BULLETIN No. 76. JANUARY, 1897.

ALABAMA

Agricultural Experiment Station

OF THE

AGRICULTURAL AND MECHANICAL COLLEGE,

AUBURN.

EXPERIMENTS WITH COTTON.

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MONTGOMERY, ALA.:
THE BROWN PRINTING COMPANY, PRINTERS.
1897.

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EXPERIMENTS WITH COTTON.

By J. F. Duggar.

SUMMARY.

I. Of seventeen varieties of cotton tested in 1896, Hutchinson ranked first in yield and value of lint and value of total product. Truitt stood second, Dickson Cluster third, and Peerless fourth.

II. Seed from different parts of the Cotton Belt showed no very marked difference in productiveness.

III. No constant difference in productiveness was apparent when fresh and 2-year-old cotton seed were planted.

IV. The use of a roller after planting cotton caused the seeds to come up promptly and greatly improved the stand of young plants. Favorable weather in May resulted in a perfect stand on plots not rolled, as well as on the rolled plots, so that when the crop was gathered the rolled plots had lost nearly all of their early advantage.

V. At first cultivation barring off with a turn plow run very shallow did not reduce the yield of cotton when rain fell in time to prevent injurious drying of the soil.

VI. In rows 3.5 feet apart larger yields were obtained where the single plants stood 12 or 18 inches apart than where the distance between plants was 24, 30, or 36 inches.

VII. Subsoiling with a scooter gave an increase of 46 lbs. of lint and 93 lbs. of seed per acre over the yield of land not subsoiled. This result was secured on rather stiff red land in a very dry season, both of which conditions favored subsoiling.

VIII. In the dry season of 1896 slightly larger yields

were obtained from bedding on all the fertilizer than from reserving one-third of the fertilizer and applying this portion in the seed drill at planting time.

IX. Fine horse manure, crushed cotton seed, and acid phosphate, applied separately and mixed in the center furrow about one month before planting, were more effective than was a compost made of the same kinds and amounts of material and applied in the center furrow immediately before planting. Seed planted over the mixture had a settled seed bed, those over the compost were planted in loose soil. This difference in compactness is probably the chief cause of the more favorable result from the mixture.

X. On the field used for a fertilizer experiment a mixture of kainit and cotton seed meal proved more profitable in the dry season of 1896 than any other combination. The conditions of this test were peculiar, for the season was dry and fertilization and cropping in previous years had been unusual. Tests in other localities under more nearly normal conditions, indicate that cotton on most soils responds generously to acid phosphate and cotton seed meal.

Florida soft phosphate proved inferior to acid phosphate. Slaked lime did not increase the yield of cotton either on grey, sandy or red soil.

Introductory.

Cotton, like nearly all other farm crops, was injured by the dry weather of the spring and summer of 1896. In Bulletin No. 75, of this Station, is a statement regarding the periods of drought from which the station farm, as well as a large part of the entire State, suffered during the past year. When abundant rains came in July they were accompanied by violent winds. During July cotton plants dropped a large proportion of their squares, blooms, and small bolls.

All the experiments here described were made on carefully measured plots, which in different fields varied from one-twenty-first to one-fifteenth of an acre in area. Whenever practicable experiments were conducted on duplicate plots. In fertilizer experiments every plot was separated from the adjacent one by an unfertilized row of cotton which was not counted as part of the experiment. On all plots the rows were 3.5 feet apart, and in all cases, except in the distance experiment, the space between plants averaged 18 inches. Thinning was done in such a manner as to leave a uniform stand on all plots.

In addition to the experiments recorded in this bulletin other investigations relative to cotton were begun, the result of which are withheld until verified by another year's work.

The results of tests of varieties originated by Prof. P. H. Mell, Botanist of the Station, were turned over to him.

I. Varieties.

In the field used for this experiment every fifth plot was planted with King seed as a check on the fertility of the land. The field proved to be quite uniform.

All varieties were spaced equally, the distance between plants in 3.5 feet rows averaging 18 inches.

Preparation, fertilization, and cultivation were alike for all plots.

The following table shows the varieties tested, arranged in order of yield of lint; their relative earliness as indicated by the per cent. of the total crop gathered in the first picking, August 20th; and the per cent of lint in seed cotton:

Yield per acre of varieties of cotton.

