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A U B U R N

**Local Fertilizer Experiments With Corn in
North Alabama in 1911, 1912, 1913 and 1914**

By

J. F. DUGGAR

and

J. T. WILLIAMSON

1914

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LOCAL FERTILIZER EXPERIMENTS WITH CORN IN NORTH ALABAMA IN 1911-1912-1913-1914

By

J. F. DUGGAR AND J. T. WILLIAMSON.

CONCLUSIONS AND RECOMMENDATIONS.

From these experiments, most of which were conducted on poor land in dry seasons, it appears that under these conditions, reliance should not be placed chiefly on commercial fertilizers in growing corn. Commercial fertilizers have proved much more effective and profitable for cotton than for corn.

On about half of the experiments nitrogen, when employed as cotton seed meal, gave an increase sufficient to be profitable.

Acid phosphate, like cotton seed meal, gave small increases in most cases, but under the conditions of the unfavorable seasons, these increases were profitable in only about 50 per cent of the experiments.

Nitrate of soda, applied when the corn plants were 2 to 3 feet high, and on plots which had previously received acid phosphate and kainit afforded, in 72 per cent of these experiments, a profit above the cost of the nitrate. Moreover, the complete fertilizer containing
100 pounds nitrate of soda,
240 pounds acid phosphate and
100 pounds kainit

afforded a profit in 71 per cent of these experiments; but when nitrogen in a complete fertilizer was supplied in the form of cotton seed meal, the resulting increase was sufficient to afford a profit in only 39 per cent of these experiments.

In most of these experiments, kainit at the rate of 200 pounds per acre, was the least profitable of the fertilizers tested. While this amount of kainit was usually unprofitable when used alone or with only one other fertilizer, yet in many of the experiments it proved slightly profitable as a part of a complete fertilizer containing nitrogen, phosphate and potash.

In these experiments commercial fertilizers usually increased the yield to at least as large an extent on land capable of producing 25 to 30 bushels of corn without fertilizer as on poorer land; this suggests that

it was the supply of moisture in the richer soils, rather than the fertilizers, which determined yield in these unfavorable seasons. This argues for the plowing under of organic matter in connection with the use of only moderate amounts of commercial fertilizers for corn.

Considering other experiments, as well as these, the writers make the following general recommendations regarding the fertilization of corn:

(1) That so far as practicable stable manure and the remains of soil-improving plants, such as cowpeas, velvet beans and crimson clover, be preferred to most kinds of commercial fertilizers.

(2) That the amounts of commercial fertilizer be limited.

(3) That most of the money invested in fertilizers be used in the purchase of nitrogen.

(4) That where a pound of nitrogen can be bought in nitrate of soda at about the same price as in cotton seed meal, the preference be given to nitrate of soda as a fertilizer for corn.

(5) That in view of results of unpublished experiments to determine the best time of applying nitrate of soda it is recommended that it be applied as a side application when the corn plants are between 2-½ and 4 feet high.

(6) That on soils known to be deficient in phosphoric acid, and especially where heavy applications have not been applied to preceding crops, a moderate amount of acid phosphate be employed.

(7) That no investment be made in potash as a fertilizer for corn, especially at the high prices which will doubtless prevail in 1915, except where experience has shown the need of it; and that under normal conditions potash constitute only a small part of the fertilizer for corn, and then only in a complete fertilizer.

For the farmer wishing to make only a small investment in the fertilization of corn the following formula, for corn grown under average conditions, is suggested:

100 pounds acid phosphate, before planting or by the time plants are 2-½ feet high.

60-100 pounds nitrate of soda, applied when the plants are 2-½ to 4 feet high.

Or, if nitrate of soda is not available,

120 to 200 pounds cotton seed meal, applied at the same time as the phosphate, may be substituted.

INTRODUCTORY.

The chief object of these local fertilizer experiments or soil tests has been to ascertain the best combination of fertilizers for corn growing on each of the principal soils of the northern half of Alabama.

The results recorded in this bulletin were obtained in fertilizer experiments conducted with funds appropriated by the Legislature of Alabama, in February 1911, to the Experiment Station for making local experiments with crops, fertilizers, fruits, live stock, insects, plant diseases, etc.

This bulletin deals with fertilizer experiments carried to a conclusion in 1911-12-13-14 in the northern half of the State. For convenience the counties grouped together in this bulletin are those lying wholly north of the Central Prairie or Lime Region.

The results of fertilizer experiments made in the counties lying south of the Central Prairie Region appear in Bulletin No. 181 of this Station.

Local fertilizer tests constitute only one of many lines of experiments instituted in 1911 by the Alabama Experiment Station with the support of State funds.

Local fertilizer experiments as now conducted are made by farmers especially recommended as being men likely to take the necessary pains to secure accurate results.

Small lots of carefully weighed and mixed fertilizers were supplied to each experimenter. Detailed instructions as to how to conduct the experiment and blank forms for reporting results were also furnished. Representatives of the Station inspected the experiments here published as often as practicable.

The directions sent to each experimenter stated that the land employed for this test should be level and uniform, not manured in recent years, not in cowpeas the preceding year, and that it should be representative of large soil areas in its vicinity.

In order to meet these conditions it was often necessary to select *very old*, "run-down" cotton land on which no effort for improvement had been made. This largely explains why the yields were not higher. The need of perfect uniformity and standard treatment for all plots (except as to kind of fertilizer used) was emphasized.

Fertilizers were applied in the usual manner—that is, drilled before planting, except nitrate of soda which was directed to be applied when the plants were 2 to 3 feet high.

Bulletins thus far published in this series detailing the results of local fertilizer experiments with cotton on this uniform plan are the following:

For South Alabama—Bulletins No. 160, 169 and 174.

For North Alabama—Bulletins No. 162, 170 and 175.

The experiments with corn detailed in this bulletin are on exactly the same plan as the fertilizer experiments heretofore conducted with cotton.

FIELD EXPERIMENTS REPEATED OFTEN, THE ONLY MEANS
OF DETERMINING WHAT FERTILIZERS A GIVEN
TYPE OF SOIL REQUIRES.

