

2006 Full Report C.I. Project # 03-166AL

Fertilization of Cotton on Black Belt Soils

C. C. Mitchell , Dennis Delaney, Rudy Yates, G. Huluka, Jimmy Holliman

This experiment was laid out in 2004 and was designed to complement the “Rates of NPK Experiment” (circa 1929) on other outlying units of the Alabama Agricultural Experiment Station. The purpose of this experiment is to identify optimum rates of N, P₂O₅, and K₂O for cotton on similar Black Belt soils by having a permanent site for soil fertility research at the Black Belt Research and Extension Center in Marion Junction, Alabama. The site is on an acid, Vaiden clay (very fine, montmorillonitic, thermic, Vertic Hapludalfs) and is the only soil fertility experiment in Alabama on Black Belt soils.

Description

The experiment consists of 6 N rates, 4 P rates, 5 K rates and a no-lime treatment and an unfertilized treatment replicated 4 times in a randomized block design (Table 1). Because of disappointing yields in 2005 when cotton was planted no-till into a rye cover crop and excessive rainfall, the decision was made to switch to a ridge tillage system with no cover crop for 2006. Beds were made in November, 2005, and allowed to over-winter. Cotton was planted on 14 April 2006. Initial fertilizer treatments were applied on 4 May. Due to dry weather, there were skips in the stand of cotton. Some areas had to be replanted on 15 May. Sidedress N was applied on 14 June.

Results

What has been described as the worst summer drought and highest temperatures in over 50 years plagued this region of the state all summer long (Fig. 1). By mid July, a few bolls were beginning to open. Plots were hand-picked on 30 September.

Although overall yields were slightly higher than 2005 yields, the drought-damaged crop failed to produce a decent crop of cotton at this site. Seeds were immature and hollow and the crop ginned 47.3% lint. However, if the crop had been machine harvested, very little of the lint would have been saved because of hard locks and weak bolls. There was not a significant difference in the treatments in 2006 at P<0.1. Cotton lint quality was measured on 4 different treatments by USDA AMS Cotton Program Birmingham Classing Office. There were no differences in mean fiber quality:

Micronaire = 4.6
Length/staple = 97/31
Strength = 26.9
Uniformity = 81.9

Conclusions

Two years with extreme weather conditions and very poor cotton yields at this site preclude any conclusions regarding soil fertility. Since these are the only established soil fertility variable plots on the Black Belt R&E Center, we hope that they will be maintained indefinitely as is the “Rates of NPK” experiment at 6 other Alabama locations. This experiment will be conducted with cotton again in 2007.

Acknowledgement

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Table 1. Fertilizer treatments and cotton lint yields on a Vaiden clay in 2005 and 2006.

Treatment number	Description	Rate of Nutrients applied			2005	2006
		N	P ₂ O ₅	K ₂ O	Lint yield	Lint yield
-----pounds per acre-----						
N rates						
1	No N	0	100	100	177	311
2	Low N	30	100	100	214	380
3	Intermediate N	60	100	100	265	403
5	Control	90	100	100	388	393
4	High N	120	100	100	237	400
6	No S/VH N	150	100	100	320	387
P rates						
7	No P	90	0	100	280	378
8	Very low P	90	20	100	205	394
9	Low soil P	90	40	100	274	375
10	Intermediate P	90	60	100	233	388
5	Control	90	100	100	388	393
K rates						
11	No K	90	100	0	157	353
12	Very low K	90	100	20	170	324
13	Low K	90	100	40	253	295
14	Intermediate K	90	100	60	341	335
15	High K	90	100	80	319	349
5	Control	90	100	100	388	393
Other treatments						
16	No lime	90	100	100	196	413
17	Nothing	0	0	0	160	300
	L.S.D _{P<0.1}				135	ns

