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Field experiments on various crops

William Carter Stubbs

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BULLETIN No. 3,

—OF THE—

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LOUISIANA

SUGAR EXPERIMENT STATION.

—

WM C STUBBS, DIRECTOR

—

KENNER, LA., APRIL, 1886.

Sugar-Bowl print, 6 Camp st., N. O.

BULLETIN No 3

OF THE

LOUISIANA SUGAR EXPERIMENT STATION.

KENNER P. O., April 1, 1886.

In the pause between the planting of the experiments and their after cultivation, it has been deemed expedient to give a summary of the work of the Station since its organization, October, 1885, to date, April 1st.

Transforming a small sugar plantation, in poor condition, to the requirements of an Experiment Station, is a huge task, and the successful accomplishment of such an enterprise in a short time requires a combination of good qualities rarely met with in one individual.

However, this task has been essayed, and it is for the sugar planters of Louisiana to say, by critical inspection, which they are cordially invited to give it at an early date, how far it has been successful.

LABORATORY.

A chemical laboratory, fully equipped with all the most improved facilities for rapid and accurate work has been carefully fitted up, *where analyses of all kinds will be made, free of charge, for all subscribers to the Station.* When time will per-

mit, analyses for outsiders will be made at moderate prices. This laboratory has a furnace room, a working room, a weighing room, a polariscope room, and a small store room. In the furnace room is a two horse boiler, with inspirator and ejector (the latter for elevating water for the filter pumps and general laboratory uses;) water baths, steam baths, drying chambers, a still and combustion and muffle furnaces. In the work room are all the apparatus used in analyses. In the weighing room are balances made by H. Troemner, of Philadelphia. In the polariscope room are French and German polariscopes, the former with monochromatic and white light attachments. The entire laboratory is furnished with gas.

The work in the laboratory has, up to the present time, been confined almost exclusively to analyses of cane juice and its products (results of which will appear in a separate bulletin,) and of various kinds of fertilizers. The analyses of fertilizers will be given later.

The Station is also engaged in the analyses of drainage water from plats differently fertilized, to determine the quantity and quality of the loss of manūrial ingredients sustained by the sugar soils of Louisiana by the rain percolating through them. The results so far have been very suggestive and promise in the end valuable instruction. In connection with the laboratory we have a weather bureau, with barometer, rain gauge, maximum, minimum, wet and dry bulb thermometers. Three daily observations, at fixed hours, are made and recorded. The results for March are given in Appendix.

The Station is indebted to the U. S. Signal Service for the rain gauge and maximum and minimum thermometers.

In a few weeks the Station will begin the systematic analyses of all the sugar soils of the State, at which time samples of typical soils, with full instructions how to take them, will be solicited.

EXPERIMENTS IN THE FIELD.

Before instituting a regular series of experiments, a large amount of work was necessary in the way of fencing, drainage and preparation of the soil. The ditches on the Station had been sadly neglected, and the soil was accordingly suffering for want of drainage. Besides digging a large number of open ditches, several acres have been underlaid with tile, using the latter of various sizes and at different depths and distances. Upon these tile drained plats, experiments in cane, to test their value and efficiency, have been planted. There are now planted at the Station 454 experiments, viz: 30 in oats, 66 in corn, 8 in sorghum and 350 in cane. On my neighbor's plantation, with his consent and co-operation, the Station has 20 experiments in rice. Experiments in peas, both following the oats and in corn, will be made, and the economy of manuring the peas as a purveyor for the cane, instead of manuring the latter, will be scientifically and practically studied. Attention will also be given next fall to grasses with a view of determining those best adapted to the wants of the sugar planter.

EXPERIMENTS IN OATS.

It was the aim of the Station to plant a plat of oats every month, from October to April, for the purpose of determining the best time, in conjunction with the best manure, for sowing this cereal in South Louisiana. Accordingly, Plat No. 12 of the Station, was broken on 22d and 23d October, manured and planted 27th October, using $2\frac{1}{2}$ bushels red rust proof oats to the acre. The oats, on account of a prevailing drouth, were lightly plowed in with one horse plows.

PLAT NO. 12—OATS.

