Program 13C-2

Conventional Cottons From The University Of Arkansas

Presented by Dr. Fred Bourland
Center Director/Professor, University of Arkansas

The widespread occurrence of glyphosate-resistant pigweeds has forced many Arkansas cotton producers to return to conventional weed control programs. Thus, some see conventional cottons as a way to reduce production costs by avoiding the Round-up Ready technology fee. With the introduction of two new insecticides, technology fees associated with Bt cottons might also be avoided in areas with low worm pressure. Due to low demand, well-adapted conventional varieties have not been available. In response to this need, Arkansas Agricultural Experiment Station is releasing a conventional variety that has demonstrated high yields, early maturity and exceptional fiber quality.

Program 4C-2

Effect Of Long-Term Conservation Tillage Rotations On Crop Yields And Soil Physical And Chemical Properties

Presented by Charles Burmester
Extension Agronomist, Auburn University

Introduction

A replicated cotton rotation experiment was established in 1979 and for the past 30 years has provided valuable information to farmers in the Tennessee Valley region in Northern Alabama. The comparison of continuous cotton production with one year rotations of corn, soybeans or wheat/double-cropped soybeans have been consistent since 1979. In 1988, two continuous no-till cotton plots and fall tillage (chisel) prior to planting a wheat cover crop were established. The two no-tillage plots consist of planting into old cotton stubble or into a wheat cover crop. In 1994 all plots except continuous cotton were changed to no-tillage, and the row spacing for cotton, corn and soybeans were reduce from 40 to a 30 inches.

Yield Results

It is important to note that this rotation test site, located on a Decatur silt loam soil, has developed no major disease or nematode problems during its 32 year history. Cotton yield responses to rotations were low (2-7%) during the first eight years of the study (Table 1). Cotton yield response to rotations increased slightly during the 1988-1994 time period. The biggest cotton yield increase (13%) was found in the wheat and double-cropped soybean rotation (Table 1). The no-till cotton yields during this period were disappointing, especially where cotton yields were reduced by 2% when planted into old cotton stubble (Table 1). The 1995-2005 time periods saw many changes in cotton production including Bt and Roundup Ready cotton development. Cotton yield response to rotations increased greatly this period (Table 1). All rotations except corn produced double digit increases in cotton yields (Table 1). These increases coincided with all the treatments except continuous cotton planted with conservation tillage. The 2006-2010 time periods contained two major drought years (2006-2007) that reduced cotton yield responses greatly. Even with these two non-responsive years,

cotton yield increases averaged 12% when cotton was rotated with wheat and double cropped soybeans and 10% and 17%, respectively, when no-tilled into cotton stubble or a wheat cover. Cotton yields were also increased 16% when no-tilled into wheat following fall tillage. Cotton yields increased only 6% when rotated with corn during this period and cotton yields were reduced 3% when cotton followed soybeans (Table 1).

Soil Properties

During this cotton rotation experiment soil organic matter (SOM) was analyzed in the top 2.5 inches of the soil from key treatments in 1987, 1994, 2001. In 2010 SOM was sampled in the top 2 inches of the treatments. The 1987 sampling was before establishment of the two no-till treatments. The 1994 sampling was before all the rotations were switched to conservation tillage and the 2001 and 2010 sampling serve as baselines for SOM development (Table 2). Continuous cotton SOM increased very slightly from the 1.34% level found in 1987 to 1.53% SOM in 2010 (Table 2). Using conventional tillage the corn and soybean rotation did not significantly increase SOM at the 1987 or 1994 sampling (Table 2). In 1994 the no-till cotton treatments and wheat-double cropped soybean rotation significantly improved SOM in the top 3 inches (Table 2). Also in 2001,the largest increases in SOM reading were found in the no-till cotton treatments and the wheat double-cropped soybean rotation. In the 2010 sampling large increases in SOM was noted in all the rotations and all rotations increased SOM compared to the conventional tillage cotton (Table 2). Some of the increase in SOM in 2010 may be relates to a slightly shallower sampling depth of 2.0 inches versus 2.5 inches in previous years. The rotations including wheat almost doubled SOM levels from 2001-2010 (Table 2). The corn rotation increased SOM by over 1% and the cotton no-till into old cotton residue increased SOM by over 0.5% during this 9 year period (Table 2). The soybean rotation was not sampled for SOM at this depth in 2010. During the 2010 sampling SOM was measured on an existing pasture (over 20 years) on the same soil type. The SOM in the pasture measured about 5 times higher compared to continuous cotton and about 3 times higher than compared to the no-till wheat cover treatment. (Table 2).

