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AUBURN.

Co-operative Experiments with Cotton in 1899-1900.

By J. F. DUGGAR, Agriculturist.

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CO-OPERATIVE FERTILIZER EXPERIMENTS
WITH COTTON IN 1899 and 1900.

BY J. F. DUGGAR.

These experiments were conducted under the direction of the Agricultural Department of this Station in 1899 and 1900. These tests in 1899 were made by farmers in nineteen localities; the tests made in 1900 were conducted in eighteen localities, not including in this count the few experimenters who failed to report results.

The method of conducting the experiments was the same as in former years. The plots were each one-eighth acre in area.

The following is the list of those who made experiments in 1899 and 1900 and who reported results.

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Troyer, A. M.	Calhoun	Lowndes	36, 52
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THE FERTILIZERS USED.

These consisted of high grade acid phosphate guaranteed to contain at least 14 per cent. of available phosphoric acid.

The following table gives the plan of the experiment and the composition of the fertilizers employed:

Pounds per acre of fertilizers, nitrogen, phosphoric acid, and potash used, and composition of each mixture.

Plot No.	FERTILIZERS.		MIXTURE CONTAINS.			Cost of mixture, per ton.
	Amount per acre.	KIND.	Nitrogen.	† Available phosphoric acid.	Potash	
1	Lbs. 200	Cotton seed meal <i>In 100 lbs. s. c. meal.*</i>	Lbs. 13.58 6.79	Lbs. 5.76 2.88	Lbs. 3.54 1.77	\$ 19.00
2	240	Acid phosphate <i>In 100 lbs. acid phos</i>		36.12 15.05			12.50
4	200	Kainit <i>In 100 lbs. kainit.</i>			24.60 12.30	13.75
5 {	200	Cotton seed meal	13.58	41.88	3.54	
	240	Acid phosphate <i>In 100 lbs. above mixt.</i>					3.09	9.52	.80	15.45
6 {	200	Cotton seed meal	13.58	5.76	28.14	
	200	Kainit <i>In 100 lbs. above mixt</i>					3.39	1.44	7.03	16.38
7 {	240	Acid phosphate				
	200	Kainit <i>In 100 lbs. above mixt</i>						8.21	5.59	13.69
9 {	200	Cotton seed meal	13.58	41.88	28.14	
	240	Acid phosphate				
	200	Kainit <i>In 100 lbs. above mixt</i>					2.12	6.54	4.39	14.94
10 {	200	Cotton seed meal	13.58	41.88	15.84	
	240	Acid phosphate				
	100	Kainit <i>In 100 lbs. above mixt</i>					2.59	7.75	2.93	15.11

* Average of many analyses.

† Counting all the phosphoric acid in cotton seed meal as available.

Those farmers who are more accustomed to the word ammonia than to the term nitrogen, can change the figures for nitrogen into their ammonia equivalents by multiplying by $1\frac{3}{14}$.

The phosphate and cotton seed were purchased at market prices. Most of the kainit was donated by the German Kali Works.

In determining the increase over the unfertilized plots, the yield of the fertilized plots, Nos. 4, 5, 6 and 7, is compared with both unfertilized plots, lying on either side, giving to each unfertilized plot a weight inversely proportional to its distance from the plot under comparison. This method of comparison tends to compensate for variations in the fertility of the several plots.

It should be remembered that seasons, as well as soils, determine the effects of fertilizers, so that to be absolutely reliable a fertilizer experiment should be repeated for several years on the same kind of soil. Abnormal weather conditions in 1899 and 1900 resulted in an unusually large proportion of inconclusive experiments.

THE WEATHER IN 1899 and 1900.

The following data are taken from the records of the Alabama Section of the Weather Bureau for 1899 and 1900 and give average results of a number of stations:

	1899.	1900.
Rainfall for April, inches.....	2.80	9.06
Rainfall for May, inches.....	2.03	2.64
Rainfall for June, inches.....	2.54	11.80
Rainfall for July, inches ..	6.76	4.93
Rainfall for August, inches.....	3.68	2.89
Rainfall for September, inches.....	.66	4.00
Rainfall for October, inches.....	2.18	5.64
Rainfall for November, inches.....	3.04	3.88

It will be seen from the above that the spring and early summer of 1899 were very dry. Complaints of drought in that year were general. In 1900 an excessive precipitation in April and June greatly injured crops, and in addition there was in many localities a severe drought in August.

Two more unfavorable seasons in immediate succession seldom occur.

EXPERIMENTS MADE BY W. F. FULTON, LARIMORE OR
COLLINSVILLE, DEKALB COUNTY.

Dark gray, mulatto, or reddish, stiff soil; subsoil red clay.

An experiment with cotton has been conducted on this farm in Big Wills Valley for three years in succession on land cleared about three-quarters of a century ago. The crop preceding the cotton experiments of both 1899 and 1900 was corn. The early part of the summer of 1899 was rather dry; in 1900 "from the time the cotton was planted until it was laid by my notes show almost continuous rain,—the wettest season in the knowledge of the oldest inhabitant."

The results for 1898 were printed in Bulletin No. 102. Those for 1899 and 1900 are given in the following table:

Larimore or Collinsville experiment with cotton.

Plot No.	FERTILIZERS.		1899		1900	
	Amount per acre.	KIND.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.
1	Lbs. 200	Cotton seed meal.....	Lbs. 648	Lbs. 208	Lbs. 544	Lbs. 0
2	240	Acid phosphate.....	760	320	880	336
3	00	No fertilizer.....	440	.....	544	.....
4	200	Kainit.....	648	205	666	107
5	200	Cotton seed meal....	880	434	1120	550
	240	Acid phosphate.....				
6	200	Cotton seed meal....	736	287	920	337
	200	Kainit.....				
7	240	Acid phosphate.....	856	404	1064	468
	200	Kainit.....				
8	00	No fertilizer.....	456	.....	608	.....
9	200	Cotton seed meal....	976	520	1208	600
	240	Acid phosphate.....				
	200	Kainit.....				
10	200	Cotton seed meal....	912	456	1032	424
	240	Acid phosphate....				
	100	Kainit.....				

Increase of seed cotton per acre when cotton seed meal was added:

	1899	1900
To unfertilized plot	208 lbs.	0 lbs.
To acid phosphate plot	114 lbs.	214 lbs.
To kainit plot	82 lbs.	230 lbs.
To acid phosphate and kainit plot.....	116 lbs.	132 lbs.
Average increase with cotton seed meal.....	130 lbs.	144 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	320 lbs.	336 lbs.
To cotton seed meal plot.....	126 lbs.	550 lbs.
To kainit plot.....	233 lbs.	263 lbs.
To cotton seed meal and kainit plot	233 lbs.	263 lbs.
Average increase with acid phosphate... ..	219 lbs.	378 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	205 lbs.	107 lbs.
To cotton seed meal plot.....	79 lbs.	337 lbs.
To acid phosphate plot.....	84 lbs.	132 lbs.
To cotton seed meal and acid phosphate plot	86 lbs.	50 lbs.
Average increase with kainit.....	116 lbs.	157 lbs

The principal need of this soil, clearly shown in each of three tests, is for phosphate, which has paid a large profit, whether employed alone or in combination with any of the other materials. The increase attributable to phosphate in each of the three years is respectively 464, 219, and 378 pounds of seed cotton per acre. Cotton seed meal usually increased the yield more than enough to cover its cost, the averages for the 3 years being respectively 152, 130, and 144 pounds of seed cotton. Its relatively slight effect suggests the advisability of reducing the amount of cotton seed meal, of which about half as much as of phosphate might be used for cotton.

Kainit was the least beneficial on this soil of the ingredients of the complete fertilizer and the figures indicate that its addition to the mixture of phosphate and kainit was not profitable.

EXPERIMENT MADE BY W. M. PURIFOY, 2 MILES NORTH-
EAST OF SNOW HILL, WILCOX COUNTY.

White bald prairie; subsoil, white rotten limestone.

This experiment was made in 1899 on land especially favorable to the development of black rust of cotton. The land was not broken until May 25, when it was bedded with a one-horse plow. "Many stalks had nothing on them on account of coming up too late. Extreme drought ruined the experiment."

The table on page 11 gives the yields and the subjoined analysis of results of Mr. Purifoy's tests, both in 1898 and 1899, shows the increase attributable to each fertilizer, when used alone or in combinations under cotton growing on poor white prairie soil.