The reader should bear in mind that there are great numbers of different soils in Alabama, and that even the same soil would give different results in different years, depending on how it had been cropped, fertilized and cared for in the year or two immediately preceding the test.

It is the purpose of the authors in later years to publish bulletins classifying the soils on which all these tests are made and drawing conclusions relative to the needs of each class of soils. However, before this can be safely done, these experiments must be often repeated, so that the average results may teach clearly the fertilizer requirements of each distinct type of soil.

Averaging the results obtained on dissimilar soils will not afford the desired information. Neither will chemical analysis of the soil indicate what fertilizers are needed.

WEATHER CONDITIONS.

The average rainfall in the part of Alabama covered by these experiments is given below by months, according to data furnished by the Alabama Weather Service.

	1911	1912	1913	1914
January -----	4.58	5.78	7.42	2.10
February -----	4.28	5.14	6.03	3.57
March -----	2.38	9.98	7.00	4.27
April -----	8.22	8.89	2.25	4.83
May -----	2.50	3.24	4.10	1.37
June -----	3.77	5.58	3.69	2.30
July -----	6.25	5.52	3.95	4.53

August	4.66	5.56	2.59	6.21
September	1.92	3.60	5.77	3.00
October	3.72	2.81	2.11	3.11
November	4.58	1.07	1.25	3.03
December	7.99	6.14	3.70	5.93
Total 12 months	54.85	63.11	49.86	44.25

The total rainfall for the months of May, June and July, and its distribution are probably the most important climatic factors in determining the yield of corn.

Hence, it should be noted that for these critical months of the growing season, the rainfall was as follows:

1911	12.52 inches
1912	14.34 inches
1913	11.74 inches
1914	8.20 inches

For corn, 1913 and 1914 were dry seasons so that fertilizers failed to exert their full effect. Moreover, the month of May had a deficient rainfall, both in 1913 and 1914. Hence, the yields reported in this bulletin are below the normal.

LOCATION OF EXPERIMENTS.

County	Post Office	Name	Page
Bibb	Brent	J. D. James	208
Calhoun	Anniston	E. L. Turner, Jr.	208
Chambers	LaFayette	T. C. Key	204
Clay	Ashland	W. M. Upchurch	203
Clay	Lineville	J. H. Russell	202
Cleburne	Heflin	W. J. Campbell	205-208
Colbert	Tuscumbia	G. H. Harris	192-207
Cullman	Hanceville	T. A. Williams	195
DeKalb	Collinsville	T. A. Ventrees	207
Etowah	Steele	J. T. Hawkins	198-199
Jackson	Stevenson	J. C. Tally	194-207
Jefferson	Birmingham	W. Mims	208
Lawrence	Courtland	W. E. Hotchkiss	207
Lawrence	Courtland	W. E. Saunders	207
Limestone	Athens	8th Dist. Agr. School	193-207
Madison	Huntsville	C. E. Hoy	207
Madison	Huntsville	W. H. Johnston	207
Marion	Guin	L. H. Bowlan	200-208
Marion	Guin	L. S. Bowlan	200
Marshall	Boaz	J. R. Smith	198
Marshall	Albertville	7th Dist. Agr. School	197
Morgan	New Decatur	L. B. Wyatt	207
Morgan	Decatur	W. C. Holland	193
St. Clair	Asheville	Jenkins and Stevenson	196
Talladega	Talladega	J. M. Howington	206
Tallapoosa	Camp Hill	W. T. Langley	203
Walker	Jasper	D. B. Lewis	201

Experiments were begun in the counties named below, but for various reasons, satisfactorily explained at the time, they were not carried to a conclusion.

<i>County</i>	<i>Post Office</i>	<i>Name</i>	<i>Year</i>
Bibb	Centerville	J. J. Ellison	1912
Blount	Oneonta	W. F. Tidwell	1911
Clay	Lineville	V. W. White	1911
Cullman	Hanceville	A. W. Johnston	1912
DeKalb	Ft. Payne	J. J. Sampley on farm of J. B. Isbell	1912
Franklin	Russellville	J. M. Webb	1913
Jefferson	Bessemer	Martin Investment Co.	1914
Lawrence	Wheeler	W. G. Gilchrist	1911
Limestone	Elkmont	Tom Dunnivant	1912
Madison	Madison	J. B. Bronaugh	1911
Madison	Huntsville	W. W. Fox	1911
Talladega	Talladega	J. R. Weisinger	1913
Winston	Double Springs	A. S. Vanderford	1912

THE FERTILIZERS USED.

The following prices are used, as representing a rather high average cash price in local markets during the last few years, 1911, 1912, 1913 and 1914:

	Per Ton
Acid Phosphate (16 per cent available)	\$14.00
Cotton Seed Meal	\$30.00
Kainit	\$14.00
Nitrate of Soda (\$50 in 1911 and 1912)	\$60.00

Prices naturally vary in different localities. Any one can substitute the cost of fertilizers in his locality for the prices given above.

In each experiment three plots were left unfertilized, these being Plots 3, 7 and 11. When these yields differed widely the experiment was classed as inconclusive. The increase on plots 4 to 6 is calculated on the assumption that the gradation in fertility is uniform from plots 3 to 7; likewise the increase is calculated for plots 8 to 10 inclusive.*

PRICE ASSUMED FOR CORN.

The price assumed per bushel of corn is 75 cents in 1911, 80 cents in 1912, and 90 cents in both 1913 and 1914.

*For the standard method employed in this bulletin for calculating the increased yield, see Alabama Station Bulletin 160 or 162.

