phosphorus fertilizers) and Nutrisphere (for nitrogen fertilizers). The intent of this memo is to present available information and to discuss current research plans.

Theoretical estimation of the potential effect on Soil CEC Due to Organic Polymer Additions:
Neither AVAIL or Nutrisphere-N supplies plant nutrients; instead their mechanism of action is due to the large net negative charge and thus cation exchange capacity of the maleic itaconic copolymer. Like other soil amendments, the effectiveness depends on the rate of product applied and the mode of action of the material.

The actual rate of copolymer applied to the soil can be calculated from the fertilizer rate, the recommended product rate per unit fertilizer, and product. The estimated change in soil CEC can be calculated from the existing soil CEC (from a standard soil test report), the product CEC, and the product rate using a weighted average approach. If 1 lb/ac of copolymer with a CEC of 250 meq/100 g is incorporated into the top 6 inches of a sandy soil with a CEC of 4 meq/100 g, only a miniscule increase in soil CEC is expected (from 4.0000 to 4.0001 meq/100 g) since this small amount of polymer is diluted by the approximately 2 million pounds of topsoil per acre. The copolymer product is sometimes band-applied and only mixes with a small fraction of the soil volume. Even if only 0.1% of the soil mixes with the product (a 1/2-inch wide strip every 30 inches, with only 1/2-inches vertically out of the 6-inch topsoil) the copolymer product is still diluted by 2,000 lb of topsoil per acre. The increase in soil CEC expected with 1 lb/ac of copolymer in this highly restrictive band is still small (from 4.00 to 4.12 meq/100 g). Based on these calculations we would expect this small change in CEC to have little impact on nutrient availability.

Field Trials With Avail: In 2007, Dr. Heiniger tested Avail on corn with starter fertilizer at five locations and Drs. Osmond and Hardy at three locations (2 soil types per location and both grain and silage). Results from all eight of these tests showed that at recommended starter fertilizer rates, there was no yield advantage with Avail. In the trials of Osmond and Hardy, which were on soils testing medium to very high for phosphorus, nitrogen-only starter fertilizer did statistically as well as nitrogen + phosphorus starter or nitrogen + phosphorus + Avail starter (see Figures 1 and 2 on Page 3).
Avail trials are planned in corn and tobacco for 2008. Drs. Heiniger, Osmond and Hardy will conduct corn trials. Dr. Heiniger will run two trials (Pasquotank and Pamlico Counties) using banded 11-27-0, with and without Avail. Drs. Osmond and Hardy will repeat the 2007 trial at the same locations. In addition, they will have a phosphorus rate study, with and without Avail on low soil test phosphorus locations (coastal plain and piedmont). Dr. Fisher will test Avail on a low soil test P soil (Stokes County) and a high soil test P soil with tobacco.

**Field Trials With Nutrisphere-N:** Yield studies using Nutrisphere-N have proven inconclusive and mixed. A recent popular press article describes research by two scientists; yield increases with the use of Nutrisphere-N were seen by one of the two researchers

http://www.agriculture.com/ag/story.jhtml?storyid=/templatedata/ag/story/data/1205351323541.xml&ordersrc=raftstory). A recent on-farm test in Virginia showed no advantage to using Nutrisphere-N (http://www.ext.vt.edu/pubs/grains/424-050-07/424-050-07.html#L7) nor did rice research that was presented at the Southern Branch of the American Society of Agronomy meeting. Although, research conducted in North Carolina by Dr. Heiniger showed no difference in average yield between UAN and UAN+Nutrisphere-N, there was, however, a statistical increase in yield due to Nutrisphere-N at the lower application rates when all fertilizer was applied at planting. As application of all N fertilizer at planting is not a recommended practice, Dr. Heiniger plans a larger testing program in 2008.

Nutrisphere-N trials on corn will again be conducted in 2008. Dr. Heiniger will have two trials comparing UAN and UAN+Nutrisphere-N at five nitrogen rates and two different application times. Dr. Osmond will conduct three trials (coastal plain, piedmont, and mountains) to compare four nitrogen fertilizers (ESN, UAN, UAN+Nutrisphere-N, UCAN23) at five different nitrogen rates. Drs. Osmond and Weisz have wheat trials at two locations comparing the same nitrogen fertilizers at five different nitrogen rates. Dr. Fisher will have a tobacco trial to evaluate Nutrisphere-N.

**Current Conclusions:** We clearly do not have strong evidence to support the use of these products at this time. However, before providing more guidance on these materials, we need at least two years of data. Those of us working with these materials expect that within the next six to nine months we will have better NC-based research to present.

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Figure 1. Corn yields on medium soil test phosphorus soils at three locations and three different starter fertilizer types. (DA= Starter N+P+Avail; DAP= Starter N+P; N= Starter N).

Figure 2. Corn yields on high soil test phosphorus soils at three locations and three different starter fertilizer types. (DA= Starter N+P+Avail; DAP= Starter N+P; N= Starter N).