Increase of seed cotton per acre when cotton seed meal was added:

	1898.	v899.
To unfertilized plot	128 lbs.	144 lbs.
To acid phosphate plot	27 lbs.	16 lbs.
To kainit plot	227 lbs.	144 lbs.
To acid phosphate and kainit plot.	141 lbs.	128 lbs.
Average increase with cotton seed meal	131 lbs.	100 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	200 lbs.	208 lbs.
To cotton seed meal plot	99 lbs.	48 lbs.
To kainit plot	209 lbs.	240 lbs.
To cotton seed meal and kainit plot.	123 lbs.	224 lbs.
Average increase with acid phosphate	158 lbs.	180 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	27 lbs.	0 lbs.
To cotton seed meal plot.....	72 lbs.	0 lbs.
To acid phosphate plot	18 lbs.	32 lbs.
To cotton seed meal and acid phosphate plot ..	96 lbs.	176 lbs.

Average increase with kainit..... 41 lbs. 52 lbs.

In the above paragraphs the results of Mr. Purifoy's experiment in 1898 are republished to show the close correspondence between the results of the two years, both tending to indicate that the phosphate was more beneficial than cotton seed meal and that kainit was of least effect.

Snow Hill and Furman experiments with cotton on white bald prairie.

Plot No.	FERTILIZERS.		SNOW HILL 1899.		FURMAN. 1900.	
	Amount per acre	KIND.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.
1	Lbs. 200	Cotton seed meal.....	Lbs. 144	Lbs. 144	Lbs. 480	Lbs. 80
2	240	Acid phosphate.....	208	208	480	80
3	00	No fertilizer.....	00	.....	400	.....
4	200	Kainit.....	00	.....0	376	—27
5	200	Cotton seed meal.....	192	192	664	258
	240	Acid phosphate.....				
6	200	Cotton seed meal.....	144	144	488	79
	200	Kainit.....				
7	240	Acid phosphate.....	240	240	616	204
	200	Kainit.....				
8	00	No fertilizer	00	.....	416	.....
9	200	Cotton seed meal	368	368	624	208
	240	Acid phosphate.....				
	200	Kainit.....				
10	200	Cotton seed meal	416	416	616	200
	240	Acid phosphate				
	100	Kainit.....				

EXPERIMENT MADE IN 1900 BY E. L. CUNNINGHAM, 6 MILES
EAST OF FURMAN, WILCOX COUNTY.

White prairie, the surface dark gray; sub-soil white rotten limestone.

The original growth, cleared about 30 or 40 years ago, is reported as oak and hickory with some short-leaf pine. The field was in cotton in 1897 and 1898 and uncultivated in 1899.

The depth of plowing was 5 or 6 inches. On Plot 5 there was considerable black rust, but very little on Plots 9 and 10, where a complete fertilizer containing kainit was used. The stand was full and uniform. There was too much rain.

The yields are given in the table above.

Increase of seed cotton per acre when cotton seed meal was added:

To unfertilized plot	80 lbs.
To acid phosphate plot	178 lbs.
To kainit plot.....	106 lbs.
To acid phosphate and kainit plot.....	4 lbs.

Average increase with cotton seed meal, - - 92 lbs.

Increase of seed cotton per acre when acid phosphate was used.

To unfertilized plot	80 lbs.
To cotton seed meal plot	178 lbs.
To kainit plot	231 lbs.
To cotton seed meal and kainit plot.....	129 lbs.

Average increase with acid phosphate, - - 130 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot.....	—27 lbs.
To cotton seed meal plot	—1 lbs.
To acid phosphate plot ..	124 lbs.
To seed cotton meal and acid phosphate plot...	—50 lbs.

Average increase with kainit, - - - - - 12 lbs.

Mr. Cunningham's experiment, like both of the tests made by Mr. Purifoy, on the same class of land, white prairie, indicates that phosphate was most needed. The largest yield was made with a mixture of cotton seed meal and phosphate. Kainit did not increase the yield, though it did seem to somewhat restrain the rust on Plots 9 and 10.

It should be noted that white prairie soil was not very responsive to commercial fertilizers and that none of these paid a very large profit.

Although phosphate was undoubtedly useful in each of these experiments, its effects were far less notable than the favorable influence that is exerted by adding suitable vegetable matter to this class of soils. We cannot yet recommend the use of phosphate on these soils, believing that the same money invested in the seed of melilotus or of other renovating plant would be more profitably spent.

EXPERIMENTS MADE BY J. S. DUNCAN ON G. W. FREEMAN'S
FARM, 1½ MILES SOUTHWEST OF MAPLE GROVE,
CHEROKEE COUNTY.

In 1899 the test was made on gray sandy upland, with red subsoil; in 1900 on light alluvial second bottom of a dark gray color, with red subsoil. Both fields had been cleared for more than a quarter of a century. The

cotton experiment of 1899 was preceded by cotton, that of 1900 by corn.

In 1899 the summer was excessively dry, in 1900 excessively wet.

Maple Grove experiment with cotton.

Plot No.	FERTILIZERS.		MAPLE GROVE. 1899.		MAPLE GROVE. 1900.	
	Amount per acre.	KIND.	Yield seed cotton per acre.	Increase over unfertilized plots	Yield seed cotton per acre.	Increase over unfertilized plots
1	Lbs. 200	Cotton seed meal	Lbs. 800	176	Lbs. 1036	Lbs. 220
2	240	Acid phosphate	752	128	932	116
3	00	No fertilizer	624	.....	816	.....
4	200	Kainit	616	—43	920	106
5	200	Cotton seed meal	960	266	992	181
	240	Acid phosphate				
6	200	Cotton seed meal	804	175	1032	223
	200	Kainit				
7	240	Acid phosphate	776	12	1024	218
	200	Kainit				
8	00	No fertilizer	800	.....	804	.....
9	200	Cotton seed meal	1024	224	1080	276
	240	Acid phosphate				
10	200	Kainit	992	192	1032	228
	240	Acid phosphate				
	100	Kainit				

Increase of seed cotton per acre when cotton seed meal was added :

	1899.	1900.
To unfertilized plot	176 lbs.	220 lbs.
To acid phosphate plot	138 lbs.	65 lbs.
To kainit plot	218 lbs.	117 lbs.
To acid phosphate and kainit plot.	212 lbs.	58 lbs.
Average increase with cotton seed meal	186 lbs.	115 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	128 lbs.	116 lbs.
To cotton seed meal plot	90 lbs.	—39 lbs.
To kainit plot	55 lbs.	112 lbs.
To cotton seed meal and kainit plot.	49 lbs.	53 lbs.

Average increase with acid phosphate	81 lbs.	61 lbs.
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Increase of seed cotton per acre when kainit was added:

To unfertilized plot	—43 lbs.	106 lbs.
To cotton seed meal plot	—1 lb.	3 lbs.
To acid phosphate plot	—116 lbs.	102 lbs.
To cotton seed meal and acid phosphate plot	—42 lbs.	95 lbs.

Average increase (or decrease [—]) with kainit	—51	77 lbs.
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In both years cotton seed meal was the most important fertilizer for cotton; phosphate afforded a small increase, possibly because of abnormal weather conditions; kainit was useless on upland in 1899 and scarcely profitable in 1900 on second bottom land.

EXPERIMENT MADE BY J. W. FRENCH, 3 MILES NORTH OF GORDO, PICKENS COUNTY.

This test was conducted in 1899 on gray upland, and in 1900 on dark sandy upland, both having red subsoils, rather retentive of water. The cotton experiment of 1899 was preceded by corn, that of 1900 by cotton. In both cases the tests were on old fields, cleared of pines and reclaimed four to seven years before the experiments began.

The former season was exceedingly dry; the latter, "the most unfavorable ever known, first too wet and then too dry." The stand was reported as excellent.

Gordo experiment with cotton.