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

Plot No.	FERTILIZERS		MIXTURE CONTAINS			COST OF FERTILIZERS	
	Amount per acre	KIND OF FERTILIZER	Nitrogen	** Available phosphoric acid	Potash	Per ton	Per acre
1	Lbs. 200	Cotton seed meal	Lbs. 13.58	Lbs. 5.76	Lbs. 3.54	\$30 00	\$3.00
		<i>In 100 lbs. c. s. meal*</i>	6.79	2.88	1.77		
2	240	Acid phosphate		38.40		14.00	1.68
		<i>In 100 lbs. acid phos</i>		16.00			
4	200	Kainit			24.60	14 00	1.40
		<i>In 100 lbs. kainit</i>			12.30		
5	200	Cotton seed meal	13.58	44.16	3.54	21.27	4.68
	240	Acid phosphate					
		<i>In 100 lbs. above mixt</i>					
6	200	Cotton seed meal	13.58	5.76	28.14	22:00	4.40
	200	Kainit					
		<i>In 100 lbs. above mixt</i>					
8	240	Acid phosphate				13.99	3.08
	200	Kainit					
		<i>In 100 lbs. above mixt</i>		8.73	5.59		
9	200	Cotton seed meal	13.58	44.16	28.14	19.00	6.08
	240	Acid phosphate					
	200	Kainit					
		<i>In 100 lbs. above mixt</i>	2.12	6.90	4.40		
10	200	Cotton seed meal	13.58	44.16	15.84	20.13	5.38
	240	Acid phosphate					
	100	Kainit					
		<i>In 100 lbs. above mixt</i>	2.59	8.18	2.93		
12	240	Acid phosphate				***	****
	100	Kainit	14.00	16.00	12.30		
	100	Nitrate of soda					
		<i>In 160 lbs. above mixt</i>	3.18	8.73	2.80	24.45	5.38

* Average of many analyses.

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

*** Only \$22.17 in 1911 and 1912.

**** Only \$4.88 in 1911 and 1912.

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 1.3-14.

COLBERT COUNTY, 2 MILES EAST OF
TUSCUMBIA.

G. H. HARRIS—1911.

Typical red Tennessee Valley upland.

This field had grown corn for the two preceding years, and prior to that time had been used as a pasture. It was fertile enough to produce without fertilizer more than 45 bushels of corn per acre.

All fertilizers, whether alone or in combinations, increased the yield, but usually not enough to pay the cost of the fertilizer.

G. H. HARRIS—1914.

In 1914 the same experiment was repeated on red soil, somewhat lower and richer than that used in the experiment of 1911.

All recent crops had been corn. The yield without fertilizer was more than 35 bushels per acre. The results were inconclusive; the effects of the same fertilizers in different combinations being irregular and unaccountable. (See page 209.)

Experiments in Colbert and Limestone Counties.

Plot No.	Amt. fertilizer per acre	KIND OF FERTILIZER	1911 TUSCUMBIA			1912 ATHENS		
			Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer	Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer
	Lbs.		Bus.	Bus.	\$	Bus.	Bus.	\$
1	200	Cotton seed meal	50.1	4.3	0.23	28.1	6.7	2.36
2	240	Acid phosphate	47.4	1.6	-0.48	24.9	3.5	1.12
3		No fertilizer	45.8			21.4		
4	200	Kainit	48.4	2.3	0.33	21.8	0.7	-0.84
5	200	C. S. Meal	46.6	0.3	-4.45	27.1	6.4	0.44
	240	Acid phosphate						
6	200	C. S. Meal	49.7	3.1	-2.07	29.1	8.7	2.56
	200	Kainit						
7		No fertilizer	46.8			20.0		
8	240	Acid phosphate	50.1	3.1	-0.75	24.4	2.7	-0.92
	200	Kainit						
9	200	C. S. Meal	48.1	1.0	-5.33	33.3	10.0	1.92
	240	Acid phosphate						
10	200	Kainit	51.5	4.2	-2.23	33.9	8.9	1.74
	240	Acid phosphate						
11	100	Kainit	47.4			26.6		
12	240	Acid phosphate	51.8	4.4	-1.58	35.9	9.3	2.56
	100	Kainit						
	100	Nitrate of soda						

LIMESTONE COUNTY, 1 MILE EAST OF ATHENS.
EIGHTH DISTRICT AGRICULTURAL
SCHOOL—1912.

Typical Tennessee Valley red soil.

This field had been many years in cultivation. The largest increases in yield, 8.9, 9.3 and 10 bushels per acre, were obtained on Plots 10, 12 and 9 respectively, each fertilized with a complete fertilizer.

The largest profit from fertilizer, \$2.56 per acre was afforded by Plot 12, fertilized per acre as follows:

240 pounds acid phosphate

100 pounds kainit

100 pounds nitrate of soda

The average increases attributable to cotton seed meal was 6.2 bushels per acre; to acid phosphate, 1.6 bushels; and to kainit, 1.4 bushels per acre.

Nitrate of soda was superior to cotton seed meal.

EIGHTH DISTRICT AGRICULTURAL
SCHOOL—1913.

A similar experiment with corn was conducted by this Institution in 1913, the results of which were inconclusive. (See page 209.)

MORGAN COUNTY, 1-½ MILES WEST OF DECATUR
W. C. HOLLAND—1913.

Typical Tennessee Valley red clay soil.

The land on which this experiment was made had been in cultivation 25 or more years. The three preceding crops were cotton.

Increases of approximately 3-½ bushels per acre were afforded by Plots 9 and 12.

No fertilizer or combination of fertilizers afforded increases enough to be notably profitable.

Experiments in Morgan and Jackson Counties.

			1913 DECATUR			1912 STEVENSON		
Plot No.	Amt. fertilizer per acre	KIND OF FERTILIZER	Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer	Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer
	Lbs.		Bus.	Bus.	\$	Bus.	Bus.	\$
1	200	Cotton seed meal	15.3	2.7	\$-0.57	28.6	1.1	\$-2.12
2	240	Acid phosphate	15.0	2.4	0.48	28.5	1.0	-0.88
3		No fertilizer	12.6			27.5		
4	200	Kainit	11.6	-0.9	-2.21	22.7	-3.9	-4.52
5	200	C. S. Meal	13.3	0.8	-3.96	32.4	6.6	0.60
	240	Acid phosphate						
6	200	C. S. Meal	15.2	2.8	-1.88	28.5	3.6	-1.52
	200	Kainit						
7		No fertilizer				24.0		
8	240	Acid phosphate	13.6	1.3	-1.91	24.9	0.9	-2.36
	200	Kainit						
9	200	C. S. Meal	15.7	3.5	-2.93	30.4	6.4	-0.96
	240	Acid phosphate						
10	200	Kainit	13.7	1.5	-4.03	30.3	6.4	-0.26
	200	C. S. Meal						
11		No fertilizer	12.1			23.9		
12	240	Acid phosphate	15.5	3.4	-2.32	29.4	5.5	-0.48
	100	Kainit						
	100	Nitrate of soda						

JACKSON COUNTY, 4 MILES NORTH OF
STEVENSON.