Experiment	No.	1	{ 30 lbs. cotton seed meal.
			{ 30 " acid phosphate.
"	"	2	{ 40 lbs. cotton seed meal.
			{ 20 " acid phosphate.
"	"	3	{ 45 lbs. cotton seed meal.
			{ 15 " acid phosphate.

Experiment	No.	4	{ 45 lbs. cotton seed meal. 15 " acid phosphate. 30 " kainite.
"	"	5	{ 40 lbs. cotton seed meal. 20 " acid phosphate. 30 " kainite.
"	"	6	{ 30 lbs. cotton seed meal. 30 " acid phosphate. 30 " kainite.
"	"	7	—30 lbs. cotton seed meal.
"	"	8	—15 lbs. acid phosphate.
"	"	9	—15 lbs. kainite.
"	"	10	{ 30 lbs. cotton seed meal. 15 " acid phosphate. 15 " kainite.
"	"	11	—Nothing.
"	"	12	{ 30 lbs. cotton seed meal. 15 " acid phosphate.

A good stand was secured, which successfully withstood the severe freeze January 8–13th. The plats fertilized with cotton seed meal and acid phosphate are, at this date, very fine, the admiration of all who have beheld them.

PLAT NO. 3—OATS.

Broken with four horse plows, harrowed, manured and planted November 17th at rate $2\frac{1}{2}$ bushels per acre; seed, red rust proof, plowed in lightly with one horse plows. Stand excellent, growth vigorous until the freeze (8th–13th January,) killed them completely. Plat re-seeded February 1st and 2d; 2 bushels to acre; stand good; condition fair. Little or no effect yet visible from manures.

Experiment	No.	1	—50 lbs. cotton seed meal.
"	"	2	—Nothing.
"	"	3	{ 50 lbs. cotton seed meal. 10 " acid phosphate.
"	"	4	{ 10 lbs. acid phosphate. 20 " kainite.
"	"	5	—Nothing.
"	"	6	{ 50 lbs. cotton seed meal. 20 " kainite.
"	"	7	—10 lbs. acid phosphate.

Experiment No.	8—Nothing.
“	“ 9—20 lbs. kainite.
“	“ 10 { 50 lbs. cotton seed meal. 10 “ acid phosphate. 20 “ kainite.
“	“ 11 Nothing.
“	“ 12 { 50 lbs. cotton seed meal. 10 “ floats. 20 kainite.

This plat is upon a blacker and stiffer soil than Plat No. 12.

PLAT NO. 13—OATS.

Broken with two horse plow, harrowed, manured and planted January 30th. Oats (2 bushels to acre) plowed in with one horse plows. Stand excellent; growth vigorous. Land sandier than either Plats 12 or 3.

Experiment No.	1 { 25 lbs. cotton seed meal. 25 “ Orchilla phosphate. 12½ “ kainite.
“	“ 2 { 25 lbs. Orchilla. 12½ “ kainite.
“	“ 3—25 “ Orchilla.
“	“ 4 { 25 lbs. cotton seed meal. 25 “ Charleston floats. 12½ “ kainite.
“	“ 5 { 25 lbs. Charleston floats. 12½ “ kainite.
“	“ 6—25 “ Charleston floats.

Intending to follow oats with peas, this plat has been manured with special reference to the latter, testing how far oats will be benefitted and what the residue will accomplish for peas. Floats and kainite constituted the “ash element” of the late Dr. Ravenel, which in his hands proved such an excellent manure for peas.

A valuable conclusion can be drawn from our experience with oats, viz: those sown early enough to have formed a good root developement were not injured by the freeze; all others were. Those sown November 17th were killed outright while those sown October 27th were unhurt.

EXPERIMENTS IN CANE

May be divided into several classes: 1st—Germination questions; 2d—Physiological questions; 3d—Varieties, and 4th—Manurial requirements.

PLAT 0 — CANE.

(First—Germination Questions.)

This plat was devoted to testing the best part of the cane to plant, as well as the quantity to the row. Accordingly great pains were taken to select stalks of uniform length, which were cut up into short pieces, beginning with the green, immature top.