Plot No.	FERTILIZERS.		1899.		1900.	
	Amount per acre.	KIND.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.
1	Lbs. 200	Cotton seed meal	Lbs. 536	Lbs. 200	Lbs. 696	Lbs. 312
2	240	Acid phosphate	848	512	568	184
3	00	No fertilizer	336	.....	384	.....
4	200	Kainit	360	38	400	11
5	200	Cotton seed meal	944	637	728	335
	240	Acid phosphate				
6	200	Cotton seed meal	528	235	584	186
	200	Kainit				
7	240	Acid phosphate	736	458	552	149
	200	Kainit				
8	00	No fertilizer	264	.....	408	.....
9	200	Cotton seed meal	1032	868	888	480
	240	Acid phosphate				
	200	Kainit				
10	200	Cotton seed meal	928	664	818	440
	240	Acid phosphate				
	100	Kainit				

Increase of seed cotton per acre when cotton seed meal was added:

	1899..	1900.
To unfertilized plot	200 lbs.	312 lbs.
To acid phosphate plot	125 lbs.	151 lbs.
To kainit plot	197 lbs.	175 lbs.
To acid phosphate and kainit plot	410 lbs.	331 lbs.

Average increase with cotton seed meal, 238 lbs. 242 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	512 lbs.	184 lbs.
To cotton seed meal plot	437 lbs.	23 lbs.
To kainit plot	420 lbs.	138 lbs.
To cotton seed meal and kainit plot	633 lbs.	294 lbs.

Average increase with acid phosphate, 501 lbs. 160 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	38 lbs.	11 lbs.
To cotton seed meal plot	—35 lbs.	—126 lbs.
To acid phosphate plot	—54 lbs.	—35 lbs.
To cotton seed meal and acid phosphate plot	231 lbs.	145 lbs.

Average increase with kainit, - - 63 lbs. —1 lb.

Phosphate was the material of most importance for the gray soil and it was also needed on the darker soil. Cotton seed meal was first in importance in 1900 and second in 1899. Kainit was useless except in a complete fertilizer, in which combination it was slightly profitable, but never so important as phosphate or cotton seed meal.

EXPERIMENT CONDUCTED BY E. J. DAFFIN, 3 MILES S. OF
TUSCALOOSA, TUSCALOOSA COUNTY.

This test was made in 1900 on the F. S. Moody farm. The soil is described as second bottom, sandy, and of a reddish gray color; the subsoil, as red clay. The original growth, removed more than half a century ago, is sweet gum, black gum, persimmon, and sassafras. The preceding crop was cotton.

June and July brought an excessive rainfall, interfering with cultivation and August was very dry. There were 1,065 plants per eighth-acre plot. "Red rust" was reported as injurious alike on all plots.

Both cotton seed meal and acid phosphate, whether used alone, or in any combination, greatly increased the yield and afforded a good profit. Kainit was practically ineffective except in combination with the other two fertilizers, where it seems to have increased the yield to a profitable extent; the complete fertilizer, con-

taining kainit (Plot 9) affording an increase greater by 236 pounds of seed cotton per acre than the increment where only phosphate and meal were used together. (Plot 5.)

Increase of seed cotton per acre when cotton seed meal was added:

To unfertilized plot	216 lbs.
To acid phosphate plot	356 lbs.
To kainit plot	259 lbs.
To acid phosphate and kainit plot	529 lbs.

Average increase with cotton seed meal 340 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	152 lbs.
To cotton seed meal plot	292 lbs.
To kainit plot	189 lbs.
To cotton seed meal and kainit plot	459 lbs.

Average increase with acid phosphate 273 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	26 lbs.
To cotton seed meal plot	69 lbs.
To acid phosphate plot	63 lbs.
To cotton seed meal and acid-phosphate	236 lbs.

Average increase with kainit 99 lbs.

Mr. Daffin also conducted similar tests in 1897 and 1898 on red sandy upland, with red clay subsoil, two and one-half miles east of Tuscaloosa. In both years phosphate was by far the chief need of that soil, but both cotton seed meal and kainit afforded considerable increase, so that the greatest profit was obtained by the use of a complete fertilizer containing all three of these materials.

EXPERIMENT MADE IN 1899 BY E. MELTON, ONE MILE
WEST OF HUGENT, FAYETTE COUNTY.

Dark or "mulatto" soil, with red clay subsoil.

The original growth, removed about 50 years ago, is reported as short-leaf pine, oak, and hickory. The three preceding crops were corn. The plants were free from rust.

As shown in the detailed statement below, phosphate was the fertilizer chiefly needed by this soil, and its use, alone and in every combination, was highly profitable, the average increase attributable to phosphate being 364 pounds of seed cotton per acre. Cotton seed meal was next in importance, affording an average increase of 168 pounds per acre.

The most profitable fertilizer was a mixture of acid phosphate and cotton seed meal. Kainit was not needed.

Increase of seed cotton per acre when cotton seed meal was used:

To unfertilized plot	128 lbs.
To acid phosphate plot	160 lbs.
To kainit plot	176 lbs.
To acid phosphate and kainit plot	208 lbs.

Average increase with cotton seed meal 168 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	400 lbs.
To cotton seed meal plot	432 lbs.
To kainit plot	296 lbs.
To cotton seed meal and kainit plot	328 lbs.

Average increase with acid phosphate 364 lbs.

Increase of seed cotton per acre when kainit was added:	
To unfertilized plot	72 lbs.
To cotton seed meal plot	120 lbs.
To acid phosphate plot	—32 lbs.
To cotton seed meal and acid phosphate plot	16 lbs.
Average increase with kainit	44 lbs.

EXPERIMENTS CONDUCTED BY W. T. CHISM, 1 MILE SOUTH-
EAST OF VICK, BIBB COUNTY.

Both experiments were conducted on dark gray sandy or loamy branch bottom soil, rather retentive of moisture. The earlier experiment was preceded by corn, the later one by cotton.

The field had been cleared about 75 years and the original growth is reported as sweet gum, red and white oak, hickory, ash, poplar, cucumber tree, and a few short-leaf pines, and chestnuts.

The latter part of the season of 1899 was dry and unfavorable and in 1900 there was almost continuous wet weather during the season of cultivation. The soil was worked June 25, 1900, when too wet, by which the experimenter reports that the crop was greatly damaged.

Increase of seed cotton per acre when cotton seed meal was used.

	1899.	1900.
To unfertilized plot	256 lbs.	62 lbs.
To acid phosphate plot	96 lbs.	77 lbs.
To kainit plot	244 lbs.	100 lbs.
To acid phosphate and kainit plot	92 lbs.	15 lbs.
Average increase with cotton seed meal,	172 lbs.	64 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	104 lbs.	24 lbs.
To cotton seed meal plot.	—56 lbs.	39 lbs.
To kainit plot	116 lbs.	78 lbs.
To cotton seed meal and kainit plot ..	—24 lbs.	—7 lbs.
Average increase with acid phosphate,	35 lbs.	34 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	—24 lbs.	—1 lb.
To cotton seed meal plot	—32 lbs.	37 lbs.
To acid phosphate plot	—12 lbs.	53 lbs.
To cotton seed meal and acid phosphate plot	—16 lbs.	—9 lbs.
Average increase with kainit.	—20 lbs.	20 lbs.

In 1900 cotton seed meal was the only fertilizer that was very effective. In 1899 none of them were decidedly beneficial. On account of the extremely unfavorable weather in both years, it is probable that neither experiment indicates the real needs of this soil, so that we must place these tests in the class of inconclusive experiments.

EXPERIMENT MADE IN 1899 BY J. P. SLATON, 7 MILES
SOUTH OF NOTASULGA AND 7 MILES N. E. OF
TUSKEGEE, MACON COUNTY.

Gray sandy upland, with retentive red clay subsoil.

The field was originally cleared about 75 years ago, and cleared of the second growth about 12 years ago. The original growth was long leaf pine and oak. The preceding crop was cotton.

The cotton did not come up until the first of June and

this late start may have kept the fertilizers from exerting their full effect. The stand was good.

As shown in the table on page 23 and in the detailed statements below, phosphate and cotton seed meal were both effective in nearly every combination. Kainit was not needed.

Mr. Slaton conducted an experiment in 1898 (see Bulletin No. 102) on similar soil. In that year acid phosphate and cotton seed meal were even more profitable than in 1900 and kainit was useless. It seems that this gray soil, with a clay subsoil near at hand, needs only a mixture of acid phosphate and cotton seed meal to produce a profitable cotton crop.

Increase of seed cotton per acre when cotton seed meal was added:

To unfertilized plot	192 lbs.
To acid phosphate plot	43 lbs.
To kainit plot	110 lbs.
To acid phosphate and kainit plot	123 lbs.

