

2006 Alabama Wheat & Feed Grains Report
Continued Support of Long-term, Field Research
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The Old Rotation (circa 1896) - 2006

The Old Rotation (circa 1896) is the oldest, continuous cotton experiment in the world and the third oldest field crop experiment in the U.S. Its 13 plots on 1 acre of land on the campus of Auburn University continue to document the long-term effects of crop rotations with and without winter legumes (crimson clover) as a source of nitrogen for cotton, corn, soybean, and wheat.

In spite of a severe drought throughout most of Alabama in 2006, crops on the Old Rotation experiment continued a trend that began in 1996 when the experiment changed from conventional tillage to conservation tillage. Another record cotton yield of 1760 lb. lint per acre was produced on the NON-IRRIGATED half of the treatment following corn and crimson clover cover crop plus 120 pound N per acre. This surpassed 2005's record cotton yield of 1660 lb. lint per acre on the same treatment. Interestingly, the irrigated half produced larger plants in 2006 but only 1730 lb. lint per acre (Table 1). After 4 years of irrigated cotton yields compared to non-irrigated cotton yields on this experiment, we have yet to demonstrate any advantage to irrigating cotton at this location (Table 2). Irrigation experiments with cotton in the Tennessee Valley have repeatedly shown advantages to irrigated cotton. Explanations as to why irrigation on the Old Rotation has not been an advantage include: (1) timely rainfall (Fig. 1), (2) improved infiltration, soil water-holding capacity, and depth of rooting because of conservation tillage techniques, and (3) poor irrigation timing. Over 4 years, the irrigated cotton yields were 101% of the non-irrigated yields. On the other hand, irrigated corn plots produced 125% of the non-irrigated plots and irrigated soybean produced 124% of the non-irrigated plots. Clearly, N is a limiting factor on all the treatments receiving corn and plans are to increase the N rate used on corn in all the treatments. This year, 154 bushels per acre was produced with irrigation and 120 lb. N per acre following crimson clover cover crop.

Table 1. Crop yields on the Old Rotation in 2006.

Plot	Description	Clover dry matter lb/acre	Wheat bu/acre	Corn		Cotton		Soybean	
				Irrigated -----bu/acre-----	Non-irrigated	Irrigated -----lint/acre-----	Non-irrigated	Irrigated -----bu/acre-----	Non-irrigated
1	no N/no legume	0				560	410		
2	winter legume	5710				1200	1240		
3	winter legume	6060				1330	1260		
4	cotton-corn	6400				1400	1650		
5	cotton-corn + N	6710				1730	1760		
6	no N/no legume	0				480	360		
7	cotton-corn	6270		62	54				
8	winter legume	5850		.	.	900	1400		
9	cotton-corn + N	7080		154	118				
10	3-year rotation	6880		103	74				
11	3-year rotation	0	66.8					66.1	48.3
12	3-year rotation	0				900	900		
13	Cont. cotton/no legume +N	0				1420	1260		

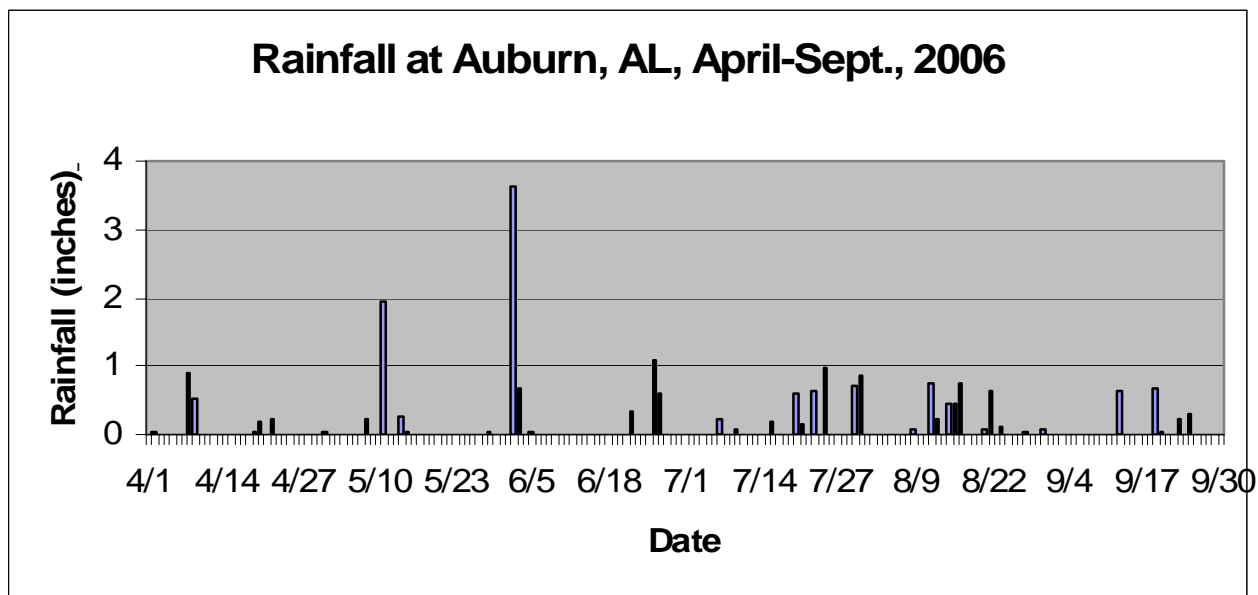


Fig. 1. Rainfall at Auburn, Alabama, during the growing season in 2006.