Experiment	No.	1—Planted with green tops usually thrown away.
"	"	2—2 joints next to top (green.)
"	"	3—Next 2 joints (partially green.)
"	"	4— " " "
"	"	5— " " "
"	"	6— " " "
"	"	7— " " "
"	"	8— " " "
"	"	9—2 Butt joints.
"	"	10—Upper thirds of the cane.
"	"	11—Middle " "
"	"	12— Butt " "
"	"	13—1 cane with lap.
"	"	14—2 " "
"	"	15—3 " "

The severe weather and late spring will probably prevent accurate results.

PLAT NO. 11—CANES.

(Second—Physiological Questions.)

This plat runs east and west, and was selected to try the experiment of orientation, and also the question of suckers. It was manured like several adjacent pieces running north and south. Planted February 18th:

Experiment	No.	1—Orientation.
"	"	2—All suckers left.
"	"	3—No suckers left.
"	"	4—Only such as covered by plow removed.

PLAT NO. 00—CANES

(Third Varieties.)

Early in the fall planters throughout the State were requested to send to Station a few selected cane of the different varieties

grown by them. The object was to test whether, by selection and proper manuring, an improved variety could not be permanently developed. The following have been received :

No.	1.	Selected red cane, from Ashland plantation, Kenner & Brent.
"	2.	striped Mexican " "
"	3.	white La Pice " "
"	4.	Japanese, from Tchoupitoulas plantation, Soniat Bros.
"	5.	small red, " "
"	6.	striped, " "
"	7.	bastard, " "
"	8.	large red, " "
"	9.	large red and striped, from Station.
"	10.	large red, from Cypremort, St. Mary, J. M. Burguières.
"	11.	yellow ribbon, Port Hickey, W. S. Slaughter & Bros.
"	12.	red " "
"	13.	red, from Baton Rouge, S. Shorten.
"	14.	red, from Homestead, Dr. Wm. E. Brickell.
"	15.	ribbon " "
"	16.	Bourbon, from Cuba, D. D. Colcock.
"	17.	red, from Homestead, Dr. Wm. E. Brickell.
"	18.	red (tops), " "
"	19.	yellow La Pice, from H. A. LeSassier.

The other plats of cane were devoted to the *manurial requirements* of cane.

PLAT NO 1—CANE.

(Fourth—Manurial Requirements.)

Land broken October 6-9, with four horse plow; harrowed and planted Oct. 16 and 17. Divided into 28 plats, and left to be manured in spring, after cane was up, with same manures as used upon the first 28 experiments in Plat No. 2, the object being to test difference between fall and spring manuring upon fall plant cane. The north end of plat No. 1 was broken, harrowed, manured and planted November 30 and December 1-3.

Experiment No. 1-28, see Plat No. 2, 1-28.

" " 29 { 32½ lbs. cotton seed meal.
5 " acid phosphate.
12½ " kainite.

" " 30 { 30 lbs. cotton seed meal.
7½ " acid phosphate.
12½ " kainite.

31—Nothing.

" " 32 { 25 lbs. cotton seed meal.
12½ " acid phosphate.
12½ " kainite.

" " 33 Nothing.

Experiment No.	34	{	18 $\frac{3}{4}$	lbs. cotton seed meal.
			18 $\frac{3}{4}$	" acid phosphate.
			12 $\frac{1}{2}$	" kainite.
"	35	{	15	lbs. cotton seed meal.
			22 $\frac{1}{2}$	" acid phosphate.
			12 $\frac{1}{2}$	" kainite.
"	36	{	15	lbs. cotton seed meal,
			25	" acid phosphate.
			30	" kainite.
			18	" gypsum.
"	37	{	15	lbs. cotton seed meal.
			25	" acid phosphate.
			15	" kainite.
"	38			Nothing.
"	39	{	50	lbs. lime.
			25	" cotton seed meal.
			25	" floats.
			12 $\frac{1}{2}$	" cotton hull ashes.

The object of experiments Nos. 29 to 35 is to test the proportion of nitrogen to phosphoric acid suitable for cane on black land; using them from 3 of former to 1 of latter in No. 29, to 1 of former to 3 of latter in 35. Nos. 36 and 37 are Ville's formulas for cane, modified one with and the other without gypsum. No. 39 was first top dressed with 50 lbs. lime and then treated with rest of formula. This cane was planted during a prevailing drouth and some apprehension exists of danger therefrom.