Average increase with cotton seed meal..... 117 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	176 lbs.
To cotton seed meal plot	27 lbs.
To kainit plot	145 lbs.
To cotton seed meal and kainit plot	158 lbs.

Average increase with acid phosphate. 127 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	20 lbs.
To cotton seed meal plot	—62 lbs.
To acid phosphate plot	—11 lbs.
To cotton seed meal and acid phosphate plot	69 lbs.

Average increase with kainit..... 4 lbs.

Tuscaloosa, Hugent, Vick and Notasulga experiments with cotton.

Plot No.	FERTILIZERS.		TUSCALOOSA. 1900.		HUGENT. 1899.		VICK. 1899.		VICK 1900.		NOTASULGA. 1899.	
	Amount per acre.	KIND.	Yield seed cotton	Increase over	Yield seed cotton	Increase over	Yield seed cotton	Increase over	Yield seed cotton	Increase over	Yield seed cotton	Increase over
			per acre.	unfertilized plots	per acre.	unfertilized plots.	per acre.	unfertilized plots.	per acre.	unfertilized plots.	per acre.	unfertilized plots.
1	Lbs. 200	Cotton seed meal	680	Lbs. 216	Lbs. 464	Lbs. 128	Lbs. 992	Lbs. 256	Lbs. 526	Lbs. 62	Lbs. 592	Lbs. 192
2	240	Acid phosphate	616	152	736	400	840	104	488	24	576	176
3	00	No fertilizer	464	.....	336	.....	736	.....	464	.....	400	.....
4	200	Kainit.	496	26	400	72	668	-24	452	-1	544	20
5	200	Cotton seed meal	984	508	880	560	848	200	544	101	724	219
	240	Acid phosphate										
6	200	Cotton seed meal	768	285	560	248	824	220	532	99	616	180
	200	Kainit.										
7	240	Acid phosphate	704	215	672	368	652	92	500	77	632	165
	200	Kainit.										
8	00	No fertilizer	496	.....	296	.....	516	.....	412	.....	448	.....
9	200	Cotton seed meal	1240	744	872	576	700	184	504	92	736	288
	240	Acid phosphate										
10	200	Kainit.	1040	544	752	456	840	324	496	84	744	296
	200	Cotton seed meal										
	240	Acid phosphate										
	100	Kainit.										

AUBURN EXPERIMENTS IN 1898, 1899, & 1900, ON EXPERIMENT STATION FARM.

These tests were made on three adjacent areas set apart for permanent fertilizer experiments with cotton, corn, and oats. The soil is of the same character on all three areas, as was also the previous fertilization of each plot.

All three of the cotton crops were preceded by oats fertilized like the corresponding cotton plot.

In 1900 each plot received the same fertilizer as in 1898 and 1899. Hence the results should show not only the immediate effects of fertilizers, but the residual on cumulative effects, if there are any on this light soil.

Contrary to our usual custom, cowpeas were not sown after the oats, but instead a thin growth of crabgrass, rag weed, and poverty weed covered the ground during the summer and fall following the harvesting of each oat crop.

Commercial fertilizers, chiefly acid phosphate, had been liberally, though not lavishly, employed annually for a number of years before the experiment began.

The soil is a deep sand bed nearly free from stone or gravel, and the plots occupy the crest of a hill.

The dates of planting were April 15, 1898; April 11, 1899; and April 24, 1900. The stand was nearly perfect except in 1900, when there was some slight want of uniformity, so that the figures for 1900 represent the yields after being corrected on the basis of an equal number of plants on each plot.

The Peerless variety was used each year. In 1898 black rust was quite injurious. September 23 it was estimated that the plants on the plots on which kainit had been used had shed 50 to 70 per cent. of their leaves while

the plants receiving no kainit had shed 75 to 92 per cent of their leaves.

The prevalence of black rust probably accounts, at least in part, for the very favorable showing made by kainit in 1898, for numerous experiments recorded in the bulletins of this Station show that kainit generally decreases the injury from black rust.

Fertilizer experiments with cotton at Auburn, 1898, 1899 and 1900 on Experiment Station farm.

Plot No.	FERTILIZERS.		1898.		1899.		1900.		Average increase 3 years.
	Amount per acre.	KIND.	Yield.	Increase.	Yield.	Increase.	Yield.	Increase.	
1	Lbs. 200	Cotton seed meal.....	889	214	1008	234	379	35	161
2	240	Acid phosphate.....	853	178	819	145	266	-78	82
3	00	No fertilizer.....	675	...	774	...	344	...	...
4	200	Kainit.....	783	122	1049	262	360	46	143
5	200	Cotton seed meal....	1013	346	1029	231	393	109	229
	240	Acid phosphate.....							
6	200	Cotton seed meal....	1192	529	1075	265	434	180	325
	200	Kainit.....							
7	240	Acid phosphate.....	1145	488	1051	229	246	22	246
	200	Kainit.....							
8	00	No fertilizer.....	655	...	833	...	194	...	...
9	200	Cotton seed meal....	1177	522	1152	319	435	241	361
	240	Acid phosphate.....							
10	200	Kainit.....	.....	.....	1055	422	.....	.....	.....
	200	Cotton seed meal....							
	240	Acid phosphate.....							
	100	Kainit.....							

Increase in yield from cotton seed, acid phosphate, and kainit on Experiment Station Farm in 1898, 1899 and 1900.

	Increase; lbs. seed cotton per acre.			
	1898.	1899	1900.	Average, 3 years.
<i>Increase of seed cotton per acre where cotton seed meal was added</i>				
	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>
To unfertilized plot.....	214	234	35	161
To acid phosphate plot.....	168	86	187	147
To kainit plot.....	407	3	134	181
To acid phosphate and kainit plot.....	36	90	219	115
Average increase with cotton seed meal	206	103	144	151
<i>Increase of seed cotton per acre where phosphate was added</i>				
To unfertilized plot.....	178	145	-78	82
To cotton seed meal plot.....	132	-3	194	80
To kainit plot.....	364	-33	-24	102
To cotton seed meal and kainit plot.....	-7	54	61	36
Average increase with acid phosphate	167	41	38	82
<i>Increase of seed cotton per acre where kainit was added</i>				
To unfertilized plot.....	122	262	46	143
To cotton seed meal plot.....	315	31	145	164
To acid phosphate plot.....	308	84	100	164
To cotton seed meal and acid phos. plot..	176	58	132	132
Average increase with kainit	235	116	106	152

In 1898 the greatest increase in yield was obtained by the use of a mixture of cotton seed meal and kainit. This mixture was a close second to the complete fertilizer in 1899 and 1900 and its average increase for the three years lacked only 36 pounds of seed cotton per acre of equalling the increase due to a complete fertilizer.

Quite unexpectedly, acid phosphate has not been very effective. If this is due to the accumulation of a sufficient supply of phosphoric acid in the soil from the phosphate applied annually for many years before the

beginning of the experiment, the value of applications of phosphate should become more marked in future as this supply is exhausted.

It would be safe to estimate the amount of phosphate applied annually during the decade before the test began at 200 pounds per acre or less. Results on most soils seem to indicate that phosphate is the most important single fertilizing material for cotton.

EXPERIMENTS CONDUCTED BY J. D. FOSTER, 1 MILE SOUTH
OF AUBURN, LEE COUNTY.

*Light sandy loam, gray upland; subsoil yellowish clay
or loam, not compact.*

The experiments of 1899 and 1900 were conducted in different parts of the same field, on identical soil.

The field, on which the original growth was reported as long-leaf pine, had been in cultivation for a great many years.

The crop preceding the experiment of 1899 was corn, with drilled cowpeas between the rows. The peas made only a moderate growth and were grazed in the fall of 1898.

The stand of cotton was uniform. In 1900 cotton was planted May 25. The cotton experiment in 1900 occupied the plots that had been used in 1899 for a similar fertilizer experiment with corn, (having no cowpeas between the rows.) Hence the results of the cotton experiment of 1900 should show not only the immediate effects of each fertilizer, but also the residual or second-year effects, if there were any lasting benefit from commercial fertilizers used on this light soil.

Auburn experiment with cotton on J. D. Foster farm.