Plot No	Variety.	Per cent of total crop at		Per cent. lint.	Yield of seed.	Yield of lint.
		1st picking.	2d, 3d, & 4th pickings.			
					Lbs.	*Lbs.*
1	Hutchinson Storm Prolific	43	57	32.3	845	403
5	Truitt Imp'd Premium Prolific	47	53	32.1	811	384
4	Dickson Cluster	72	28	33.6	696	368
8	Peerless	53	47	30.6	725	342
2,7,12,17	King, (average of 4 plots)	71	29	35.1	607	328
6	Tyler	50	50	30.9	724	320
9	Peterkin	48	52	34.6	603	320
16	Hawkins	48	52	31.4	691	317
13	Duncan Mammoth Prolific	56	44	31.7	670	312
15	Jones Improved	50	50	33.1	622	309
0	Allen New Hybrid Long Staple			26 4	830	298
14	Hunnicutt Choice	57	43	31.6	640	296
10	Herlong	45	55	32.3	619	296
11	Jones Long Staple	48	52	29.2	691	288
3	Welborn Pet	74	26	31.5	624	288
20	Whatley Improved	54	46	32.7	561	272
18	Petit Gulf	44	56	32.6	528	256

In the preceding table Hutchinson stands first in yield of lint followed by Truitt, Dickson Cluster, and Peerless.

The earliest varieties tested were Welborn Pet, Dickson Cluster, and King. Climatic conditions caused all varieties to mature early.

King afforded the highest per cent of lint, 35.1, which is higher than the record made by Peterkin in this test, which latter variety generally stands at the top in percentage of lint. The lowest per cent of lint as usual was with the long staple varieties.

The following table gives the value per acre of seed, lint, and total crop, and also the classification and market price January 1, 1897, in Opelika, as determined by an expert cotton buyer, Mr. H. L. Bandy:

Classification, market price of lint, and value per acre for varieties of cotton.

Plot No.	Variety.	Classification of staple.	Opelika price per lb. Jan. 1, '97.	Value of seed at 37½ c. per 100 lbs.	Value of lint.	Value of seed & lint per acre.
			Cents.	*Dollars.*	*Dollars.*	*Dollars.*
1	Hutchinson Storm Prolific	Strict good middling.	7	$ 3 17	$ 28 21	$ 31 38
5	Truitt Improved Premium Prolific	Good middling	6¾	3 04	25 92	28 96
4	Dickson Cluster	Middling	6½	2 61	23 92	26 53
8	Peerless	Strict middling	6⅝	2 72	22 66	25 38
	King	*	6.11-16	2 27	22 05	24 32
6	Tyler	Good middling	6¾	2 71	21 60	24 31
9	Peterkin	Good middling	6¾	2 26	21 60	23 86
16	Hawkins	Strict middling	6⅝	2 59	21 00	23 59
14	Hunnicutt Choice	Good middling	6¾	2 40	20 68	23 08
15	Jones Improved	Strict middling	6⅝	2 33	20 47	22 80
0	Allen New Hybrid Long Staple	† (estimated)	7¼	3 11	21.60	24.71
13	Duncan Mammoth Prolific	Good middling	6¾	2 51	21 06	23 57
11	Jones Long Staple (1⅛ inch)	† (estimated)	7	2 67	20.16	22.83
10	Herlong	Strict middling	6⅝	2 32	19 61	21 93
3	Welborn Pet	Strict middling	6⅝	2 34	18 08	20 42
20	Whatley Improved	Good middling	6¾	2 10	18 36	20 46
18	Petit Gulf	Strict middling	6⅝	1 98	16 96	18 94

* King on 2 plots was rated as good middling and on 2 plots as strict middling, hence the average price of 6.11-16 cents used in this table.

† "Staple of 1⅛ inch does not command much premium here where our receipts ordinarily average 1 inch; we get considerable cotton as long as 1.1-16. Cotton 1¼ inch in length brings all the way from ¾c. to 1c. more than upland, based on middling." Letter from Jno. H. Clisby & Co., Montgomery, Ala.

The varieties which yielded most lint, Hutchinson, Truitt, Dickson, and Peerless, gave also the highest combined value of seed and lint. The two long staple varieties take a higher rank in this than in the preceding table, on account of the higher price assumed for long staple lint. However, this higher price can be obtained only in the large cotton markets. In Opelika, and presumably in most towns of similar size, long staple commands no higher price than short staple cotton.