PLAT NO. 2—CANE.

Ground prepared with four horse plow. Harrowed manures put out and cane planted October 19th. Ground very hard. This plat was manured in fall, while a portion of plat No. 1 is intended to be similarly manured in the spring.

Experiment No.	1	{	10	lbs. cotton seed meal.
			5	" acid phosphate.
"	2	{	16 $\frac{2}{3}$	" cotton seed meal.
			8 $\frac{1}{3}$	" acid phosphate.
"	3			Nothing.
"	4	{	23 $\frac{1}{3}$	lbs. cotton seed meal.
			11 $\frac{2}{3}$	" acid phosphate.
"	5	{	30	" cotton seed meal.
			15	" acid phosphate.
"	6	{	30	" cotton seed meal.
			15	" acid phosphate.
			15	" kainite.

Experiment No. 7-30 lbs. cotton seed meal.

"	"	8—Nothing.	
"	"	9 { 15 lbs. acid phosphate.	
		15 " kainite.	
"	"	10—15 " kainite.	
"	"	11 { 10 " cotton seed meal.	
		5 " floats.	
"	"	12 { 16 $\frac{2}{3}$ " cotton seed meal.	
		8 $\frac{1}{3}$ " floats.	
"	"	13—Nothing.	
"	"	14 { 23 $\frac{1}{3}$ lbs. cotton seed meal.	
		11 $\frac{2}{3}$ " floats.	
"	"	15 { 30 " cotton seed meal.	
		15 " floats.	
"	"	16 { 30 " cotton seed meal.	
		15 " floats.	
		15 " kainite.	
"	"	17 { 30 " cotton seed meal.	
		15 " floats.	
		15 " kainite.	
		10 " gypsum.	
"	"	18—Nothing.	
"	"	19 { 30 lbs. cotton seed meal.	
		15 " floats.	
		15 " cotton hull ashes.	
"	"	20—15 " tankage.	
"	"	21—25 " tankage.	
"	"	22—35 " tankage.	
"	"	23—Nothing.	
"	"	24—45 lbs. tankage.	
"	"	25 { 45 " tankage.	
		15 " kainite.	
"	"	26 { 45 " tankage.	
		15 " kainite.	
		10 " gypsum.	
"	"	27 { 45 " tankage.	
		15 " cotton hull ashes.	
"	"	28—Nothing.	
"	"	29—85 lbs. cotton seed.	
"	"	30 { 85 " cotton seed.	
		15 " acid phosphate.	
"	"	31 { 85 " cotton seed.	
		15 " acid phosphate.	
		15 " kainite.	
"	"	32 { 85 " cotton seed.	
		15 " cotton hull ashes.	
"	"	33—Nothing.	

Experiment No. 34	{	85 lbs. cotton seed.
	{	15 " floats.
" " 35	{	85 " cotton seed.
	{	15 " floats.
	{	10 " gypsum.
" " 36		—stable manure.
" " 37	{	stable manure.
	{	15 lbs. acid phosphate.
" " 38		—Nothing.
" " 39	{	stable manure.
	{	15 lbs. acid phosphate.
	{	15 " kainite.
" " 40	{	stable manure.
	{	15 lbs. floats.

This plat is coming up quite well, and hopes are entertained of a good stand.

SPRING PLANTING.

PLATS 4 AND 5.

These plats lie side by side, running north and south, with no visible marks to indicate the one from the other. They are of the same size. No. 5 is tile drained ; No. 4 is not. The plats are naturally low, and very stiff and black. Duplicate experiments have been made on each to test the advantage of tile drained over untiled. They were planted on 15th and 16th February. The following are experiments upon each :

Experiment No. 1	{	25 lbs. cotton seed meal.
	{	25 " acid phosphate.
	{	25 " kainite.
" " 2	{	25 " cotton seed meal.
	{	25 " acid phosphate.
" " 3		—Nothing.
" " 4	{	25 lbs. cotton seed meal.
	{	25 " Orchilla phosphate.
	{	25 " kainite.
" " 5	{	25 " cotton seed meal.
	{	25 " Orchilla phosphate.
" " 6		—Nothing.
" " 7	{	25 lbs. cotton seed meal.
	{	25 " bone dust.
	{	25 " kainite.