J. C. TALLY—1912.

Light brown Decatur loam, second bottom.

This field had been in cultivation for many years, and had borne no legumes in recent years.

The largest increase in yield, due to fertilizers, 6.6 bushels per acre, was obtained on Plot 5, fertilized as follows:

200 pounds cotton seed meal per acre.

240 pounds acid phosphate per acre.

On most plots the increase was not sufficient to pay for fertilizers.

The average increase, (See page 211), attributable to cotton seed meal was 4.9 bushels per acre; to acid

phosphate, 3.5 bushels, while kainit failed to increase the yield.

J. C. TALLY—1913-1914.

Mr. Tally repeated this experiment in 1913, when the yields were small, with inconclusive results. (See page 210), and again, with inconclusive results in 1914 when the yields on the fertilized plots ranged around 40 bushels per acre. (See page 210.)

CULLMAN COUNTY, ONE MILE EAST OF
HANCEVILLE.

T. A. WILLIAMS—1913.

Greyish gravelly sandy soil with stiffer subsoil.

This field had been in cultivation about ten years. The crop in 1912 and 1910 had been corn and in 1911 oats.

The largest increase in yield, 8.1 bushels per acre, was obtained on Plot 2, fertilized with 240 lbs. of acid phosphate per acre. This plot also afforded the largest profit from fertilizers, \$5.61.

As may be seen from the table of increases on page 211, acid phosphate was more effective than cotton seed meal, and potash was not needed for corn under the conditions of this year.

Nitrate of soda was superior to cotton seed meal.

Experiments in Cullman and St. Clair Counties.

			1913 HANCEVILLE			1912 ASHEVILLE		
Plot No.	Amt. fertilizer per acre	KIND OF FERTILIZER	Yield corn	Increase over	Profit from	Yield corn	Increase over	Profit from
			per acre	unfertilized plot	fertilizer	per acre	unfertilized plot	fertilizer
	Lbs.		Bus.	Bus.	\$	Bus.	Bus.	\$
1	200	Cotton seed meal	18.3	4.6	\$ 1.14	33.5	0.1	\$-2.92
2	240	Acid phosphate	21.8	8.1	5.61	29.4	-4.0	-4.88
3		No fertilizer	13.7			33.4		
4	200	Kainit	14.6	0.9	-0.59	33.2	0.8	-0.76
5	200	C. S. Meal	18.2	4.6	-0.54	34.1	2.6	-2.60
	240	Acid phosphate						
6	200	C. S. Meal	15.5	1.9	-2.69	33.2	2.7	-2.24
	200	Kainit						
7		No fertilizer	13.5			29.5		
8	240	Acid phosphate	18.2	3.9	0.43	26.7	-1.9	-4.60
	200	Kainit						
9	200	C. S. Meal	22.4	7.3	0.49	32.1	4.3	2.64
	240	Acid phosphate						
10	200	Kainit	18.2	2.4	-3.22	33.7	6.8	0.06
	240	Acid phosphate						
11	100	Kainit	16.6			26.0		
12	240	Acid phosphate	16.6			26.0		
	100	No fertilizer						
12	240	Acid phosphate	23.7	7.1	1.01	34.9	8.9	2.24
	100	Kainit						
	100	Nitrate of soda						

**ST. CLAIR COUNTY, 2 MILES SOUTH OF WHITNEY,
NEAR ASHEVILLE.**

JENKINS & STEVENSON—1912.

Gray sandy soil with light yellow subsoil.

This upland field had been in cultivation for many years.

The largest increase, 8.9 bushels per acre, and the largest profit, \$2.24 per acre were obtained on Plot 12, fertilized as follows:

240 pounds acid phosphate per acre,
100 pounds kainit per acre and
100 pounds nitrate of soda per acre.

The average increase due to 200 pounds cotton seed meal applied before planting was 3.7 bushels per acre; to kainit, 1.8 bushels per acre; and with acid phosphate there was an average loss of 0.7 bushels per acre.

Nitrate of soda applied when the corn was 2 to 3 feet high was more effective than was cotton seed meal applied before planting.

MARSHALL COUNTY, ON CAMPUS OF SEVENTH
DISTRICT AGRICULTURAL SCHOOL.
ALBERTVILLE.

SEVENTH DISTRICT AGRICULTURAL SCHOOL—1914.

*Gray fine sandy loam with greyish yellow fine sandy
subsoil.*

This upland soil had been in cultivation 10 or more years. The preceding crop was cotton. The stand was practically the same on all plots.

Under the conditions of this season the only fertilizer which produced a profit worth considering was a mixture of

240 pounds acid phosphate per acre.

100 pounds kainit per acre.

100 pounds nitrate of soda per acre.

This mixture was used on Plot 12, and gave an increase of 14.4 bushels per acre and a profit of \$7.58 per acre.

Nitrogen in every combination gave an increased yield, with an average increase of 2.7 bushels per acre; acid phosphate and kainit gave average increases of only 0.4 bushels and 0.8 bushels per acre, respectively.

Experiments in Marshall County.