A single variety test cannot determine the true value of a variety. The average of many tests is more reliable. The table below, compiled for a recent publication of the U. S. Department of Agriculture, Office of Experiment Stations (Bul. 33), gives average results of variety tests of cotton published prior to 1895. Only those varieties are included which has been tested 10 or more times. The figures showing average relative yields are obtained by taking the average yield of all varieties in any one experiment as 100, and giving correspondingly higher or lower values to varieties exceeding or falling below that average. The average of the 10 or more figures thus obtained is taken as indicating the relative productiveness of a given variety. The varieties are arranged in order of average yield of lint.

Relative yield of lint of varieties often tested at Southern Experiment Stations.

Variety.	Number of tests.	Relative productiveness.		
		Maximum	Minimum	Average.
Peterson	53	171	70	131
Excelsior	10	154	84	109
King	44	173	76	108
Boyd Prolific	10	156	68	107
Truitt Premium	45	161	40	106
Jones Improved	23	135	82	105
Peerless	36	143	76	105
Texas Storm Proof	27	176	69	104
Dickson	21	141	74	103
Deering	19	150	80	103
Shine Early	18	132	61	103
Welborn Pet	37	185	73	103
Ben Smith	11	139	73	102
Crawford Peerless	20	155	58	101
Hawkins	34	148	57	101
Ozier	17	119	45	100
Southern Hope [Long Staple]	34	139	68	99
Jowers	11	128	76	97
Cherry Long Staple	14	132	74	96
Jones Long Staple	26	136	57	96
Petit Gulf	15	132	46	96
Okra	28	124	67	95
Allen [Long Staple]	34	144	52	94
Cherry Cluster	13	123	55	90
Cook, (W. A.) [Long Staple]	12	123	56	85

Where to Get Seed.

As this Station cannot supply seed, the addresses of parties from whom the Station obtained its supply of seed are given below :

Allen New Hydrid Long Staple, J. B. Allen, Port Gibson, Miss.

Dickson Cluster, Mark W. Johnson Seed Co, Atlanta, Ga.

Duncan Mammoth Prolific, Ala. Expt. Station, Auburn, Ala.

Hunnicutt Choice, Ala. Expt. Station, Auburn, Ala.

Jones Improved, Ala. Expt. Station, Auburn, Ala.

Petit Gulf, Ala Expt. Station, Auburn, Ala.

Herlong, H. P. Jones, Herndon, Ga.

Jones Long Staple, H. P. Jones, Herndon, Ga.
Peerless, H. P. Jones, Herndon, Ga.
Peterkin, H. P. Jones, Herndon, Ga.
Hawkins, Alexander Drug and Seed Co., Augusta, Ga.
King, T. J. King, Richmond, Va.
Hutchinson, J. N. Hutchinson, Salem, Ala.
Truitt, G. W. Truitt, La Grange, Ga.
Tyler, K. J. Tyler, Aiken, S. C.
Welborn Pet, Mark W Johnson Seed Co., Atlanta, Ga.
Whatley Impd, T. A. Whatley, Opelika, Ala.

II. Seed From Different Latitudes.

Seed of the variety King was obtained from the northern part of South Carolina, from Pickens Co., Ala., and from Baton Rouge, La.

The yields per acre were as follows:

Seed from different latitudes.

Plot No	Seed from	Yield of lint per acre.
		Lbs.
17&23	Northern part South Carolina	292.
24	Pickens county, Alabama	288.
19	Baton Rouge, Louisiana	259.

The figures are slightly in favor of seed from the most northernly locality, but the differences are small.

III. Old versus New Cotton Seed.

In selecting seed of most cultivated plants, new or fresh seed are to be preferred. However, it has been stated that old seed of some species are more productive than new. The writer has never met with any evidence in support of this claim. Old seed as a rule germinate poorly, thus affording a poor stand.

At least one dealer in cotton seed has advertised the alleged superiority of old cotton seed over new seed. The

substance of his claim is that when old seed are planted, the weaker or poorer seeds fail to germinate, and that only such old seeds as have strong vitality or natural superiority are able to come up. Thus we are told that the planting of old cotton seed insures a process of natural selection, and that only the best seeds grow.

In order to compare old and new seed, three samples of seed were obtained from the originator of the Gold Dust variety, and three from the originator of the Whatley Improved. Each lot of three samples represented respectively the crops of 1893, 1894, and 1895, grown on the same farm.

All were planted in the same field April 17, 1896, and given identical culture and fertilization.

The following table gives the results:

Yield of lint per acre produced by seed of different ages.