Treatment (plots)	Corn grain		Cotton lint	
	Irrigated	Non-irrigated	Irrigated	Non-irrigated
	-----bu/acre-----		-----pounds lint/acre-----	
No N/no legume (plots 1 & 6)	--	--	452 c	379 d
Legume N only (plot 8)	--	--	1013 b	1075 bc
120 lb. N/acre (plot 13)	--	--	1210 ab	1177 b
2-yr rotation, legume N only (plots 4&7)	66 c	56 c	1140 b	1210 b
2-yr rotation, +legume, + 120 lb N/acre (plots 5&9)	164 a	134 a	1420 a	1540 a
3-yr rotation, legume N only (plots 10, 11, 12)	103 b	77 b	1100 b	870 c
Soybean yield (4-yr mean) on 3-yr rotation: irrigated=54.6 bu/a; non-irrigated=44.1 bu/a				

The Cullars Rotation (circa 1911) – 2006

Historical Marker Dedicated.

An historical marker was dedicated at the Cullars Rotation experiment on 3 November 2006. Text on the two sides of the marker is as follows:



The Cullars Rotation (Established 1911)

The Cullars Rotation is the oldest, continuous soil fertility study in the South and the second oldest cotton study in the world. It was started in 1911 by the Alabama Agricultural Experiment Station on the farm of J.A. Cullars and John P. Alvis. In 1938, the "Alvis Field" was sold to Alabama Polytechnic Institute which became Auburn University in 1960. The experiment consists of 14 soil fertility variables in three blocks that are rotated with cotton followed by a winter legume, corn followed by wheat, and soybeans planted after wheat.

National Register of Historical Places, April 19, 2003

Members of the Auburn Heritage Association and the Historic Chattahoochee Commission admire the national historical marker dedicated on November 3, 2006.

The Alvis Field and Cotton Rust

In the late 1800s, J.P. Alvis and J.A. Cullars farmed this property which later became known as the "Alvis Field." They allowed Prof. G.F. Atkinson, a biologist at the Agricultural and Mechanical College of Alabama, to use this site to study cotton rust, a disease that causes cotton plants to shed leaves early. Atkinson's research in 1890 led to the discovery that cotton rust was caused by a potassium deficiency. As a result, the Cullars Rotation was started in 1911. Today, potassium fertilizers are used on cotton throughout the South.

Auburn Heritage Association and Historic Chattahoochee Commission

Record Cotton Yield of 4+ bales produced in 2006

An all-time record cotton lint yield of 2050 lb. lint per acre was produced on the treatment that receives complete N-P-K fertilization (plot 3)! This surpasses the previous record cotton yield of 1880 lb. lint per acre on this same plot in 2004. Good wheat (54 bu/acre) and corn yields (110 bu/acre) were made on this treatment in spite of a drought throughout the rest of Alabama (Table 3). As in the Old Rotation, timely rainfall at this site (Fig. 1) and the long-term benefits of conservation tillage are given credit for high yields in a drought year.

While long-term trends seem to indicate higher yields on the well fertilized plots, the plots with low levels of one or more nutrient or factor e.g., plot C (nothing), plot 2 (no P), plot 6 (no K), and plot 8 (no lime), continue a trend toward lower and lower yields. For example, plot C (nothing) would produce very low yields of most crops until recently when we get nothing from this treatment. Yields on the no P, no K, and no lime plots are also decreasing.

Plot	Description	CLOVER	WHEAT	CORN	COTTON	SOYBEAN
		dry matter	Wheat	Non-irrigated	Non-irrigated	Non-irrigated
		lb/acre	bu/acre	bu/acre	lint/acre	bu/acre
A	no N/+legume	5560	20.3	43	1130	51.2
B	no N/no legume	0	24.6	11	1260	53.8
C	nothing	0	0	0	0	0
1	no legume	0	45.3	94	1820	48.5
2	no P	4740	14.9	50	215	11.6
3	complete	5580	53.3	110	2050	47.5
4	4/3 K	5060	46	85	1820	49.9
5	rock P	6230	47.6	96	1800	48.2
6	no K	3130	40.3	54	0	21.3
7	2/3 K	510	46.1	93	1650	50.3
8	no lime	0	0	25	0	0
9	no S	4580	41	102	1600	50.6
10	complete+ micros	6780	47.1	96	1830	54.0
11	1/3 K	2490	45.3	96	720	50.8

ACKNOWLEDGEMENT

These long-term experiments and others around the state are maintained by the Agronomy & Soils Department at Auburn University with the help of the USDA Soil Dynamics Laboratory. Additional support comes from checkoff funds through the Wheat and Feed Grains Committee and the Cotton Commission of the Alabama Farmers Federation.