Summary

In the last several years many Tennessee Valley area farmers in northern Alabama have switched from continuous cotton to rotations with wheat, corn and soybeans. Conservation tillage is also used by many farmers in this area. This data indicated large advantages to rotations and conservation tillage on these soils. This data indicates a direct relationship between cotton yield increases and increases in surface SOM. The rotations including wheat in the rotations appeared to build organic matter faster, resulting in consistently higher yields. Using conservation tillage and wheat in the rotations can lead to double digit cotton yield increases and large increases in SOM. Rotations with corn and soybeans increased cotton yields and SOM levels over time, but less than seen with wheat in the rotation.

In cotton fields with reniform nematode problems much higher yield response to using corn in the rotation would be expected. This rotation test indicates the positive cotton yield response to rotations and cropping systems that can result from building SOM over time.

Table 1. ***Relative seed cotton yield responses to long term crop rotation/tillage systems at the Tennessee Valley Substation, 1980-2010.***

Rotation/Tillage System	1980-1987 %	1988-1994 %	1995-2005 %	2006-2010 %
Continuous Cotton[1]	100.00	100.00	100.00	100.00
Cotton/Soybean[2]	105.00	105.00	109.00	97.00
Cotton/Corn[2]	102.00	108.00	111.00	106.00
Cotton/Wheat-Soybean[2]	107.00	113.00	111.00	112.00
NT Cotton (stubble)[3]	-	98.00	110.00	110.00
NT Cotton (wheat)[3]	-	104.00	116.00	117.00
Cotton/Wheat-Chisel[4]	-	109.00	117.00	116.00

[1]continuous conventional tillage cotton since 1979.
[2]rotations established in 1979, converted from conventional to no-tillage in 1994.
[3]no-tillage into wheat cover crop or previous cotton stubble established in 1988.
[4]fall tillage performed prior to wheat cover crop planting, established 1988.

Table 2. ***Surface soil organic matter (%) from long-term rotation/tillage experiment at the Tennessee Valley Substation, 1980-2010.***

Rotation/Tillage System	1987(2.5in)	1994(2.5in)	2001(2.5 in)	2010(2.0in)
Continuous Cotton[1]	1.34	1.48	1.41	1.53
Cotton/Soybean[2]	1.38	1.58	1.65	-
Cotton/Corn[2]	1.35	1.50	1.70	2.80
Cotton/Wheat-Soybean[2]	1.46	1.85	1.98	3.80
Cotton - No till stubble[3]	-	1.75	2.23	2.80
Cotton - No till wheat[3]	-	1.68	2.26	4.42
Pasture (>20 years)[4]	-	-	-	7.43

[1]continuous conventional tillage cotton since 1979.
[2]rotations established in 1979, converted from conventional to no-tillage in 1994.
[3]no-tillage into wheat cover crop or previous cotton stubble established in 1988.
[4]continuous pasture for more than 20 years.

Program 5C-2

Management Of Cotton Insect Pest In The Mid-South

Presented by Dr. Angus Catchot
Extension Entomologist, Mississippi State University

2011 started off rough for cotton producers in the state of Mississippi. Greater than 50% of the crop was planted more than two weeks later than normal due to inclement weather and flooding from the Mississippi River. Also, sandblasting in the north Delta required replanting of more than 20% of the acres in that region. This year was also above average for many of the insect pests that attack cotton, particularly in the Delta.

Tarnished plant bug has ranked as the states number one insect pest of cotton for the past decade. It is not uncommon in the Delta region of the state for some producers to have more than 10 insecticide applications for this pest alone. Many of the problems associated with tarnished plant bug are a result of widespread insecticide resistance to multiple classes of chemistry. Currently to obtain acceptable control of this pest growers have to mix several classes of chemistry together which is ultimately more costly. To some extent, this pest alone, has contributed to the slow rebound of cotton acres in the Delta despite record high prices of cotton.

Spider mites typically rank as the second or third most damaging pest of cotton over the last five years. Spider mites traditionally have been called a late season or "cutout" type pest of cotton in Mississippi. Spider mites are no stranger to cotton in Mississippi but only in recent years has their status been elevated to a season long pest. Spider mites are somewhat of an "induced" pest of cotton meaning that they can easily exploit changes in the production system to their advantage. The high number of insecticide applications being made for tarnished plant bugs essentially "flares" spider mites by eliminating beneficial insects. Also, the widespread adoption of insecticide seed treatments to control thrips early in the season has no activity on spider mites allowing them to build earlier in the growing season. In 2011, producers treated approximately 38% of the cotton acres for spider mites.

Tarnished plant bugs and spider mites alone have contributed to greater than 50% of total losses from pest of cotton over the last few years. The good news is growers and consultants have recognized the threat from these pests and have begun to take an integrated approach to managing them. For instance, many growers recognize that cotton/corn interfaces are hot spots for plant bugs to develop and are beginning to try and block their corn away from their cotton fields. Also, research conducted over the last several years at Mississippi State University has shown that planting cotton early can reduce the total numbers of applications needed to control tarnished plant bugs by avoiding late season build ups. Recognizing that