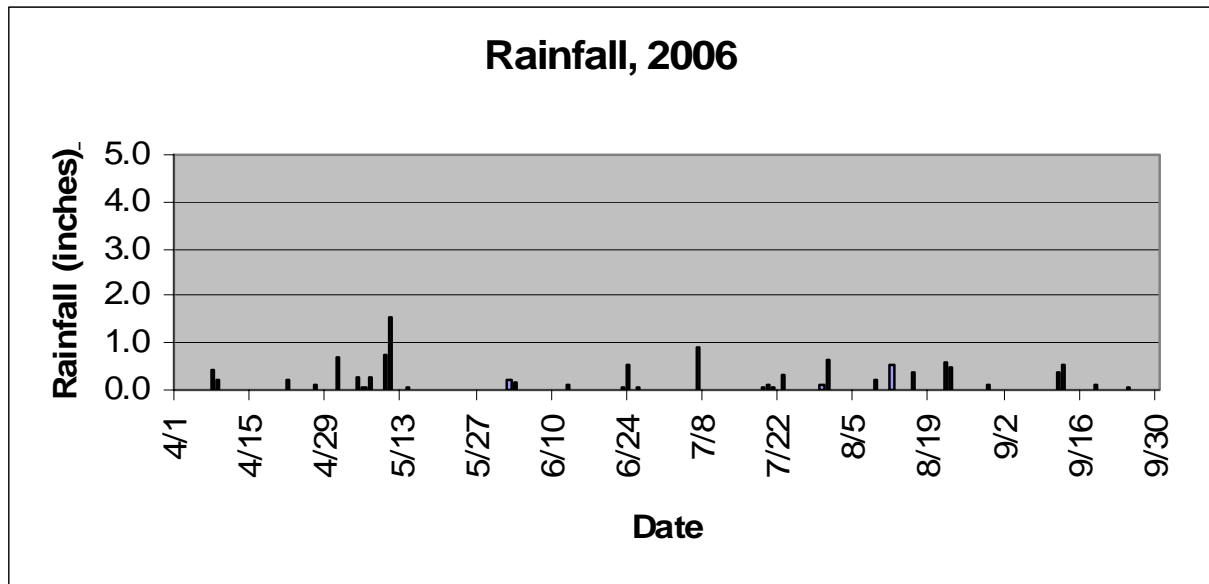
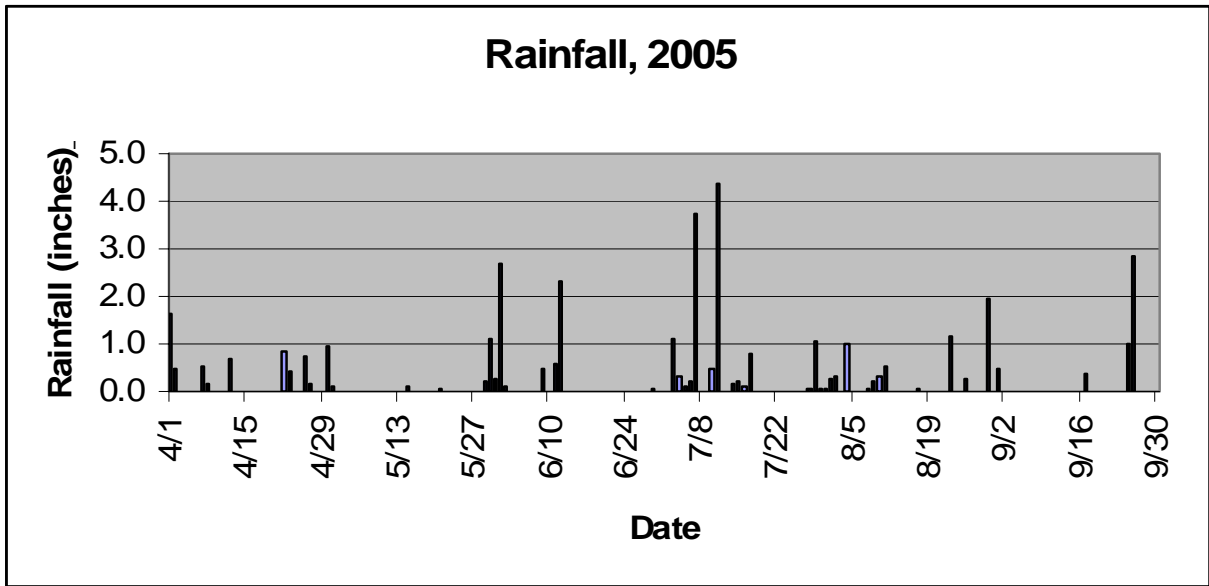


Fig. 1. Precipitation at Black Belt R&E Center in 2005 and 2006.