Plot No.	FERTILIZERS.		1899.		1900.	
	Amount per acre.	KIND.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.
1	Lbs. 200	Cotton seed meal	Lbs. 616	Lbs. 280	Lbs. 600	Lbs. 240
2	240	Acid phosphate	528	192	488	128
3	00	No fertilizer	336	.....	360	.....
4	200	Kainit	520	183	432	79
5	200	Cotton seed meal	744	405	744	397
	240	Acid phosphate				
6	200	Cotton seed meal	648	307	688	347
	200	Kainit				
7	240	Acid phosphate	568	225	528	194
	200	Kainit				
8	00	No fertilizer	344	.....	328	.....
9	200	Cotton seed meal	664	320	726	398
	240	Acid phosphate				
	200	Kainit				
10	200	Cotton seed meal	656	312	688	360
	240	Acid phosphate				
	100	Kainit				

Increase of seed cotton per acre when cotton seed meal was added :

	1899.	1900.
To unfertilized plot	280 lbs.	240 lbs.
To acid phosphate plot	213 lbs.	269 lbs.
To kainit plot	124 lbs.	268 lbs.
To acid phosphate and kainit plot	95 lbs.	204 lbs.

Average increase with cotton seed meal, 178 lbs. 245 lbs.

Increase of seed cotton per acre when acid phosphate was added :

To unfertilized plot	192 lbs.	128 lbs.
To cotton seed meal plot	125 lbs.	157 lbs.
To kainit plot	42 lbs.	115 lbs.
To cotton seed meal and kainit plot	13 lbs.	51 lbs.

Average increase with acid phosphate, 93 lbs. 113 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	183 lbs.	79 lbs.
To cotton seed meal plot	27 lbs.	107 lbs.
To acid phosphate plot	33 lbs.	66 lbs.
To cotton seed meal and acid phosphate plot	—85 lbs.	1 lb.
Average increase with kainit	39 lbs.	63 lbs.

The figures for the two years agree closely and show that a larger increase was afforded by cotton seed meal than by any other single material. The most profitable of all the fertilizers was a mixture of cotton seed meal and phosphate. Kainit was unprofitable.

EXPERIMENT CONDUCTED BY JUDGE T. J. THOMASON, 2 MILES SOUTH OF RANBURNE (NEAR KAYLOR), RANDOLPH COUNTY.

This experiment was made in 1899 on gray land, with yellow subsoil. The soil is described as table land rather retentive of moisture. The preceding crop was cotton.

This is the third experiment on a uniform plan conducted by Judge Thomason. (See Bulletin No. 107; p. 274). If we take the average increase of each fertilizer under all conditions we have for the entire period of three years an average increase of 187 pounds of seed cotton per acre attributable to cotton seed meal, 197 to phosphate, and only 31 to kainit. The inference is plain that a mixture of cotton seed meal and phosphate was all that cotton needed on this soil, and that the addition of kainit, at the rate of 200 pounds per acre, was usually unprofitable. The results for 1899, when kainit afforded a slight profit, were more favorable to potash than were the results of the two previous tests on this soil.

The following statements show the average increase in yield for the entire period of three years.

Increase of seed cotton per acre when cotton seed meal was added:

To unfertilized plot	217 lbs.
To acid phosphate plot	137 lbs.
To kainit plot	156 lbs.
To acid phosphate and kainit plot.....	238 lbs.

Average increase with cotton seed meal..... 187 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	264 lbs.
To cotton seed meal plot	184 lbs.
To kainit plot	128 lbs.
To cotton seed meal and kainit plot	210 lbs.

Average increase with acid phosphate..... 197 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	90 lbs.
To cotton seed meal plot	29 lbs.
To acid phosphate plot	—80 lbs.
To acid phosphate and cotton seed meal.....	54 lbs.

Average increase with kainit..... 31 lbs.

EXPERIMENT CONDUCTED BY T. T. MEADOWS $\frac{1}{2}$ MILE NORTH OF CUSSETA, CHAMBERS COUNTY.

Soil, red, stoney; subsoil red clay.

This test, made in 1899, is the third experiment conducted on similar soil by Mr. Meadows. (See Bulletin No. 107, p. 274.)

Giving attention to the average results for the three years we find that the principal need of this soil was for

acid phosphate, which gave an average increase of 202 pounds of seed cotton per acre. Cotton seed meal was added to the phosphate with profit, but kainit was not needed.

The red clay soils of the Metamorphic Region in this part of the State seem to contain sufficient potash for the ordinary needs of the cotton crop, though when black rust is prevalent kainit is beneficial even here.

Statements of the average increase in yield for the *three years* follows:

Increase of seed cotton per acre when cotton seed meal was added:

To unfertilized plot	109 lbs.
To acid phosphate plot	156 lbs.
To kainit plot	164 lbs.
To acid phosphate and kainit plot	128 lbs.

Average increase with cotton seed meal 139 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	192 lbs.
To cotton seed meal plot	239 lbs.
To kainit plot	217 lbs.
To cotton seed meal and kainit plot.	189 lbs.

Average increase with acid phosphate 202 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	—8 lbs.
To cotton seed meal plot	43 lbs.
To acid phosphate plot	15 lbs.
To cotton seed meal and acid phosphate plot.	—9 lbs.

Average increase with kainit 10 lbs.

EXPERIMENT CONDUCTED IN 1900 BY W. N. INGRAM, 8
MILES EAST OF OPELIKA, LEE COUNTY.

The description of the land seems to indicate that the soil was a yellowish loam, with subsoil of somewhat the same character, and not compact. The original growth is reported as oak and hickory, which had been removed about forty years before. The rainfall was excessive in June. The preceding crop was corn.

The results are not entirely conclusive, but on the whole they show that cotton seed meal was profitable and that the returns from the other fertilizers this wet year were not satisfactory.

Increase of seed cotton per acre when cotton seed meal was added:

added:

To unfertilized plot	248 lbs.
To acid phosphate plot	—30 lbs.
To kainit plot	242 lbs.
To acid phosphate and kainit plot	180 lbs.

Average increase with cotton seed meal 160 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	96 lbs.
To cotton seed meal plot	—182 lbs.
To kainit plot	87 lbs.
To cotton seed meal and kainit plot.	25 lbs.

Average increase with acid phosphate 7 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	29 lbs.
To cotton seed meal plot	23 lbs.
To acid phosphate plot	20 lbs.
To cotton seed meal and acid phosphate plot.	230 lbs.

Average increase with kainit 75 lbs.

Kaylor, Cusseta and Opelika experiments with cotton.

Plot No.	FERTILIZERS.		KAYLOR. 1899.		CUSSETA. 1899.		OPELIKA. 1900.	
	Amount per acre.	KIND.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.
1	Lbs. 200	Cotton seed meal...	888	112	296	104	1000	248
2	240	Acid phosphate.....	848	72	456	284	848	96
3	00	No fertilizer.....	776	.....	192	.....	752	.....
4	200	Kainit.....	804	49	152	—45	800	29
5	200	Cotton seed meal.}	1084	350	504	302	856	66
	240	Acid phosphate...}						
6	200	Cotton seed meal.}	944	232	304	97	1080	271
	200	Kainit.....}						
7	240	Acid phosphate...}	872	182	472	260	944	116
	200	Kainit.....}						
8	00	No fertilizer.....	663	.....	216	.....	848	.....
9	200	Cotton seed meal.}	1124	456	640	424	1144	296
	240	Acid phosphate...}						
10	200	Kainit.....}	1140	472	560	344	1112	264
	240	Acid phosphate...}						
	100	Kainit.....}						

EXPERIMENT CONDUCTED BY J. C. WATKINS $1\frac{1}{2}$ MILES
NORTH OF BURNT CORN, MONROE COUNTY.

The experiments of 1899 and 1900 were made on poor yellowish or chocolate-colored upland sandy soil, with red subsoil. This soil bakes badly.

The rainfall in 1900 was excessive. There was no black rust in either year.

The table on page 34 gives the yields for 1899 and 1900. This is the fourth experiment made by Mr. Watkins according to the present plan. (See Bulletin No. 197, p. 274). Most of the tests have shown that phosphate was more important than cotton seed meal and that kainit only increased the yield; however in 1900 kainit was the most effective fertilizer.

The average results for 4 years show that phosphate gave an average increase of 207, cotton seed meal of 151, and kainit of 70 pounds of seed cotton per acre.

Burnt Corn experiments with cotton.

