



Conservation Systems

United States
Department of
Agriculture

Agricultural
Research
Service

National Soil
Dynamics Lab

Conservation
Systems
Research

Research
Project
Report
No. 24

October 2002

Contact us:

USDA-ARS-NSDL
411 S. Donahue Dr.
Auburn, AL 36832
334-844-4741 x179

<http://msa.ars.usda.gov/al/auburn/nsdl/csr>



RESEARCH PROJECT DESCRIPTION No. 24

Tillage and Cover Crop Effects on Reducing Soil Compaction of Tennessee Valley Soils in Conservation Tillage Systems



Inspecting cover crop residue

Researchers

R.L. Raper (Agricultural Engineer), D.W. Reeves (Research Agronomist), C.H. Burmester (Extension Agronomist), E.B. Schwab (Agronomist)

The Challenge

Reduced cotton yields occur on many farms in the Tennessee Valley region of northern Alabama for farmers attempting to adopt no-till farming. Soil compaction limits yields and prevents adequate root elongation. We want to develop conservation tillage systems that overcome compaction problems to allow profitable cotton yields and to protect soil and water resources.

Farmers wishing to adopt conservation tillage systems can use a cover crop and shallow, in-row tillage to maintain surface residue without sacrificing crop yield.

Spring tillage reduced cone index and bulk density in the fall compared with fall tillage performed the previous year.

Winter cover crops reduced cone index in the spring, probably because of increased soil moisture. This effect disappeared by fall, after harvest.

Farmers wishing to adopt conservation tillage systems can use a cover crop and shallow, in-row tillage to maintain surface residue without sacrificing crop yield.

The Experiment

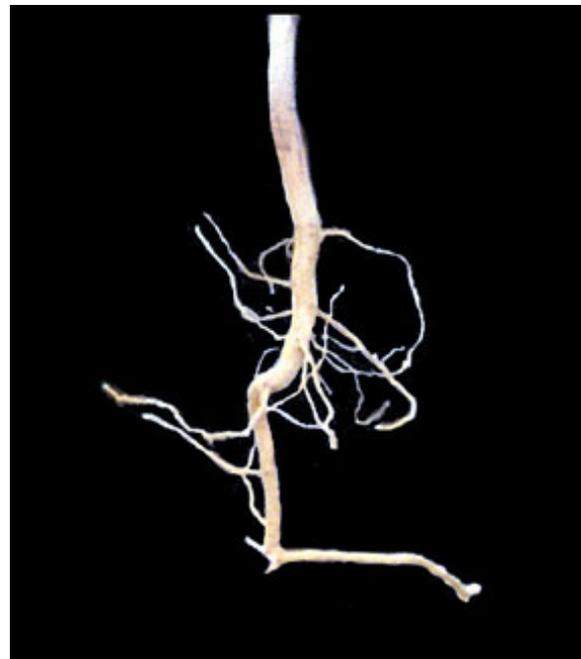
We conducted a four-year experiment at the Alabama Agricultural Experiment Station's Tennessee Valley Substation in Belle Mina, AL to determine the most effective conservation tillage systems to disrupt hardpan problems and to maintain this disrupted state. Prior to this study, the field had used many years for cotton production under conventional tillage.

Tillage systems studied:

- cover crop (none or rye);
- tillage timing (fall or spring);
- tillage depth (shallow or deep);
- tillage type (no-till or conventional).

What We Have Learned

In-row tillage performed in either fall or spring, at either shallow or deep depths, reduced cone index and bulk density compared to no-tillage.



Cotton root reacts to compacted soil layer

Related Publications

Raper, R.L. 2002. The Influence of Implement Type, Tillage Depth, and Tillage Timing on Residue Burial. submitted to the Power & Machinery Division of ASAE. *In press.*