Plot No.	Amt. fertilizer per acre	KIND OF FERTILIZER	1914 ALBERTVILLE			1912 BOAZ		
			Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer	Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer
1	Lbs. 200	Cotton seed meal	Bus 15.1	Bus. 4.2	\$ 0.78	Bus. 13.6	Bus. 2.4	\$-1.08
2	240	Acid phosphate	13.2	2.3	0.39	9.9	-1.3	-2.72
3		No fertilizer	10.9			11.2		
4	200	Kainit	14.2	2.2	0.58	8.0	-2.8	-3.64
5	200	C. S. Meal	15.6	2.5	-2.43	8.8	-1.6	-5.96
	240	Acid phosphate						
6	200	C. S. Meal	17.6	3.4	-1.34	14.0	4.1	-1.12
	200	Kainit						
7		No fertilizer	15.3			9.5		
8	240	Acid phosphate	15.2	0.7	-2.45	9.5	0.1	-3.00
	200	Kainit						
	200	C. S. Meal	19.5	5.7	-0.95	9.8	0.5	-5.68
9	240	Acid phosphate						
	200	Kainit	15.8	2.8	-2.86	8.1	-1.0	-6.18
10	240	Acid phosphate						
	100	Kainit	12.2			9.0		
11		No fertilizer						
12	240	Acid phosphate	26.6	14.4	7.58	15.5	6.5	0.32
	100	Kainit						
	100	Nitrate of soda						

MARSHALL COUNTY, 6 MILES SOUTHWEST OF BOAZ.

J. ROBT. SMITH—1912.

Light colored sandy soil with yellow stiffer subsoil.

This field had been in cultivation several years. The preceding crop was cotton. Each plot had the same number of plants.

No fertilizer or combination of fertilizer increased the yield sufficiently to be notably profitable.

ETOWAH COUNTY, 3-1/2 MILES WEST OF STEELE.

J. T. HAWKINS—1913.

Greyish yellow flatwoods soil, with yellow clay subsoil.

This field had been cleared about 13 years of its original growth of oak, hickory and short-leaf pine.

The largest increase, 10.2 bushels per acre was ob-

tained on Plot 9, fertilized as follows:

200 pounds cotton seed meal per acre,
240 pounds acid phosphate per acre and
200 pounds kainit per acre.

The largest net profit from fertilizers, \$4.98 per acre was obtained by the use of acid phosphate alone.

As may be seen in the table of increases, page 211 in every case, nitrogen and phosphorous increased the yield, while the results with potash were variable and less marked.

Experiments in Etowah County.

Plot No.	Amt. fertilizer per acre	KIND OF FERTILIZER	1913 NEAR STEELE			1914 NEAR STEELE		
			Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer	Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer
1	Lbs. 200	Cotton seed meal	Bus. 19.7	Bus. 3.7	\$ 0.33	Bus. 24.2	Bus. 7.9	\$ 4.11
2	240	Acid phosphate	23.4	7.4	4.98	24.4	8.1	5.61
3		No fertilizer	16.0			16.3		
4	200	Kainit	14.1	-1.4	-2.66	18.9	2.3	0.67
5	200	C. S. Meal	23.3	8.3	2.79	33.3	16.4	10.08
	240	Acid phosphate						
6	200	C. S. Meal	23.9	9.4	4.06	29.7	12.6	6.94
	200	Kainit						
7		No fertilizer	14.0			17.4		
8	240	Acid phosphate	19.9	4.2	0.70	26.8	7.9	4.03
	200	Kainit						
9	200	C. S. Meal	27.6	10.2	3.10	32.3	11.9	4.63
	240	Acid phosphate						
10	200	Kainit	25.7	6.7	0.65	33.2	11.3	4.79
	240	Acid phosphate						
11	100	Kainit	20.7			23.4		
		No fertilizer						
12	240	Acid phosphate	29.5	8.8	2.54	36.5	13.1	6.41
	100	Kainit						
	100	Nitrate of soda						

J. T. HAWKINS—1914.

On the same plots as the above experiment a similar experiment was conducted in 1914.

In this dry year, on this typical flatwoods soil, every fertilizer and every combination of fertilizers were profitable. With the exception of kainit alone, which

made a profit of only 67 cents, no fertilizer or fertilizer combination made less than \$4.00 profit.

The largest increase, 16.4 bushels per acre, and the largest profit, \$10.08 per acre, were obtained on Plot 5, fertilized with a mixture of cotton seed meal and acid phosphate. Increases of 13.1 bushels and 12.6 bushels and profits of \$6.41 and \$6.94 were obtained respectively from Plots 12 and 6.

The average increase due to cotton seed meal was 7.6 bushels; to acid phosphate, 5.4 bushels; and to kainit, only 0.6 bushels.

Nitrate of soda applied late was slightly more profitable than was cotton seed meal applied at planting time.

MARION COUNTY, 3 MILES NORTHEAST OF GUIN

L. S. BOWLAN—1914.

Gray sandy soil with stiffer light red subsoil.

This creek bottom land had been in cultivation 50 or more years. The preceding crop was cotton. The stand was good.

The increases were small and about equal on the plots receiving a complete fertilizer, and on Plot 5, which received phosphate and cotton seed meal.

Cotton seed meal was superior to nitrate of soda and more effective than phosphate. Potash was not needed.

L. H. BOWLAN—1913.

Mr. L. H. Bowlan conducted an experiment on the same farm and on similar soil in 1913. The results were inconclusive. (See page 210.)

Experiments in Marion and Walker Counties.

Plot No.	Amt. fertilizer per acre	KIND OF FERTILIZER	1914 GUIN			1912 JASPER		
			Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer	Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer
	Lbs.		Bus.	Bus.	\$	Bus.	Bus.	\$
1	200	Cotton seed meal	29.3	0.0	-\$3.00	6.3	0.0	-\$3.00
2	240	Acid phosphate	30.8	1.5	-.033	13.7	7.4	4.24
3		No fertilizer	29.3			6.3		
4	200	Kainit	29.8	0.4	-1.04	6.9	0.1	-1.32
5	200	C. S. Meal	32.9	3.4	-1.62	12.0	4.6	-1.00
	240	Acid phosphate						
6	200	C. S. Meal	32.1	2.6	-2.06	11.4	3.5	-1.60
	200	Kainit						
7		No fertilizer	29.6			8.4		
8	240	Acid phosphate	29.9	1.0	-2.18	15.4	6.7	2.28
	200	Kainit						
9	200	C. S. Meal	32.0	3.7	-2.75	17.7	8.7	0.88
	240	Acid phosphate						
	200	Kainit						
10	200	C. S. Meal	31.6	4.0	-1.78	15.2	6.0	-0.58
	240	Acid phosphate						
	100	Kainit						
11		No fertilizer	26.9			9.5		
12	240	Acid phosphate	29.5	2.4	-3.22	18.7	9.2	2.48
	100	Kainit						
	100	Nitrate of soda						

WALKER COUNTY, 6 MILES EAST OF JASPER.