Plot No.	FERTILIZERS.		1899.		1900.	
	Amount per acre.	KIND.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.
1	Lbs. 200	Cotton seed meal.....	Lbs. 480	Lbs. 216	Lbs. 348	Lbs. —60
2	240	Acid phosphate.....	556	292	456	48
3	00	No fertilizer.....	264	.....	408	.....
4	200	Kainit.....	280	27	528	128
5	200	Cotton seed meal.....	768	526	492	100
	240	Acid phosphate.....				
6	200	Cotton seed meal.....	524	293	588	204
	200	Kainit.....				
7	240	Acid phosphate.....	684	465	476	100
	200	Kainit.....				
8	00	No fertilizer.....	208	.....	368	.....
9	200	Cotton seed meal.....	828	620	648	280
	240	Acid phosphate.....				
	200	Kainit.....				
10	200	Cotton seed meal.....	944	736	532	164
	240	Acid phosphate.....				
	100	Kainit.....				

The following figures refer only to the results obtained in 1900, similar statement for other years having been previously published:

Increase of seed cotton per acre when cotton seed meal was added:

To unfertilized plot—60 lbs.
 To acid phosphate plot 52 lbs.
 To kainit plot 76 lbs.
 To acid phosphate and kainit plot180 lbs.

Average increase with cotton seed meal..... 62 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	48 lbs.
To cotton seed meal plot	160 lbs.
To kainit plot	—28 lbs.
To cotton seed meal and kainit plot	76 lbs.

Average increase with acid phosphate 64 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	128 lbs.
To cotton seed meal plot	264 lbs.
To acid phosphate plot	52 lbs.
To cotton seed meal and acid phosphate plot....	180 lbs.

Average increase with kainit..... 155 lbs.

EXPERIMENT MADE BY C. E. RIVERS, 6½ MILES S. OF
HURTSBORO, RUSSELL COUNTY.

Dark sandy soil, with yellow subsoil.

This test was made in 1900 on flat land that might be designated as second bottom.

The land had been cleared about 40 years ago of its original growth of long leaf pine, but for many years before the experiment began it had been uncultivated and had grown up in broomsedge. The date of planting was late and it was noted that many bolls, especially on Plots 9 and 10, did not mature.

Phosphate under all conditions was highly profitable. The average increase with cotton meal was not quite sufficient to yield a profit; this poor showing of cotton seed meal is probably due to the fact that considerable vegetable matter and nitrogen must have accumulated on the land while it was uncultivated. On fields in

constant cultivation some cotton seed meal would doubtless have been profitable. Kainit was slightly helpful and as a part of a complete fertilizer, containing all three materials, kainit paid a fair profit.

Increase of seed cotton per acre when cotton seed meal was added :

To unfertilized plot	154 lbs.
To acid phosphate plot	30 lbs.
To kainit plot	14 lbs.
To acid phosphate and kainit plot	27 lbs.

Average increase with cotton seed meal..... 56 lbs.

Increase of seed cotton per acre when acid phosphate was added :

To unfertilized plot	240 lbs.
To cotton seed meal plot	116 lbs.
To kainit plot	274 lbs.
To cotton seed meal and kainit plot	287 lbs.

Average increase with acid phosphate..... 229 lbs.

Increase of seed cotton per acre when kainit was added :

To unfertilized plot	83 lbs.
To cotton seed meal plot	—57 lbs.
To acid phosphate plot	117 lbs.
To cotton seed meal and acid phosphate plot....	114 lbs.

Average increase with kainit..... 64 lbs.

EXPERIMENT MADE IN 1899 BY A. M. TROYER, $\frac{3}{4}$ OF A MILE N. OF CALHOUN, LOWNDES COUNTY.

The soil is described as a loam fairly retentive of water and as being of a very light reddish color, with bright red subsoil. The second growth of trees, removed about 5 years ago, was short leaf and old field pine. In 1896

and 1897 this field was not cultivated, and in 1898 the crop was oats.

Under all conditions acid phosphate was highly profitable, the average increase attributable to phosphate being 434 pounds per acre. Cotton seed meal was generally profitable, but not to the same extent as phosphate. Kainit was not needed. By far the larger profit was obtained on the plot containing both acid phosphate and cotton seed meal.

Mr. Troyer also conducted an experiment in 1900 on similar soil, the results of which were entirely inconclusive. They may be found in the table on page 52.

In 1900 he also tested the most promising combinations of fertilizers on an adjoining farm, on very sandy soil.

The fertilizer for this last test was not furnished by the Experiment Station and a detailed report of the amounts of fertilizer used is not at hand.

The following is Mr. Troyer's statement of the increase in yield in 1900 on his sandy soil, where the unfertilized land yielded 384 pounds of seed cotton per acre:

	Increase per acre in	
	lbs. seed cotton.	Net profit.
Cotton seed meal	144	\$2.40
Acid phosphate	48	.16
Kainit	112	2.88
Cotton seed meal and phosphate. . .	176	1.76
Cotton seed meal, phosphate and kainit	320	5.28

Apparently on this sandier soil a complete fertilizer was needed, kainit, as well as other materials, yielding a profit.

The increased yields obtained in the experiment at Calhoun in 1899 are given below:

Increase of seed cotton per acre when cotton seed meal was added:

To unfertilized plot	312 lbs.
To acid phosphate plot	267 lbs.
To kainit plot	187 lbs.
To acid phosphate and kainit plot	—138 lbs.

Average increase with cotton seed meal 157 lbs.

Increase of seed cotton per acre when acid phosphate was added.

To unfertilized plot	482 lbs.
To cotton seed meal plot	437 lbs.
To kainit plot	571 lbs.
To cotton seed meal and kainit plot	246 lbs.

Average increase with acid phosphate 434 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	107 lbs.
To cotton seed meal plot	—18 lbs.
To acid phosphate plot	196 lbs.
To cotton seed meal and acid phosphate plot	—209 lbs.

Average increase with kainit 19 lbs.

EXPERIMENT MADE BY W. C. BEVILL IN 1899 NEAR NAHEOLA, CHOCTAW COUNTY.

This experiment was made on upland soil of a "dark mulatto" color, with red clay subsoil. The three preceding crops were cotton. The field had been cleared about 50 years and the original growth is reported as long leaf pine, short leaf pine, oak, and gum.

There was no rust or other injury except from severe

drought, which reduced the yield to about half a crop, and which probably makes the experiment nearly valueless as an indication of the needs of the cotton plant on this soil in normal seasons.

Under the conditions of this test no fertilizer was very effective, though the increase with cotton seed meal was sufficient to pay a small profit.

Mr. Bevill conducted an experiment in 1898 on what appeared to be similar soil. In that year cotton seed meal gave a large increase in yield, phosphate a smaller though profitable increment, and kainit an increase barely sufficient to afford a small profit. In 1898 as well as in 1899 unfavorable weather vitiated the experiment, and it is doubtful whether the results for either year show the full effect that any of the three fertilizers would exert in normal seasons.

Increase of seed cotton per acre when cotton seed meal was added:

To unfertilized plot	56 lbs.
To acid phosphate plot	178 lbs.
To kainit plot	114 lbs.
To acid phosphate and kainit plot	172 lbs.

Average increase with cotton seed meal..... 130 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	32 lbs.
To cotton seed meal plot	154 lbs.
To kainit plot	—25 lbs.
To cotton seed meal and kainit plot	33 lbs.

Average increase with acid phosphate 49 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	13 lbs.
To cotton seed meal plot	71 lbs.
To acid phosphate plot	—44 lbs.
To cotton seed meal and acid phosphate plot	—50 lbs.
Average increase with kainit	—3 lbs.

EXPERIMENT MADE ON THE FARM OF THE SOUTH EAST
ALABAMA AGRICULTURAL SCHOOL, JACK-
SON, CLARKE COUNTY.

Stiff, dark red, or "mulatto" soil; subsoil, red clay.

The experiment of 1899 was conducted by J. L. Ballard, that of 1900 by Prof. J. W. Culver. The field consisted of upland, cleared at least 10 years before the experiment began of its growth of long leaf and short leaf pine and oak. The land used for the experiment of 1900 had been pastured for two years. No report was made of crops preceding the experiment of 1900.

The results of the two experiments may be found in the table on page 42 and in the analysis of that table given below.

