

Potential Impact of Conservation Tillage on Conserving Water Resources in Georgia

Why Does it matter?

Georgia agriculture is a \$5.8 billion dollar industry and ranks in the top ten percent for the nation's peanut, cotton, vegetable and poultry production. Crop production accounts for \$1.8 billion, or 31 % of the state's agricultural revenues. Maintaining soil water is critical for crop production in the Southeast since intermittent drought can necessitate supplemental irrigation. Producers have responded by increasing irrigated land from 175,000 acres in 1970 to 1,497,000 acres in 2004.



Conservation tillage leaves crop residues on the soil surface resulting in increased infiltration, soil water content, and plant available water, while at the same time decreasing runoff and sedimentation. Yet, there is a general lack of knowledge and appreciation outside the agricultural community regarding the impact conservation tillage can have on sustaining water resources.

What was done?

Agricultural Research Service scientists from Watkinsville and Tifton, GA, used a data base within a geographical information system (GIS) to estimate potential water savings as a result of current and increased adoption of conservation tillage in Georgia. Total acreages by crop (cotton, corn, and peanut) and tillage (conventional and conservation) were obtained via the Conservation Technology Information Center for the 2004 growing season. Published and unpublished rainfall simulation data for conventional and conservation tillage row-cropped systems in the Coastal Plain and Piedmont provided the basis for estimating potential water saving.



What was found?

Cotton, corn and peanut comprised 85% of row crop production during 2004 in Georgia, with nearly 90% in the Coastal Plain. Conservation tillage was in place on 30% of these acreages and consisted primarily of strip tillage. Rainfall simulation data and conservation tillage acreages indicated that conservation tillage reduced statewide, irrigated water requirements from 4-14%. Increasing conservation tillage to 40 % in intensively row-cropped counties increased estimated water savings by an additional 1-6%. Using the observed adoption rates we estimated that conservation tillage saves the equivalent of 0.20 – 0.75 years (Colquitt/Dougherty Counties -Urban) or 1.5 – 5.8 years (Tift County-Rural) of water use (Table 1). Increasing conservation tillage by 10% could increase estimated water savings to 0.27 – 1.1 years in Colquitt/Dougherty and 2.1-8.3 years in Tift Counties. In drought years, estimated water savings decreased due to the greater demand for irrigation.

Table 1. Estimated water savings (expressed in years) by conservation tillage at current adoption levels and for a 10% increase in adoption for drought and normal years based on the minimum, average and maximum infiltration rates observed during rainfall simulations.

| County | Conservation Tillage Level | Drought Year | | | Average PPT Year | | |
|---------------------------------|----------------------------|--------------|---------|------|------------------|---------|------|
| | | Min | Average | Max | Min | Average | Max |
| -----Years of Water Saving----- | | | | | | | |
| Bibb | Current | 0.49 | 0.23 | 0.13 | 1.04 | 0.50 | 0.28 |
| | + 10% | 0.83 | 0.47 | 0.28 | 1.49 | 0.71 | 0.38 |
| Chatham | Current | 1.64 | 0.78 | 0.43 | 3.51 | 1.68 | 0.93 |
| | + 10% | 2.79 | 1.57 | 0.95 | 5.04 | 2.40 | 1.29 |
| Colquitt | Current | 0.35 | 0.17 | 0.09 | 0.75 | 0.36 | 0.20 |
| | + 10% | 0.60 | 0.34 | 0.20 | 1.08 | 0.51 | 0.27 |
| Dougherty | Current | 0.34 | 0.16 | 0.09 | 0.72 | 0.35 | 0.19 |
| | + 10% | 0.58 | 0.32 | 0.20 | 1.04 | 0.50 | 0.27 |
| Fulton | Current | 0.44 | 0.21 | 0.12 | 0.94 | 0.45 | 0.25 |
| | + 10% | 0.75 | 0.42 | 0.25 | 1.34 | 0.64 | 0.34 |
| Lowndes | Current | 2.25 | 1.07 | 0.59 | 4.82 | 2.31 | 1.27 |
| | + 10% | 3.84 | 2.16 | 1.31 | 6.92 | 3.30 | 1.77 |
| Muscogee | Current | 1.65 | 0.79 | 0.43 | 4.82 | 1.69 | 0.93 |
| | + 10% | 2.81 | 1.58 | 0.96 | 5.07 | 2.42 | 1.29 |
| Tift | Current | 2.68 | 1.28 | 0.71 | 5.75 | 2.76 | 1.52 |
| | + 10% | 4.58 | 2.58 | 1.56 | 8.25 | 3.94 | 2.11 |

What is the impact?

Expanding urban water needs are currently being met through increased surface water withdrawals from the Chattahoochee, Coosa, and Altamaha river basins in Georgia. Demands for water by neighboring states and Federal intervention have necessitated the development of a comprehensive state water management plan. The potential water savings that can be obtained with conservation tillage should not be ignored given the estimated water savings. Producers, policy makers, and citizens of Georgia can recognize the benefits of conservation tillage and reward farmers that adopt these water saving practices.

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