D. B. LEWIS—1912.

Light gray loam with yellow clay subsoil.

This field had been long in cultivation. The stand was uniform.

The largest increase, 9.2 bushels per acre was afforded by Plot 12, fertilized as follows:

240 pounds acid phosphate per acre.

100 pounds kainit per acre.

100 pounds nitrate of soda per acre.

The largest net profit, \$4.24, was obtained on the plot fertilized with acid phosphate alone.

As may be seen from the table of increase on page 211 the average increase was greater from acid phosphate in all combinations than from either nitrogen or potash.

Nitrate of soda was superior to cotton seed meal.

CLAY COUNTY, 3 MILES NORTH OF LINEVILLE

J. H. RUSSELL—1914.

Gray soil with stiffer red subsoil.

Mr. Russell states that this upland field had been in cultivation 54 years. Cotton had been the preceding crop for at least 3 years. A uniform stand was secured on all plots.

No fertilizer or combination of fertilizers gave increases large enough to be profitable. On Plots 9 and 10 increases of 6.8 and 6.3 bushels per acre, respectively, were obtained. However, these gains were not sufficient to afford profits of over 29 cents per acre.

Experiments in Clay County.

Plot No.	Amt. fertilizer per acre	KIND OF FERTILIZER	1914 LINEVILLE			1914 ASHLAND		
			Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer	Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer
	Lbs.		Bus.	Bus.	\$	Bus.	Bus.	\$
1	200	Cotton seed meal	14.4	0.2	2.82	18.7	3.5	0.15
2	240	Acid phosphate	14.6	0.4	1.32	14.1	-1.1	-2.67
3		No fertilizer	14.2			15.2		
4	200	Kainit	14.4	-0.2	1.58	13.5	-2.1	-3.29
5	200	C. S. Meal	16.5	1.5	-3.33	15.6	-0.4	-5.04
	240	Acid phosphate						
6	200	C. S. Meal	13.9	-1.5	-5.75	14.5	-1.9	-6.11
	200	Kainit						
7		No fertilizer	15.8			16.8		
8	240	Acid phosphate	18.8	2.5	-0.83	13.9	-2.6	-5.42
	200	Kainit						
	200	C. S. Meal						
9	240	Acid phosphate	23.5	6.8	0.04	16.6	0.5	-5.63
	200	Kainit						
	200	C. S. Meal						
10	240	Acid phosphate	23.5	6.3	0.29	17.3	1.5	-4.03
	100	Kainit						
11		No fertilizer	17.6			15.4		
12	200	Acid phosphate	21.3	3.7	-2.05	23.6	8.2	2.00
	100	Kainit						
	100	Nitrate of soda						

CLAY COUNTY, 4-½ MILES WEST OF ASHLAND

W. M. UPCHURCH—1914.

Yellowish clay loam, with red clay subsoil.

This upland field had been in cultivation about 15 years. The stand of corn was uniform.

Nitrogen was the only fertilizer constituent that invariably afforded an increase in the yield of corn (see page 211) and this increase was usually too slight to be profitable.

In this dry year phosphate and potash seemed to be slightly harmful.

By far the largest increase in yield, 8.2 bushels per acre, and the largest profit due to fertilizers, \$2.00 per acre, was obtained on Plot 12, fertilized as follows:

240 pounds acid phosphate per acre,
100 pounds kainit per acre and
100 pounds nitrate of soda per acre.

Nitrate of soda applied June 6, at the rate of 100 pounds per acre was more effective and profitable than cotton seed meal employed before planting at the rate of 200 pounds per acre.

TALLAPOOSA COUNTY, ¼ MILE EAST OF CAMP HILL

W. T. LANGLEY—1914.

Dark sandy loam, with yellowish subsoil.

This field had been long in cultivation. The two crops preceding the corn experiment had been wheat and corn. This field was in fair state of fertility and yielded more than 30 bushels of corn per acre without fertilizer.

The largest yield, 43.2 bushels per acre and the largest increase in yield due to fertilizers, 9 bushels per acre, were obtained on Plot 12, fertilized as follows:

240 pounds acid phosphate per acre,
100 pounds kainit per acre and
100 pounds nitrate of soda per acre.

This plot also afforded the largest net profit due to fertilizer, \$2.72 per acre. All three constituents, nitrogen, phosphorus and potash, were slightly effective. (See page 211), but usually not to a sufficient extent to yield a profit.

Experiments in Tallapoosa and Walker Counties

			1914 CAMP HILL			1914 LAFAYETTE		
Plot No.	Amt. fertilizer per acre	KIND OF FERTILIZER	Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer	Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer
	Lbs		Bus.	Bus.	\$	Bus.	Bus.	\$
1	200	Cotton seed meal	30.0	0.3	\$-2.73	21.5	6.8	\$ 3.12
2	240	Acid phosphate	30.5	0.8	-0.96	20.0	5.3	3.09
3		No fertilizer	29.7			14.7		
4	200	Kainit	32.6	1.6	0.04	16.0	1.4	-0.14
5	200	C. S. Meal	35.2	3.0	-1.98	17.5	3.0	-1.98
	240	Acid phosphate						
6	200	C. S. Meal	33.7	0.2	-4.22	15.6	1.2	-3.32
	200	Kainit						
7		No fertilizer	34.7			14.3		
8	240	Acid phosphate	37.9	3.3	-0.11	16.0	1.1	-2.09
	200	Kainit						
9	200	C. S. Meal	41.1	6.6	-0.14	12.0	-3.6	-9.32
	240	Acid phosphate						
10	200	C. S. Meal	38.0	3.7	-2.05	20.0	3.81	-1.96
	240	Acid phosphate						
11	100	Kainit	34.2			16.8		
		No fertilizer						
12	240	Acid phosphate	43.2	9.0	2.72	42.7		
	100	Kainit						
	100	Nitrate of soda						

CHAMBERS COUNTY, $\frac{1}{4}$ MILE NORTH OF
LAFAYETTE.