In 1899 phosphate was by far the most effective fertilizer, though both cotton seed meal and kainit, as well as phosphate, were profitable when employed in a complete fertilizer.

In 1900, on ground not fertilized for several years previous to the experiment, all three fertilizing materials were exceedingly effective, all being of practically equal importance. This soil is unusually responsive to commercial fertilizers. A complete fertilizer afforded much the largest profit, both in 1899 and 1900.

Increase of seed cotton per acre when seed meal was added :

	1899.	1900.
To unfertilized plot	136 lbs.	112 lbs.
To acid phosphate plot	—90 lbs.	179 lbs.
To kainit plot	—146 lbs.	356 lbs.
To acid phosphate and kainit plot ..	500 lbs.	855 lbs.

Average increase with cotton seed meal, 103 lbs. 376 lbs.

Increase of seed cotton per acre when acid phosphate was added :

To unfertilized plot	336 lbs.	176 lbs.
To cotton seed meal plot	110 lbs.	243 lbs.
To kainit plot	—7 lbs.	234 lbs.
To cotton seed meal and kainit plot...	639 lbs.	733 lbs.

Average increase with acid phosphate, 269 lbs. 347 lbs.

Increase of seed cotton per acre when kainit was used :

To unfertilized plot	115 lbs.	79 lbs.
To cotton seed meal plot	—167 lbs.	323 lbs.
To acid phosphate plot	—228 lbs.	137 lbs.
To cotton seed meal and acid phosphate plot ..	362 lbs.	813 lbs.

Average increase with kainit..... 21 lbs. 334 lbs.

Several experiments had been made previously on this farm. That of 1898 showed acid phosphate to be the most valuable single fertilizer, but that both kainit and cotton seed meal afforded such an increase as to make the complete fertilizer—which contained all three—the most profitable of all applications.

In 1897, when drought prevailed, only cotton seed meal was very effective.

Clearly a complete fertilizer is profitable on this soil, which lends itself readily to intensive farming.

Hurtsboro, Calhoun, Naheola and Jackson experiments with cotton.

Plot No.	FERTILIZERS.		HURTSBORO. 1900.		CALHOUN. 1899.		NAHEOLA. 1899.		JACKSON. 1899.		JACKSON. 1900.	
	Amount per acre.	KIND.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.
1	Lbs.		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1	200	Cotton seed meal	512	154	548*	312*	536	56	960	136	552	112
2	240	Acid phosphate	618	240	718*	482*	512	32	1160	336	616	176
3	00	No fertilizer	368	.....	236*	.....	460	.....	824	.....	440	.....
4	200	Kainit	440	83	366	107	520	13	968	115	520	79
5	200	Cotton seed meal	616	270	1080	749	744	310	1128	246	808	355
	240	Acid phosphate										
6	200	Cotton seed meal	432	97	598	294	688	127	880	-31	880	435
	200	Kainit										
7	240	Acid phosphate	680	357	104	678	576	-12	1048	108	760	313
	200	Kainit										
8	00	No fertilizer	312	.....	350	.....	616	.....	968	.....	448	.....
9	200	Cotton seed meal	696	384	890	540	776	160	1576	608	1616	1168
	240	Acid phosphate										
	200	Kainit										
10	200	Cotton seed meal	720	408	780*	430*	800	184	1440	472	1520	1072
	240	Acid phosphate										
	100	Kainit										

* Defective stand.

EXPERIMENTS MADE BY G. S. McCLURE, 2 MILES EAST OF
GARLAND, BUTLER COUNTY.

*Gray sandy land, with stiffer yellowish subsoil at depth
of 6 inches.*

The experiment in 1899 was made in a field cleared about 1880 and continuously in cultivation during each of the past six years. The test in 1900 was conducted on land that had been cleared about twelve years. The original growth was long-leaf pine, with a few black-jack oaks.

In both experiments oats was the preceding crop. There was practically no injury from "black rust" in 1900. In 1899 this disease caused considerable loss on Plot 2 and a smaller amount on plots 5 and 3, with practically no injury on other parts of the experiment.

The table on page 48 and the analysis of that table given below show the yield and amount of increase attributable to the fertilizers.

Increase of seed cotton per acre when cotton seed meal was added:

	1899.	1900.
To unfertilized plot	272 lbs.	96 lbs.
To acid phosphate plot	492 lbs.	336 lbs.
To kainit plot	252 lbs.	168 lbs.
To acid phosphate and kainit plot	40 lbs.	344 lbs.
Average increase with cotton seed meal,	264 lbs.	236 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	152 lbs.	160 lbs.
To cotton seed meal plot	372 lbs.	400 lbs.
To cotton seed meal and kainit plot	154 lbs.	208 lbs.
Average increase with acid phosphate,	261 lbs.	200 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	226 lbs.	48 lbs.
To cotton seed meal plot	206 lbs.	120 lbs.
To acid phosphate plot	440 lbs.	—80 lbs.
To cotton seed meal and acid phosphate plot	—12 lbs.	—72 lbs.

Average increase with kainit..... 216 lbs. —4 lbs.

In both years the most profitable fertilizer was a mixture of acid phosphate and cotton seed meal. Both cotton seed meal and acid phosphate, whether applied alone, or in combination, were highly profitable. Kainit had no beneficial effect in the presence of a mixture of phosphate and cotton seed meal, but in 1899, kainit was quite effective when used alone or in combination with either one (but not both) of the other materials; this was the season when rust was injurious on certain plots receiving no kainit.

Two experiments made in the same region by G. O. Sellans, at Lumber Mills, (see Bulletin No. 102) accord with Mr. McClure's experiments in showing that these soils are highly responsive to acid phosphate and cotton seed meal and that kainit is decidedly beneficial only in seasons when black rust is severe.

EXPERIMENT MADE IN 1899 BY C. H. MASON, $\frac{1}{2}$ MILE N. OF
WILSON, ESCAMBIA COUNTY.

Light sandy loam; with red clay subsoil.

This field of upland was cleared of its growth of long-leaf pine two years before the beginning of the test and during these two years the land was occupied by cow-peas, presumably grown for hay.

For yields of cotton seed see the table on page 48.

The following analysis shows that the one conspicuous need of this fresh land was for phosphate. The indifference of this particular field towards cotton seed meal is due to the recent clearing and to the two preceding crops of peas, both of which conditions imply the presence of considerable nitrogen in the soil. The soils of this region after a few years cultivation usually respond profitably to both phosphate and cotton seed meal, and some of them to kainit. A test made at Wilson on "new ground" in 1898 by J. H. Wilcox, gave results similar to those obtained in this experiment.

Increase of seed cotton per acre when cotton seed meal was added:

To unfertilized plot	200 lbs.
To acid phosphate plot	—112 lbs.
To kainit plot	24 lbs.
To acid phosphate and kainit plot	208 lbs.

Average increase with cotton seed meal..... 108 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	632 lbs.
To cotton seed meal plot	320 lbs.
To kainit plot	328 lbs.
To cotton seed meal and kainit plot	512 lbs.

Average increase with acid phosphate..... 448 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	8 lbs.
To cotton seed meal plot	—168 lbs.
To acid phosphate plot	—292 lbs.
To cotton seed meal and acid phosphate plot....	24 lbs.

Average decrease with kainit..... 107 lbs.

EXPERIMENTS MADE IN 1899 AND 1900 BY T. M. BORLAND,
 $\frac{1}{2}$ MILE S. W. OF DOTHAN, HENRY COUNTY.

Gray sandy land; subsoil yellowish.

The land was cleared of the original growth of long leaf pine nearly 10 years ago. In both cases the preceding crop was corn. Mr. Borland writes that peanuts were grown in 1899 between the corn rows on the area where the cotton experiment of 1900 was conducted.

Very hot dry weather in the latter part of the summer of 1899, and lice and excessive rainfall in 1900 damaged the crop. The experimenter reports that rust was absent.

Increase of seed cotton per acre when cotton seed meal was added:

	1899.	1900.
To unfertilized plot	248 lbs.	56 lbs.
To acid phosphate plot	110 lbs.	20 lbs.
To kainit plot	119 lbs.	93 lbs.
To acid phosphate and kainit plot.	123 lbs.	81 lbs.

Average increase with cotton seed meal, 150 lbs. 63 lbs.