Age of Seed.	*Lint per acre.*		
	Whatley Impd.	Gold Dust.	Average for two varieties.
	Lbs.	*Lbs.*	*Lbs.*
Seed from crop of '95	272	242	257
" " " '94	237	248	242
" " " '93	246	277	262

There was a slight difference in the fertility of the plots used in this experiment, but this is corrected by averaging the two varieties together. Taking the average figures for the two varieties, the differences in yield are too small to justify the conclusion that old seed are better than new.

The percentage of lint was practically the same for all classes of seed. There is no valid evidence here that an old cotton seed, if it grows, will develop into a more productive plant than a new seed. Very often the old seed will not grow, and a poor stand results. Since new seed usually insure the better stand of plants, we should expect them to afford the better crop.

IV. The Use of the Roller in Cotton Planting.

For this test light sandy land was used. The field was turned or flushed about a month before planting, but not bedded until a week before planting. Undoubtedly it would have been better to have formed the beds earlier so as to give time for rain to settle or slightly pack the soil.

When the seed was planted, April 17, with a Banner planter, the ground was very loose and dry, no rain having fallen for more than two weeks previous. Before planting, the beds were pulled down almost to a level by the use of a smoothing harrow.

After planting, there was used on one plot a one-horse roller; on another a narrow roller consisting of a heavy iron pulley with a 6-inch face, which compacted only a narrow strip of soil immediately over the line of seed; on a third plot an iron pulley was used as before, and in addition loose dirt was drawn over the compacted path of the narrow roller. Subsequent treatment was identical for all plots.

The yields were as follows:

Effect of rolling after planting cotton seed.

Treatment.	Yield of lint per acre.
	Lbs.
Entire surface of plot rolled	229
Not rolled	226
Narrow space over seed rolled	236
Narrow space over seed rolled and loose dirt drawn on rolled space	258

The effects of rolling as shown by the above table are far less decided than would have been predicted from appearances of the different plots two weeks after planting. At that time there was a perfect stand on all rolled plots in spite of the dry weather of the preceding 28 days, while on the plot not rolled the stand was very poor. This was the appearance at the end of a long dry spell, but showers which

fell about two weeks after planting moistened and settled the soil and caused the majority of the seeds on all plots to grow, so that by June all differences in the appearance of the plots had disappeared. In short, during the continuation of dry weather after planting, rolling was plainly advantageous, in that it produced a perfect stand and prompt growth. But a perfect stand appearing later on all plots, this early advantage of rolling was almost lost before the crop was gathered.

A word in regard to the usual effects of rolling may be appropriate here. The immediate effect of rolling is to cause moisture to rise by capillary attraction from the subsoil into the upper layer of soil. This is clearly an advantage to seed planted in loose dry earth, more especially since rolling presses the soil particles closer to the seed and thus renders the latter better able to absorb moisture from the soil.

But rolling may be harmful if its effects are too long continued, that is, if water continues to be lifted from the depths of the soil to the surface where it evaporates and is lost. The top soil in which the seed lie is supplied with moisture by an upward current, so to speak, and when this upward movement continues for a long time in a dry season there comes a time when the supply of water in the subsoil is no longer sufficient to supply moisture to the stratum above. Thus not only the surface layer, but a great depth of soil, becomes parched.

The farmer may secure the benefits of rolling without its disadvantages by forming on top of the compressed soil a thin layer of loose dirt, which loose layer or soil mulch serves to check the further rise and evaporation of moisture, retaining it in the rolled stratum in proximity to the seed. In sowing small grains this end can be attained by following the roller (used to hasten germination in loose soil and dry weather) with a smoothing harrow which leaves a loose layer of soil on the surface. It is believed that this principle

could be advantageously introduced into the construction of cotton planters. It would be necessary only to substitute for the small roller now used at the rear end of some planters a heavier and narrower roller and to attach behind the roller two small blades or rakes to draw loose dirt over the compacted soil.

V. Barring Off.

A practice which is quite common is to use a small turn plow in the first cultivation of cotton, throwing the dirt away from the plants and leaving them standing on a very narrow ridge. At experiment stations and on a great number of well managed farms, barring off is never practiced, but shallow cultivation with some form of scrape is substituted.