T. C. KEY—1914.

Stiff red soil with red subsoil.

This upland field had been long in cultivation. The preceding crop was corn. The stand was uniform, 218 plants to each plot of 1-16 acre.

Neglecting Plot 12, which was apparently richer in this dry year than the others, we find that wherever more than 240 pounds per acre of any fertilizer was employed, the increase was not sufficient to afford a profit. However, cotton seed meal applied alone afforded a profit of \$3.12 per acre, and acid phosphate used alone gave a profit of \$3.09 per acre.

CLEBURNE COUNTY, 4 MILES SOUTH OF HEFLIN

W. J. CAMPBELL—1914.

Fine dark gray loam with yellow clay subsoil.

This bottom land had been in cultivation possibly 40 years. The preceding crop was corn.

On this rich bottom soil the largest increase, 17.2 bushels per acre, and the largest profit, \$9.40 per acre, were obtained from Plot 9, fertilized with a complete fertilizer containing

200 pounds cotton seed meal per acre,
240 pounds acid phosphate per acre and
200 pounds kainit per acre.

With only two exceptions (See page 211) every fertilizer and every combination of fertilizers gave an increase in the yield. Every fertilizer and every combination of fertilizers gave a profit except where a mixture of kainit and cotton seed meal was used and under the conditions of other seasons this might prove profitable.

Cotton seed meal was slightly less effective than was nitrate of soda when both were used in connection with acid phosphate and kainit.

W. J. CAMPBELL—1913.

A similar experiment by Mr. Campbell, in 1913, proved inconclusive because of lack of uniformity in the soil. (See page 210.)

Experiments in Cleburne and Talladega Counties.

Plot No.	Amt. fertilizer per acre	KIND OF FERTILIZER	1914 HEFLIN			1912 TALLADEGA		
			Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer	Yield corn per acre	Increase over unfertilized plot	Profit from fertilizer
	Lbs		Bus.	Bus.	\$	Bus.	Bus.	\$
1	200	Cotton seed meal	53.1	6.5	\$ 2.85	45.8	7.9	\$ 3.32
2	240	Acid phosphate	50.0	3.4	2.38	45.2	7.3	4.16
3		No fertilizer	46.6			37.9		
4	200	Kainit	57.2	10.2	7.78	30.8	-9.5	-9.00
5	200	C. S. Meal	57.7	10.3	4.59	45.7	2.9	-2.36
	240	Acid phosphate						
6	200	C. S. Meal	50.8	3.1	-1.61	42.1	-3.1	-1.92
	200	Kainit						
7		No fertilizer	48.1			47.6		
8	240	Acid phosphate	58.6	11.1	6.91	56.4	11.2	5.88
	200	Kainit						
9	200	C. S. Meal	64.1	17.2	9.40	51.5	8.8	0.96
	240	Acid phosphate						
10	200	Kainit	56.8	10.5	4.07	53.1	13.8	5.66
	240	Acid phosphate						
11	100	Kainit	45.7			37.8		
		No fertilizer						
12	240	Acid phosphate	58.1	12.4	5.78	50.1	12.3	4.96
	100	Kainit						
	100	Nitrate of soda						

TALLADEGA COUNTY, 7 MILES NORTHWEST OF TALLADEGA.

J. M. HOWINGTON, on the farm of J. C. WALLIS—1912
Dark, creek-bottom land.

This land had been in cultivation only 5 years and produced without fertilizers more than 37 bushels per acre.

The largest increase from fertilizers, 13.8 bushels per acre, was afforded by Plot 10, fertilized as follows:

200 pounds cotton seed meal per acre,
240 pounds acid phosphate per acre and
100 pounds kainit per acre.

This plot made 53.1 bushels of corn per acre, and the fertilizer applied on it afforded a net profit of \$5.66 per acre.

Apparently phosphate was first in efficiency (See page 211) followed by nitrogen. The results with potash were irregular and conflicting.

INCONCLUSIVE EXPERIMENTS.

In COLBERT COUNTY, an experiment conducted by G. H. Harris, in 1914, 2 miles East of Tusculumbia, proved inconclusive because of irregularities in the yields. (See page 209.)

In LAWRENCE COUNTY, 2-1/2 miles Southeast of Courtland, W. E. Hotchkiss, in 1912, made a test of fertilizers on corn. The results proved inconclusive on account of differences of yields on several unfertilized plots. (See page 209.)

In LAWRENCE COUNTY, 3 miles West of Courtland, Mr. D. D. Saunders made in 1913, a fertilizer experiment with corn which proved inconclusive because of the variations in the yields of several unfertilized plots. (See page 209.)

In LIMESTONE COUNTY, 1 mile Southeast of Athens, Eighth District Agricultural School conducted a fertilizer experiment with corn in 1913 on typical red land. This proved inconclusive because of variations in the yields of the several unfertilized plots. (See page 209.)

In MORGAN COUNTY, an experiment conducted by L. B. Wyatt, in 1912, two miles Southeast of New Decatur, proved inconclusive because of irregularities in the yields. The results suggests that on this typical Tennessee Valley soil, a complete fertilizer containing 100 pounds of kainit was best under the conditions of this particular season. (See page 209.)

In MADISON COUNTY, an experiment conducted by W. H. Johnston, in 1914, 5 miles West of Huntsville, proved inconclusive because of lack of uniformity in the soil. (See page 209.)