Experiment No. 8	{	25 "	cotton seed meal.
		25 "	bone dust.
"	"	9	—Nothing
"	"	10	{ 25 lbs. cotton seed meal.
			25 " floats.
			25 " kainite.
"	"	11	{ 25 " cotton seed meal.
			25 " floats.
"	"	12	—Nothing.
"	"	13	{ 25 lbs. cotton seed meal.
			25 " ashes cotton hulls.
			25 " kainite.
"	"	14	{ 25 " cotton seed meal.
			25 " ashes cotton hulls.
"	"	15	—Nothing.
"	"	16	—25 lbs. cotton seed Meal.
"	"	17	—25 " acid phosphate.
"	"	18	—25 " kainite.

In these experiments we have sought to test the value particularly of different forms of phosphates with and without kainite, using cotton seed meal as our form of nitrogen in every instance.

NITROGEN MANURES—PLAT 6.

This plat is tile drained, the tiles running east and west, while the different forms of nitrogen were applied north and south, so that whatever leaching might occur from each nitrogen group could be caught and analysed. This, to date, has been four times successfully accomplished, results of which will constitute the matter of a separate bulletin.

GROUP 1—FORMS OF NITROGEN ALONE.

Experiment No. 1	—5	lbs. nitrate soda.
"	"	2— $3\frac{3}{4}$ " sulphate of ammonia.
"	"	3—Nothing.
"	"	4— $7\frac{1}{2}$ lbs. dried blood.
"	"	5—12 " cotton seed meal.

GROUP 2—NITRATE OF SODA.

Experiment No. 6	{	15 lbs. acid phosphate.
		4 " muriate potash.
		*Mixed minerals.

*Mixed minerals in this plat always mean 15 lbs. acid phosphate and 4 lbs. muriate potash.

- Experiment No. 7 { Mixed minerals.
5 lbs. nitrate soda, equal to $\frac{1}{3}$ ration.
- " " 8—Nothing.
- " " 9 { Mixed minerals.
10 lbs. nitrate soda, equal to $\frac{2}{3}$ ration.
- " " 10 { Mixed minerals.
15 lbs. nitrate soda, equal to full ration.

GROUP 3—SULPHATE OF AMMONIA.

Experiment No. 11—Mixed minerals.

- " " 12 { Mixed minerals.
 $3\frac{3}{4}$ lbs. sulphate of ammonia, equal to $\frac{1}{3}$ ration.
- " " 13—Nothing.
- " " 14 { Mixed minerals.
 $7\frac{1}{2}$ lbs. sulphate of ammonia, equal to $\frac{2}{3}$ ration.
- " " 15 { Mixed minerals.
 $11\frac{1}{4}$ lbs. sulphate of ammonia, equal to full ration.

GROUP 4—DRIED BLOOD.

Experiment No. 16—Mixed minerals.

- " " 17 { Mixed minerals.
 $7\frac{1}{2}$ lbs. dried blood, equal to $\frac{1}{3}$ ration.
- " " 18—Nothing.
- " " 19 { Mixed minerals.
15 lbs. dried blood, equal to $\frac{2}{3}$ ration.
- " " 20 { Mixed minerals.
 $22\frac{1}{2}$ lbs. dried blood, equal to full ration.

GROUP 5 - COTTON SEED MEAL.

Experiment No. 21—Mixed minerals.

- " " 22 { Mixed minerals.
12 lbs. cotton seed meal, equal to $\frac{1}{3}$ ration.
- " " 23—Nothing.
- " " 24 { Mixed minerals.
24 lbs. cotton seed meal, equal to $\frac{2}{3}$ ration.
- " " 25 { Mixed minerals.
36 lbs. cotton seed meal, equal to full ration.

GROUP 6—FISH SCRAP.

Experiment No. 26—Mixed minerals.