On one plot barring off was done with a one-horse turn plow running to as shallow depth as possible. This was 26 days after planting the seed. At this date adjacent plots were cultivated as usual with a heel scrape. After the first plowing all plots were cultivated alike. In 1896 no injurious effects were produced on our barred-off plot, which yielded at the rate of 253 pounds of lint per acre against 246, the average of two plots, one on each side of the barred off plot and cultivated entirely with a heel scrape. The reason why barring off was harmless in this case is obvious, when we add that it rained in a few hours after the turn plow had been used. This prevented any drying out of the ridge, which drying is probably the chief injury from this method of cultivation. If such an opportune shower could always be counted on, then no strong objection could be urged against this practice. But since a drying sun is more usual than a timely shower on a given day in May, we prefer the method of cultivation with scrape, which is as good as barring off in wet weather and far better in dry weather.

VI. Distance Experiments.

Peerless cotton was planted April 14th on a sandy hill top in rows $3\frac{1}{2}$ feet apart. All plots were prepared, fertilized,

planted, cultivated, and chopped alike. The final thinning was done June 12th while the plants were still small, by pulling up superfluous stalks and leaving on the different plots stalks sufficient to average 12, 18, 24, 30, and 36 inches apart. Nematode root worms did some damage over the whole field. All plots were duplicated. The yields were as follows:

Yield per acre of seed cotton with single plants at different distances.

Plot No.	Distance.	Yield of seed cotton per acre.
		Lbs.
1	12 inches by 42 inches	887
2	18 " " 42 "	938
3	24 " " 42 "	722
4	30 " " 42 "	619
9	36 " " 42 "	546
10	24 " " 42 "	624
11	30 " " 42 "	469
12	36 " " 42 "	515
13	12 " " 42 "	653
14	18 " " 42 "	670
	Average for 12 inches	770
	" " 18 "	804
	" " 24 "	673
	" " 30 "	544
	" " 36 "	530

The table shows that there was but little difference in yield between distances of 12 and 18 inches. When the distance between single plants in the drill was greater than 18 inches there was a large reduction in yield.

VII. Subsoiling and Liming.

For this experiment there was selected a level piece of red land containing more clay than the majority of soils in this locality. This particular soil is shallow, the change of color occurring at a depth of only 3½ or 4 inches; it is inclined to bake and is very sensitive to drougth.

On January 29th, 1896, one plot was broken to the usual depth, 3 or 4 inches, with a one-horse turn plow. In this furrow followed a scooter drawn by one mule, which loosened a part of the soil to an additional depth of $3\frac{1}{2}$ inches. In this way the soil was loosened to a depth of about 7 inches without throwing up to the surface the clay of the subsoil, which is temporarily poorer than the surface soil.

At the same time two other plots were broken with a one-horse turn plow in the usual way without the subsoiling scooter, and on one of these slaked lime was applied broadcast at the rate of 640 lbs. per acre. Rows were laid off $3\frac{1}{2}$ feet apart, and in these furrows fertilizers were applied as follows on all three plots:

80 lbs. Acid phosphate per acre.
160 lbs. Cotton seed meal per acre.
40 lbs. Muriate of potash per acre.

280 lbs., total, per acre.

After drilling the fertilizers they were mixed with the soil by running a narrow scooter in each furrow containing fertilizers. Then ridges or beds were formed, and planted with a Banner cotton and corn planter. The yields of lint cotton were as follows:

Yield per acre of lint on untreated, subsoiled, and limed plots.

Treatment.	Yield of lint per acre.
	Lbs.
Neither subsoiled nor limed	195
Subsoiled	241
Limed	203

In this experiment a light surface dressing of slaked lime did not materially increase the yield of cotton.

The figures in the above table show an increase of 46 lbs. of lint on the subsoiled plot. The value of this lint at $6\frac{3}{4}$ cts. per pound, $2.84, may be taken as clear profit from subsoil-

ing. For the gain of 93 lbs. of seed on the subsoiled plot covers at least one-third of the extra expense of subsoiling, and only a part of the expense of subsoiling is justly chargeable against the first crop, since its effects are usually felt for several years.

It should be noted that this very favorable result from subsoiling was obtained in an unusually dry year, and that in wet seasons and on land with a loose subsoil, less beneficial results should be expected.

Doubtless many compact upland soils that suffer serious injury from drouth, would be benefitted by subsoiling. The expense is slight, since subsoiling is usually necessary not oftener than every third year. Subsoiling should be done, if at all, a long time before the planting season, so as to give an opportunity for at least some of the winter rains to moisten and settle the deeply stirred soil.