Increase of seed cotton per acre when acid phosphate was added:

To unfertilized plot	208 lbs.	208 lbs.
To cotton seed meal plot	70 lbs.	172 lbs.
To kainit plot	227 lbs.	30 lbs.
To cotton seed meal and kainit plot.	231 lbs.	18 lbs.

Average increase with acid phosphate, 184 lbs. 107 lbs.

Increase of seed cotton per acre when kainit was added:

To unfertilized plot	106 lbs.	201 lbs.
To cotton seed meal plot	—23 lbs.	238 lbs.
To acid phosphate plot	125 lbs.	23 lbs.
To cotton seed meal and acid phosphate plot	138 lbs.	84 lbs.
Average increase with kainit, . . .	87 lbs.	139 lbs.

In both experiments a complete fertilizer afforded the largest increase in yield. A showing almost as favorable was made by the mixture of cotton seed meal and kainit.

The slight benefit from cotton seed meal in 1900 is probably due to the fact that peanuts were grown between the corn rows the year before. The experiment of 1900 makes the fourth test of fertilizers on cotton made on this farm. All these results point toward the need of all three of the fertilizer materials tested, kainit giving the largest average increase for the four years, viz.: 168 pounds of seed cotton per acre per annum. A similar average shows the increase with cotton seed meal to be 134 pounds, and with phosphate to be 122 pounds.

It is not surprising that this land, which has been in cultivation less than 10 years should be less responsive to cotton seed meal than are most of the soils of regions that were settled earlier. It also seems less responsive to phosphate and more so to kainit than do most of the soils on which tests have been made.

Garland, Wilson and Dothan experiments with cotton.

Plot No.	FERTILIZERS.		GARLAND. 1899.		GARLAND. 1900.		WILSON. 1899.		DOTHAN. 1899.		DOTHAN. 1900.	
	Amount per acre.	KIND.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.
1	Lbs. 200	Cotton seed meal.....	Lbs. 664	Lbs. 272	Lbs. 504	Lbs. 96	Lbs. 280	Lbs. 200	Lbs. 840	Lbs. 248	Lbs. 424	Lbs. 56
2	240	Acid phosphate.....	544	152	568	160	712	632	800	208	576	208
3	00	No fertilizer.....	392	.....	408	.....	80	.....	592	.....	368	.....
4	200	Kainit.....	640	226	448	48	88	8	686	106	552	201
5	200	Cotton seed meal.....	1080	644	888	496	600	520	901	318	560	228
	240	Acid phosphate.....										
6	200	Cotton seed meal.....	936	478	600	216	112	32	808	225	608	294
	200	Kainit.....										
7	240	Acid phosphate.....	1072	592	456	80	416	336	912	333	528	231
	200	Kainit.....										
8	00	No fertilizer.....	512	.....	368	.....	80	.....	576	.....	280	.....
9	200	Cotton seed meal.....	1144	632	792	424	624	544	1032	456	592	312
	240	Acid phosphate.....										
	200	Kainit.....										
10	200	Cotton seed meal.....	1176	664	736	358	728	648	920	344	472	192
	240	Acid phosphate.....										
	100	Kainit.....										

INCONCLUSIVE EXPERIMENTS.

The three following tables give the yields obtained in tests that were altogether inconclusive:

The list on page 3 gives the names of the parties making the experiments at each of the localities referred to in the three tables that follow. In the case of some of these tests suggestions of value may reward a careful examination of the figures, but usually want of uniformity in the soil selected, or other vitiating condition, entirely destroys the worth of the experiments here tabulated.

Tuscumbia, Boligee, Berney and Hamilton experiments with cotton.

Plot No.	FERTILIZERS.		BOLIGEE. 1899.		BERNEY'S. 1899.		BERNEY'S. 1900.		HAMILTON. 1900.		TUSCUMBIA. 1899.		TUSCUMBIA. 1900.	
	Amount per acre	KIND.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.
1	Lbs		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
2	200	Cotton seed meal.....	832	296	368	72	568	40	562	136	752	184	600	240
3	240	Acid phosphate.....	640	104	363	72	552	24	600	184	728	160	536	176
4	00	No fertilizer.....	536	.....	296	.....	528	.....	416	.....	568	.....	360	.....
5	200	Kainit.....	512	-16	448	155	575	49	568	125	784	252	296	-24
5	200	Cotton seed meal.....	640	120	448	200	968	443	680	210	568	71	312	30
	240	Acid phosphate.....												
6	200	Cotton seed meal.....	632	120	480	197	704	181	668	171	440	-22	272	28
	200	Kainit.....												
7	240	Acid phosphate.....	528	24	560	283	760	239	808	283	456	28	264	60
	200	Kainit.....												
8	00	No fertilizer.....	496	.....	272	.....	520	.....	552	.....	392	.....	168	.....
9	200	Cotton seed meal.....	448	-48	464	192	624	104	808	256	352	-40	480	312
	240	Acid phosphate.....												
10	200	Kainit.....	278	-208	432	160	560	40	848	256	544	152	432	264
	240	Acid phosphate.....												
	100	Kainit.....												

Sterrett, Dillburg, Marvyn, Oak Bowery and Greensboro experiments with cotton.

Plot No.	FERTILIZERS.		STERRETT. 1899.		STERRETT. 1900.		DILLBURG. 1900.		MARVYN. 1899.		OAK BOWERY. 1900.		GREENSBORO. 1899.	
	Amount per acre.	KIND.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield cotton seed per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.
1	Lbs.		Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
2	200	Cotton seed meal.....	752	328	928	-184	976	508	376	16	120	-160	392	-24
3	240	Acid phosphate.....	640	216	1128	16	872	504	264	-16	200	00	584	168
4	00	No fertilizer.....	424		1112				280		280		416	
5	200	Kainit.....	528	82	1120	00	568	200	472	170	368	95	576	106
5	200	Cotton seed meal.....	744	275	1128	199	816	448	400	75	384	117	688	285
	240	Acid phosphate.....												
6	200	Cotton seed meal.....	712	221	1056	218	816	448	432	85	416	156	720	323
	200	Kainit.....												
7	240	Acid phosphate.....	760	246	840	93	656	288	360	-10	408	154	504	114
	200	Kainit.....												
8	00	No fertilizer.....	536		656		368		392		248		384	
9	200	Cotton seed meal.....	768	232	936	280	856	488	584	192	400	152	520	136
	240	Acid phosphate.....												
	200	Kainit.....												
10	200	Cotton seed meal.....	760	224	912	256	680	312	688	296	240	-8	536	152
	240	Acid phosphate.....												
	100	Kainit.....												

Calhoun, Greenville, Evergreen, Union Springs and Abbeville experiments with cotton.

Plot No.	FERTILIZERS.		CALHOUN. 1900.		GREENVILLE. 1900.		EVERGREEN. 1899.		UNION SPRINGS. 1899.		ABBEVILLE. 1899.		ABBEVILLE. 1900.	
	Amount per acre.	KIND.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.	Yield seed cotton per acre.	Increase over unfertilized plots.
1	Lbs. 200	Cotton seed meal.....	444	80	Lbs. 1018	Lbs. 568	Lbs. 882	Lbs. 270	Lbs. 576	Lbs. 152	Lbs. 760	Lbs. 320	Lbs. 276	Lbs. 152
2	240	Acid phosphate.....	300	—64	968	520	764	152	444	20	656	216	184	40
3	00	No fertilizer.....	364				612		424		440		144	
4	200	Kainit.....	408	—7	960	5.2	808	196			552	137	208	27
5	200	Cotton seed meal.....	256	—210	1144	696	840	228	912	376	664	274	456	237
	240	Acid phosphate.....												
6	200	Cotton seed meal.....	640	123	848	400	896	284	496	—96	640	276	469	211
	240	Kainit.....												
7	240	Acid phosphate.....	664	96	576	128	1016*	404*	568	—80	416	79	368	71
	200	Kainit.....												
8	00	No fertilizer.....	620		448		904*		704		312		336	
9	200	Cotton seed meal.....	624	4	880	432	1420*	516*	776	72	584	272	608	272
	240	Acid phosphate.....												
10	200	Kainit.....	644	24	768	320	1376*	462*	944	240	712	400	568	232
	200	Cotton seed meal.....												
	240	Acid phosphate.....												
	100	Kainit.....												

* Not comparable with Plots 1—6, being in different part of field.