- " " 27 { Mixed minerals.
10 lbs. dried fish, equal to $\frac{1}{3}$ ration.
- " " 28—Nothing.
- " " 29 { Mixed minerals.
20 lbs. dried fish, equal to $\frac{2}{3}$ ration.
- " " 30 { Mixed minerals.
30 lbs. dried fish, equal to full ration.

GROUP 7—MIXED NITROGEN.

Experiment No. 31—Mixed minerals.

		{ Mixed minerals.	
"	"	32 { $1\frac{2}{3}$ lbs. nitrate soda.	} equal to $\frac{1}{3}$ ration, mixed nitrogen.
		$1\frac{1}{4}$ " sulphate ammonia.	
		4 " cotton seed meal.	
"	"	33—Nothing.	
		{ Mixed minerals.	
"	"	34 { $3\frac{1}{3}$ lbs. nitrate soda.	} equal to $\frac{2}{3}$ ration.
		$2\frac{1}{2}$ " sulphate ammonia.	
		8 " cotton seed meal.	
		{ Mixed minerals.	
"	"	35 { 5 lbs. nitrate soda.	} equal to full ration.
		$3\frac{3}{4}$ " sulphate ammonia.	
		12 " cotton seed meal.	

GROUP 8—FORMS OF NITROGEN ALONE.

Experiment No. 36—Fish scrap.

"	"	37— " "
"	"	38—Nothing.
"	"	39—Mixed nitrogen.
"	"	40 " "

In the above experiments, such quantities of each form is taken as to represent equal amounts of nitrogen, and these are taken in $\frac{1}{3}$, $\frac{2}{3}$ and full rations. Our object is to test the best form and quantity of nitrogen for cane, as well as to test the other question of loss of these manures by leaching. This plat was planted March 11.

PHOSPHORIC ACID MANURES—PLAT 7.

The object of this plat is to test the form and quantity of phosphoric acid best adapted to cane; using it in a soluble form in dissolved bone black and acid phosphate, in a precipitated form as precipitated bone black and precipitated acid phosphate, and in an insoluble form as bone dust and finely ground Charleston phosphate, called "floats:" also in the natural form of Orchilla guano. Beside above we have a group of gypsum, or land plaster, to answer how far this substance in every super-phosphate may be responsible for its good results. This plat was planted February 20th and 22d.

GROUP 1—DISSOLVED BONE BLACK.

(Phosphoric Acid.)

- Experiment No. 1 { 18 lbs. cotton seed meal.
18 " kainite.
Basal mixture.*
- " " 2 { Basal mixture.
6 lbs. dissolved bone black, equal to $\frac{1}{3}$ ration.
- " " 3—Nothing.
- " " 4 { Basal mixture.
12 lbs. dissolved bone black, equal to $\frac{2}{3}$ ration.
- " " 5 { Basal mixture.
18 lbs. dissolved bone black, equal to full ration.

GROUP 2—ACID PHOSPHATE.

(Soluble.)

- Experiment No. 6—Basal mixture.
- " " 7 { Basal mixture.
6 lbs. acid phosphates, equal to $\frac{1}{3}$ ration.
- " " 8—Nothing.
- " " 9 { Basal mixture.
12 lbs. acid phosphate, equal to $\frac{2}{3}$ ration.
- " " 10 { Basal mixture.
18 lbs. acid phosphate, equal to full ration.

GROUP 3—PRECIPITATED BONE BLACK.

(Precipitated Phosphoric Acid.)

- Experiment No. 11—Basal mixture.
- " " 12 { Basal mixture.
6 lbs. precipitated bone black, equal to $\frac{1}{3}$ ration.
- " " 13—Nothing.
- " " 14 { Basal mixture.
12 lbs. precipitated bone black, equal to $\frac{2}{3}$ ration.
- " " 15 { Basal mixture.
18 lbs. precipitated bone black, equal to full ration.

GROUP 4—PRECIPITATED ACID PHOSPHATE.

(Precipitated Phosphoric Acid.)

- Experiment No. 16—Basal mixture.
- " " 17 { Basal mixture. [ration.
6 lbs. precipitated acid phosphate, equal to $\frac{1}{3}$
- " " 18—Nothing.

*Basal mixture in this group means 18 lbs. cotton seed meal and 18 lbs. kainite.