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# Conservation Systems Research

## *Use of Unconventional Soil Additives to Ameliorate Drought Stress Impact on Cotton*

### RESEARCH PROJECT DESCRIPTION NO. 44



Polyacrylamides (PAM) can hold a significant amount of water. Added to the soil, they can help increase water retention. Above, dry PAM (left) and same amount, wetted (right).

### Researchers

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### The Challenge

Short, mid-season drought periods are common in the southeastern USA. Since many southeastern soils are low in organic matter content, summer crops are especially susceptible to water stress because of a lack of water-holding capacity in the soils. Many studies have found that conservation tillage systems, which include heavy residue from winter cover crops, increase soil organic matter content significantly. The greater water storage capacity in these soils can

provide summer crops enough extra water to survive most of these mid-season droughts.

Remediating carbon-deficient soils with conservation systems is a long-term process. While the recovery process is in progress, short-term measures may provide some drought stress relief until the soil quality has improved.

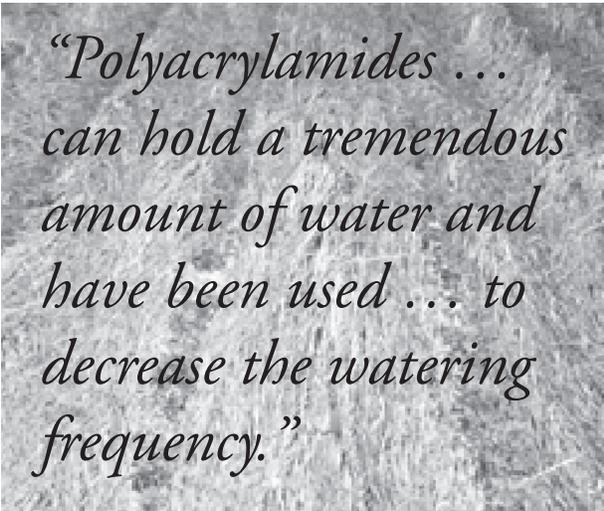
Polyacrylamides, which are synthetic polymers, can hold a tremendous amount of water and have been used with success in potted ornamental plants to decrease the watering frequency. Surfactants are wetting agents and have been used to increase soil water content in some field crops, such as potatoes. The challenge is to determine the potential of polyacrylamides and surfactants to reduce the impact of short-term drought stress in production systems common to the southeastern U.S.

## The Experiment

Greenhouse and laboratory studies at the USDA-ARS National Soil Dynamics Unit in Auburn, Alabama will:

- Evaluate the potential of anionic surfactants and polyacrylamides to increase soil water retention.
- Determine the potential of anionic surfactants and polyacrylamides to reduce the effects of short term drought on cotton production.

These studies will determine the effect of surfactants and polyacrylamide applications on soil water retention. Tests will find the best method of application – surface or incorporated with the soil – and the best rate of application. The effect of additive applications on plant water stress will be studied by planting cotton in greenhouse pots and maintaining them at different moisture levels. Data to be collected include soil water retention, water content, plant water status, and yield, among others.



*“Polyacrylamides ... can hold a tremendous amount of water and have been used ... to decrease the watering frequency.”*