VIII. One-Third of Fertilizer in Seed Drill.

At the Georgia Experiment Station a larger yield of cotton was obtained by bedding on two-thirds of the fertilizer to be used, reserving one-third and applying it at planting time in the seed drill in immediate contact with the seed. To test this question on the light sandy soil of this vicinity, the experiment was repeated here with two varieties of cotton, both heavily but differently fertilized, and growing in different fields.

The results are given in the following table:

Application of part of fertilizer in seed drill.

Method of Applying Fertilizer.	Yield per acre of seed cotton.
Peerless.	*Lbs.*
All fertilizer bedded on (av. 2 plots)	681
⅔ of fertilizer bedded on / ⅓ of fertilizer in seed drill (av. of 2 plots)	655
King.	
All fertilizer bedded on	633
⅔ of fertilizer bedded on / ⅓ of fertilizer in seed drill	611

With both varieties there was a slightly smaller yield where a part of the fertilizer was put in the seed drill. The loss was too slight to give very positive indications.

IX. Composting versus Mixing in the Furrow.

March 17th two lots of acid phosphate, two of crushed cotton seed, and two of fine horse manure were weighed. One lot of each material was made into compost, moistened, and stored under shelter for four weeks. The other lots of fertilizing materials, equal in weight to those used in the compost, were separately drilled in the marking off or center furrow of one plot, mixing being effected by running a scooter through the furrow containing the fertilizers. Beds were immediately thrown up over the fertilizers, and these were not disturbed until the day of planting.

The plot reserved for compost was not bedded till the day of planting, April 14, when the land was marked off, and in this furrow the compost was drilled; beds were immediately formed.

Both plots were then planted. The soil of the compost plot being recently plowed, was loose, while the other plot offered a more compact seed bed, rains in the latter part of March having settled the soil to some extent.

Both the mixture and compost contained per ton 333 lbs.

acid phosphate, 333⅓ lbs. crushed cotton seed and 1334 lbs. staple manure; 2835 lbs. of mixture and compost per acre were used.

The yields of seed cotton per acre were as follows:

Fertilizers mixed in furrow; firm seed bed - -	1,020 lbs.
Fertilizers composted for 4 weeks; loose seed bed	798 lbs.
Balance in favor of mixing in furrow and planting on settled beds - - - - - -	222 lbs.

It would be unfair to attribute to composting the large shrinkage in yield on the composted plot. In all probability it was due rather to the loose condition of the soil where compost had just been applied. For two weeks before planting and for two weeks afterwards no rain fell, a circumstance which placed the loose soil of the compost plot at a great disadvantage. It dried out and the seed were later in coming up on this plot than on the more compact soil of the other plot.

This is not the first experiment tending to show that with cotton, and indeed with most plants having a long growing season, it is unprofitable to incur any large expense in repeated handling of bulky manures. During idle seasons regular labor may be advantageously employed in making composts of leaves and manure that is too coarse for hauling at once from stable to field; but one should closely calculate the cost before hiring labor especially for mixing composts. Bulky manures should always be saved and used, but if handled several times the cost of labor may exceed the value of the manure.

The conclusion reached by the Georgia Station relative to composts is quoted from Bulletin 31, which gives results at that Station up to the end of the year 1895. "Composting several weeks before distributing in the soil does not seem to add materially to the effectiveness of the mixture. If the manure is well decomposed it will do just as well to mix all together and deposit in the soil a few days before planting,

or separately, one after the other, the same day, as to mix in a heap weeks beforehand, and this will involve considerably less labor of handling."

X. Experiments With Fertilizers.

Plots 1 to 8 of this experiment formed part of a co-operative fertilizer test on cotton, these plots on the Station farm being duplicates of tests conducted for this Station by farmers in a number of localities in this State. Plot 9 was designed to test the effect of lime on a sandy soil, and plot 10 was intended to show how the growth of the cotton plant was affected by an excessive quantity of kainit.

This experiment was conducted on a gray sandy soil containing but few stones. This field bore a crop of wheat in 1895, followed by a crop of sorghum the same year. Unfortunately it was not learned until the experiment had been started that this field had been used for a special fertilizer experiment in 1893 and 1894. During both of these years extremely large quantities of cotton seed meal and nitrate of soda had been used. The slight response to cotton seed meal in 1896, shows that nearly sufficient nitrogen remained in the soil from the previous applications. All plots received equal benefit from previous fertilization, for the reason that the rows ran in a direction perpindicular to that of former years.