In MADISON COUNTY C. E. Hoy conducted an experiment 4 miles Northwest of Huntsville, in 1912, also in 1913, both of which proved inconclusive because of lack of uniformity of the soil. (See page 209.)

In JACKSON COUNTY, 4 miles North of Stevenson, experiments conducted by J. C. Tally in 1913, also in 1914, proved inconclusive because of lack of uniformity in the soil. (See page 210.)

In DEKALB COUNTY, 3 miles South of Collinsville, T. A. Ventress, in 1913, also in 1914, made an experiment on dark gray gravelly soil, with reddish subsoil. The results were inconclusive because of variations

in the fertility of the three unfertilized plots. (See page 210.)

In MARION COUNTY, 3 miles Northeast of Guin, an experiment conducted by L. H. Bowlan, in 1913, proved inconclusive. (See page 210.)

In JEFFERSON COUNTY, 5 miles West of Birmingham, near West End, W. Mims conducted an experiment in 1913. The results were inconclusive because of lack of uniformity in the soil. However, they suggest that nitrate of soda was beneficial to the crop that particular year. (See page 210.)

An experiment in BIBB COUNTY, conducted by J. D. James $\frac{1}{4}$ mile Southeast of Brent, in 1914, proved inconclusive because of lack of uniformity of the soil. (See page 210.)

In CLEBURNE COUNTY, an experiment was conducted by W. J. Campbell, in 1913, 4 miles South of Heflin. It proved inconclusive because of lack of uniformity in the soil. (See page 210.)

In CALHOUN COUNTY, 1- $\frac{1}{2}$ miles East of Oxford, E. L. Turner, Jr., in 1914, conducted an experiment, which proved inconclusive.

Increase in bushels of corn per acre attributed to 200 pounds cotton seed meal, 240 pounds acid phosphate and 200 pounds of kainit per acre, respectively.

LOCALITY	YEAR	Increase by adding cotton seed meal					Increase by adding acid phosphate					Increase by adding kainit				
		To unfertilized plot	To phosphate plot	To kainit plot	To phos. and kainit plot	Av. increase due to cotton seed meal	To unfertilized plot	To cotton seed meal plot	To kainit plot	To meal and kainit plot	Av. increase due to phosphate	To unfertilized plot	To cotton seed meal plot	To phosphate plot	To meal and phosphate plot	Av. increase due to kainit
		Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.	Bus.
Tuscumbia-Harris	1911	4.3	-1.3	0.8	-2.1	0.4	1.6	-4.0	0.8	-2.1	-0.9	2.3	-1.2	1.5	0.7	0.8
Athens-E. D. A. S.	1912	6.7	2.9	8.0	7.3	6.2	3.5	-0.3	2.0	1.3	1.6	0.7	2.0	-0.8	3.6	1.4
Decatur-Holland	1913	2.7	-1.6	3.7	2.2	1.7	2.4	-1.9	2.2	0.7	0.9	-0.9	0.1	-1.1	2.7	0.2
Stevenson-Tally	1912	1.1	5.6	7.5	5.5	4.9	1.0	5.5	4.8	2.8	3.5	-3.9	2.5	-0.1	-0.2	-0.4
Hanceville-Williams	1913	4.6	-3.5	1.0	3.4	1.4	8.1	0.0	3.0	5.4	4.1	0.9	-2.7	-4.2	2.7	-0.8
Ashville-Jenkins & S.	1912	0.1	6.6	1.9	6.2	3.7	-4.0	2.5	-2.7	1.6	-0.7	0.8	2.6	2.1	1.7	1.8
Albertville-S. D. A. S.	1914	4.2	0.2	1.2	5.0	2.7	2.3	-1.7	-1.5	2.3	0.4	2.2	-0.8	-1.6	3.2	0.8
Boaz-Smith	1912	2.4	-0.3	6.9	0.4	2.4	-1.3	-4.0	2.9	-3.6	-1.5	-2.8	1.7	1.4	2.1	0.6
Steele-Hawkins	1913	3.7	0.9	10.8	6.0	5.4	7.4	4.6	5.6	0.8	4.6	-1.4	5.7	-3.2	1.9	0.8
Steele-Hawkins	1914	7.9	8.3	10.3	4.0	7.6	8.1	8.5	5.6	-0.7	5.4	2.3	4.7	-0.2	4.5	0.6
Guin-Bowlan	1914	0.0	1.9	2.2	2.7	1.7	1.5	3.4	0.6	1.1	1.7	0.4	2.6	-0.5	0.3	0.7
Jasper-Lewis	1912	0.0	-2.8	3.4	2.0	0.7	7.4	4.6	6.6	5.2	5.9	0.1	3.5	-0.7	4.1	1.7
Lineville-Russell	1914	0.2	1.1	-1.3	4.3	1.1	0.4	1.3	2.7	8.3	3.2	-0.2	-1.7	2.1	5.3	1.4
Ashland-Upchurch	1914	3.5	0.7	0.2	3.1	1.9	-1.1	-3.9	-0.5	-2.4	-2.0	-2.1	-5.4	-1.5	0.9	-2.0
Camp Hill-Langley	1914	0.3	2.2	-1.4	3.3	1.4	0.8	2.7	1.7	6.4	2.9	1.6	-0.1	2.5	3.6	1.9
LaFayette-Key	1914	6.8	-2.3	-0.2	-4.7	-0.1	5.3	-3.8	-0.3	-4.8	-0.9	1.4	-5.6	-4.2	-6.6	-3.8
Heflin-Campbell	1914	6.5	6.9	-7.1	6.1	3.1	3.4	3.8	0.9	14.1	5.6	10.2	-3.4	7.7	6.9	5.4
Talladega-Howington	1912	7.9	-4.4	6.4	-2.4	1.9	7.3	-5.0	20.7	11.9	8.7	-9.5	-11.0	3.9	5.9	-2.8
Average		3.5	1.2	3.0	2.9	2.7	3.0	0.7	3.0	2.7	2.4	0.2	-0.4	0.2	1.9	0.5

