Letter to *Farm Industry News* from Grant Cardon, Colorado State University,

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I appreciate your interest in our polymer work. For clarity's sake, poly-acrylamide is not so much a WASTE product, as it is an INTERMEDIATE product in the plastics industry, which has some useful characteristics.

The real difference between our work and the work you see repeatedly cited in the press releases on these products, is replication. Sure, without replication you can search for instances of higher yield using the products, but the results are often marginal at best, and are almost always more dependent on other factors like fertility complications (notice from the Stockosorb documents provided by American Soil Tech., that Nitrogen is the real controller of the yield increases reported, and there are no estimates of experimental error because of NO REPLICATION). The "trials" often cited are strip trials at a bunch of sites, without enough statistical structure to provide error estimates and verification of "real" differences.

Beyond the problems with statistics that almost ALWAYS exist, no one has ever really looked at the physics of water release/retention from these materials, and the problem of scale. Our paper tries to shed some light on those subjects and shows that most of the water release from the material happens before field capacity water potentials, hence much of the water released is not "available" to the plant. Second, where even dilute salt solutions are used (soil EC's less than 1.0 dS/m) the material collapses and cannot absorb water. Even in the absence of salt, the reabsorption capacity is almost completely negated after 3 to 4 wetting cycles. We have used the very same material sold by American Soil Technologies, with similar results to those above. The material has tremendous application in industry where absorption of water in "free water" conditions is needed (diaper absorbents, packaging absorbents, underground cable protection absorbents, etc.), but soil water physics is either not well understood by these companies, or ignored altogether in an attempt to sell their product.

But, even if the stuff didn't collapse in the presence of dilute salt solutions, or lose absorption capacity over just a few wetting cycles, or release moisture at soil tensions above field capacity, etc., you still have the problem of scale. The recommended application rates of the material vary company to company, but range from 2 to 5 lb/ac banded, to 15 to 20 lb/acre broadcast. Under the best irrigation water quality conditions (EC < 1.0 dS/m) the absorption of the material is between 130 to 160 times its weight in water (not 300x with distilled water). At the highest application rate of 20 lb/acre, this is a potential increase in water absorption of 2,600 to 3,100 lbs of water/acre. If one applies water to wet up the storage capacity of an "average" soil to field capacity, the water storage is about 2 inches per foot. In the top foot of soil, 2 acre inches of water (or about 54,333 gallons) weighs about 467,270 lbs, hence the increase in water storage that is

possible due to polymer application is, at best, about 0.7 percent--an insignificant amount of water in the overall water use of the crop. Couple this with the fact that 25 to 30% of the water stored in the polymer is released before soils reach field capacity tensions, and you end up with even less of a "spit in the ocean" than that--and that's the BEST you can hope for!!

It is always a very useful thing to analyze the scale of the problem. I think it is VERY helpful in putting the benefits/costs into perspective. We are currently placing a second year of our field testing into place out at the CSU research farm. We have 4 replications of 5 rates of application in both full and half-irrigated pinto beans. If you are nearby this summer, let me know and we can get together at the plots and show you what we are doing/have done in more detail.

Grant