The fertilizers used in this experiment cost, delivered in Auburn in less than car load lots, as follows:

	Per ton.
Acid phosphate, (16.26 per cent. available phosphoric acid)	$15.00
Cotton seed meal	20.20
Kainit (12.3 per cent potash)	15.70
Florida soft phosphate (29.26 per cent. total phosphoric acid, 0.78 per cent available)	13.92
Crushed cotton seed (estimated)	8.56
Slaked lime	5.00

The crop of seed cotton is estimated at $2\frac{1}{2}$ cents per pound, which is equivalent to $6\frac{3}{4}$ cents per pound for lint, and $37\frac{1}{2}$ cents per 100 pounds for seed, in cases where seed cotton affords $33\frac{1}{3}$ per cent. of lint ("thirds itself.")

The following table shows the amount and kind of fertilizers and the cost per acre; the yield of seed cotton, the increased yield on the fertilized plots; the gross value of this increase; and the net value of the increase over and above the cost of fertilizers.

Results of fertilizer experiment.

Plot.	Fertilizers—		Cost per acre.	Seed cotton		Value of increase at 2½c. per lb.	Profit from fertilizers.
	Amt. per acre.	Kind.		Yield per acre.	Incr'ase over unfertilized plots.		
	Lbs.			*Lbs.*	*Lbs.*		
1	200	Cotton seed meal	$ 3 82	759	180	$ 4 50	$ 68
	240	Acid phosphate					
2	00	No fertilizer	.....	582	.....	.....	.....
3	200	Cotton seed meal	3 59	958	373	9 33	5 74
	200	Kainit					
4	240	Acid phosphate	3 37	907	328	8 20	4 83
	200	Kainit					
5	200	Cotton seed meal	5 39	940	361	9 03	3 64
	240	Acid phosphate					
	200	Kainit					
6	00	No fertilizer	.....	577	.....	.....	.....
7	200	Cotton seed meal	5 27	844	265	6 63	1 36
	240	Florida soft phosphate					
	200	Kainit					
8	472	Crushed cotton seed	5 27	882	303	7 58	2 31
	240	Florida soft phosphate					
	200	Kainit					
9	200	Cotton seed meal	6 89	933	354	8 85	1 96
	240	Acid phosphate					
	200	Kainit					
	600	Slaked lime					
10	200	Cotton seed meal	8 53	1138	559	13 98	4 45
	240	Acid phosphate					
	600	(3 rations) Kainit					

In this test acid phosphate proved more effective than an equal weight of Florida soft phosphate. Cotton seed, even at $8.56 per ton, was a more profitable nitrogenous fertilizer than cotton seed meal. The above table shows that in this experiment mixtures containing kainit were the most effective fertilizers. A mixture of kainit and cotton seed meal was most profitable. The increase on all plots where potash was used was large, cotton seed meal was but slightly effective, and acid phosphate almost entirely without effect. This failure of acid phosphate and this favorable result from kainit is somewhat unusual, and probably finds its explanation in the previous fertilization and cropping of the land, and in the unusual character of the season.

The proceeding crops of wheat and sorghum had drawn more heavily on the potash of the soil than on the supply of phosphoric acid, sorghum containing about 2½ times as much of potash as of phosphoric acid, and wheat straw about 4 times as much of potash as of phosphoric acid. This removal of potash by previous crops would naturally leave the soil in a condition to respond freely to applications of potash.

A dry season also favored kainit, since this fertilizer is generally credited with the power of increasing the water-holding capacity of the soil.

The good effect of kainit could not be ascribed to its power to check certain forms of leaf disease, for "rust" was just as apparent on the plots receiving 200 lbs. per acre of kainit as on the plot without kainit. Only when the amount of kainit was excessive, 600 lbs. per acre, was there a noticeable tendency for the foilage to resist disease and remain green late in the season.

Apparently enough phosphoric acid for the needs of the crop remained unused from previous applications. Nearly enough nitrogen also seems to have been left, very little having leached out in the previous winter when the rainfall was light.

As noted above, this experiment was conducted under unusual conditions of soil and season, and hence its results should not be accepted as widely applicable. Other experiments conducted for this Station in a number of localities in this State in 1896, indicate that as a rule cotton seed meal and acid phosphate are much more profitable than they proved to be on this particular field.

Results of a number of fertilizer tests on cotton will be discussed in the next bulletin issued by this Department.