Water Savings through Conservation Tillage

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Cotton, corn and peanut production in Georgia covers 2.3 million acres and is an $867 million business annually. On 30 percent of those acres, conservation tillage is the preferred method of operation. Conservation tillage is a systems approach that has benefits such as reduced fuel usage, improved soil quality, and reduced erosion. Water saving, one of the most important benefits of conservation tillage, is often overlooked. Considering that 49, 55, and 56 percent of cotton, corn, and peanuts receive irrigation, conservation tillage can save a significant amount of water and energy statewide. Conservation tillage systems, coupled with the use of cover crops, increase water infiltration by as much as 30 to 45 percent compared to conventional tillage systems for loamy sand and sandy loam soils. This means more efficient use of rainfall and irrigation water, as well as less water carrying sediment and agrochemicals running off fields into waterways.

Increased infiltration, in any soil type, is beneficial to the farmer because it reduces the amount of water applied by irrigation (Reeves et al., 2005). In dryland systems, increased infiltration may have an even greater impact on crop yields. Increasing infiltration is particularly important in the Coastal Plain, where sandy, drought-prone soils are common.

Statewide, as conservation tillage increases, the amount of water savings as compared to conventional tillage production systems, is estimated to increase as follows:

<table>
<thead>
<tr>
<th>Adoption</th>
<th>Water Savings</th>
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<tbody>
<tr>
<td>30% adoption (current rate)</td>
<td>3-12% water savings</td>
</tr>
<tr>
<td>40% adoption</td>
<td>5-18% water savings</td>
</tr>
<tr>
<td>100% adoption (full adoption)</td>
<td>12-46% water savings</td>
</tr>
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Results are a function of management: para-tillage, strip-tillage with residue removed, strip-tillage with residue remaining or no-till. Savings are calculated based on estimated water use in 100 percent conventional tillage adoption.

At the current adoption rates (30 percent) and based on published data, water savings on the 1.3 million acres of cotton in Georgia amounts to 4.4 billion gallons annually (numbers for corn and peanuts would be .33 and 1.0 billion gallons respectively). Values for cotton were calculated using these assumptions (2004 data):

- 1,300,00 acres of planted cotton in Georgia
  (Georgia Agricultural Statistics, 2004)
- 30 percent adoption rate of conservation tillage in Georgia
  (Conservation Technology Information Center)
- 41.5 percent of the cotton is irrigated
  (Kerry Harrison, 2005)
- 1 irrigation application saved per growing season – 1’ per application
  (Truman and Rowland, 2005; Hawkins, et al., 2007)

27,154 gallons per acre-inch of water

This information, along with calculated values for 40 and 100 percent adoption, is in Figure 1. It highlights current and potential water savings using conservation tillage systems. Another way to look at the amount of water saved by agricultural producers using conservation tillage is by putting it in terms of water used (based on average daily consumption – Fanning, 2003) for various cities. Estimates were calculated using the current rate of conservation tillage adoption (30 percent):

<table>
<thead>
<tr>
<th>City</th>
<th>Timeframe</th>
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<tbody>
<tr>
<td>Atlanta</td>
<td>3 months-1 year</td>
</tr>
<tr>
<td>Macon</td>
<td>1-3 years</td>
</tr>
<tr>
<td>Savannah</td>
<td>1½-6 years</td>
</tr>
</tbody>
</table>
This information is presented to highlight current and potential water savings using conservation tillage systems in Georgia. Through a partnership with the University of Georgia – College of Agricultural and Environmental Sciences, USDA-Agricultural Research Service, USDA-Natural Resource Conservation Service (NRCS), Soil and Water Conservation Society and Resource Conservation and Development Councils, Agricultural Pollution Prevention Program, and the Pollution Prevention Division of Georgia DNR, research and education programs on water savings through use of conservation tillage continues in the agricultural community. If you have further questions on issues such as cover crops, tillage, how-to’s or other aspects of conservation tillage or water savings, please contact Dr. Gary L. Hawkins, UGA Biological and Agricultural Engineering, Tifton, 229-386-3914, Dr. Dana Sullivan, USDA-ARS, Tifton, 229-386-3665, Dr. Clint Truman, USDA-ARS Tifton, 229 386-7174, your local UGA Extension Agent (1-800-ASK-UGA1) or NRCS Agent.

References:


