1891

Results of field experiments with sugar cane.

T S. Adams

SECOND SERIES.

No. 6.

BULLETIN

OF THE

SUGAR EXPERIMENT STATION,

—OF THE—

LOUISIANA STATE UNIVERSITY AND A. & M. COLLEGE,

AT

AUDUBON PARK, NEW ORLEANS, LA.

WM. C. STUBBS, PH. D., Director and Official State Chemist.

RESULTS OF FIELD EXPERIMENTS

WITH

SUGAR CANE.

ISSUED BY THE BUREAU OF AGRICULTURE.
T. S. ADAMS, Commissioner.

LA. STATE UNIVERSITY AND A. & M. COLLEGE.

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The bulletins and reports will be sent free of charge to all farmers, by applying to Capt. T. S ADAMS, Commissioner of Agriculture, Baton Rouge, La.

LOUISIANA SUGAR EXPERIMENT STATION,
AUDUBON PARK, NEW ORLEANS, LA.,
January, 1891.

Capt. T. S. Adams, Commissioner of Agriculture,
Baton Rouge, La.:

Dear Sir:

I hand you herewith Field and Laboratory Experiments with Sugar Cane made during the last season, and ask that it be published as Bulletin No. 6.

Respectfully submitted,

WM. C. STUBBS, Director.

FIELD EXPERIMENTS.

WEATHER REPORT.

The Station has kept an accurate weather record and diary since March 1st, 1886. The following is a condensed record of each years rainfall and temperature.

Condensed Weather Record of Sugar Experiment Station from March 1, 1886, to January 1, 1890.

Month.	Average Temp. Deg.	Maximum Temp. Deg.	Minimum Temp. Deg.	Rainfall Inches.
1886.				
March	63	80	37	9.13
April	69	87	41	7.32
May	76	93	57	3.59
June	83	97	69	11.5
July	83	95	68	3.25
August	84	96	66	4.18
September	80	91	59	5.24
October	73	87	39	1.
November	66	75	33	5.55
December	65	79	26	2.75

1887.				
January	57.	82	22	3.31
February	65.4	80	30	5.23
March	58.2	81	40	3.27
April	71.7	89	57	2.21
May	78.	94	59	6.56
June	84.	94	62	10.35
July	84.	97	68	7.86
August	82.5	95	69	6.7
September	79.	92	56	3.3
October	69.5	86.	40	6.39
November	60.	80	30	.11
December	54.6	77	30	7.14
1888.				
January	56.6.	77	30	3.77
February	59.8	76	37	9.8
March	59.	78	36	5.79
April	73.4	85	54	.91
May	76.7	92	54	11.77
June	79.8	92	65	8.69
July	82.	98	71	5.49
August	81.2	95	70	15.8
September	77.3	89	57	3.29
October	70.6	85	53	3.4
November	62.4	84	34	2.5
December	63.6	71	27	4.12
1889.				
January	54.	71	34	8.3
February	55.	75	31	3.21
March	63.6	79	40	2.38
April	72.	86	47	3.28
May	78.1	91	48	.76
June	82.3	96	57	9.43
July	85.6	92	68	7.15
August	81.	90	66	5.74
September	79.1	91	51	5.3
October	68.1	86	51	----
November	58.9	82	30	----
December	63.	80	45	.43

SUGAR EXPERIMENT STATION.

SUMMARY OF METEOROLOGICAL OBSERVATIONS MADE AT AUDUBON PARK, DURING THE YEAR 1890.

Name of Month	Monthly Mean Temperature.	Mean Maximum Temperature.	Mean Manimum Temperature	Highest Temperature.	Date of Occurrence.	Lowest Temperature	Date of Occurrence.	Monthly Range of Temperature.	Rainfall in Inches	No. of Cloudless Days.	No. of Partly Cloudy Days.	No. of Cloudy Days.	Prevailing direction of Wind.
January.....	61 8	72.0	44.3	80.	7th and 12th	32.	17th.	48.	1.00	4.	25.	2.	North.
February	62 8	71 8	50.0	81.	26th.	36.	10th.	45	3.10	2.	23.	3.	South.
March	60 7	69.1	51.0	79.5	31st.	27.	2d.	52 5	1.98	5.	23.	3.	South.
April	69 7	78 3	60.0	84.5	14th.	42.	11th.	42.5	3.27	4.	21.	5.	South.
May	74.7	82.8	66.0	87.5	29th.	56.	9th.	31.5	10.71	4.	23.	4.	South.
Jnne	87 8	89 0	72.1	94.0	29th.	68.	23d.	25.5	4 15	1.	25.	4.	South.
July	81 7	89.8	73.3	95.0	5th and 6th	69.	9th and 27th	26.0	7.30	1.	3.	27.	South.
August	79.8	87 9	71.9	92.5	26th	67.	11th.	25.5	7.75	0.	30	1.	S. W.
September	76.3	84.9	68.9	90.0	19th.	56.5	30th.	33.5	4.56	2.	25	3.	North,
October	67 45	73 4	56 9	87.0	12th.	38.0	31st.	49.0	4.41	7.	22.	2.	North.
November.....	61 7	71 12	52 45	82.0	16th.	39.0	4th.	43.0	0.87	8.	20.	2.	North.
December	55.3	63.8	44.2	78.0	7th.	33.0	19th.	45.0	3.55	12	17.	2	North.

In the following table is presented the four years in a comparative form, and it may be useful in determining some of the factors which go toward solving the problem of good crop years.

The winter of 1886 was very severe, destroying much of the seed and stubble, the spring was late and cold, and good stands of cane were not obtained until May. The subsequent seasons were fair, and where good stands prevailed the crop was medium.

The winter of 1887 was mild and conducive to excellent seed cane, the spring was moderately dry and warm; followed by a warm and wet summer grading into a cool dry autumn; conditions favorable to heavy tonnage.

The winter of 1888 was fairly propitious, but the spring was excessively wet, preventing the proper cultivation of the cane. The wet weather extended to July, causing a serious postponement or abandonment of the regular "lay-by" of cane. These rains were succeeded by a dry, cool fall, giving us light tonnage, but heavy sugsr yield, due more to the low glucose content than excess of sugar in cane.

The year 1889 will always be remembered as the year of drouth. The rainfall for the year was only forty-six inches, and this fell mostly in the winter and summer, giving us a spring and fall of unexampled dryness—a dryness which has been prolonged into the winter of 1890 and up to this time has scarcely been broken.

The year 1890 will be memorable for the enormous crop produced. It was ushered in amidst a drouth lapsing from 1889, with mild, fair weather in January and February, giving an early germination and growth to both plant and stubble cane—both to be cut down by an unusual freeze early in March; followed by a propitious spring, with an abundant rainfall in May, preceding enough dry weather in June to permit a careful "lay-by" of the crop. Copious showers, at no time excessive, prevailing through July, August, September and October, which together with an abundance of sunshine and a continuance of warm weather, all conspired to give us the largest tonnage perhaps ever known in our history. The season was favorable throughout to the growth of cane, and hence the large crop was

harvested in a very immature condition. Neither the temperature nor rainfall has been excessive, but well distributed throughout the season, extending well into the fall.

Taking the table and the seasons, we find that a dry, warm winter followed by a moderately dry spring, and this in time succeeded by a hot, wet summer, are conditions favorable to maximum growth of cane. It seems, too, that a dry, cool autumn, beginning early in September, is necessary to produce a large sugar content.

After the cane is laid by, frequent showers of considerable intensity appear highly beneficial.

The following is the comparative weather statement for the five years:

	Aver. Temp.	Max. Temp.	Min. Temp.	Rainfall Inches.
	deg.	deg.	deg	
1887	70.3	97.	22.	62.43
1888	69.3	98.	27.	75.33
1889	70.1	96.	30.	45.98
1890	69.98	95.	27.	52.65
Spring months, 1886	69.3	93.	37.	20.04
Spring months, 1887	69.3	94.	40.	12.04
Spring months, 1888	69.7	92.	36.	18.47
Spring months, 1889	71.2	91.	40.	6.42
Spring months, 1890	68.4	87.5	27.	15.96
Summer months, 1886	83.3	97.	66.	18.93
Summer months, 1887	83.5	97.	62.	24.91
Summer months, 1888	81.0	98.	65.	29.98
Summer months, 1889	82.9	96.	57.	32.32
Summer months, 1890	83.1	95.	67.	19.20
Fall months, 1886	73.0	87.	33.	11.79
Fall months, 1887	69 5	92.	30.	9.80
Fall months, 1888	70.1	89.	35.	9.19
Fall months, 1889	68.7	91.	34.	5.30
Fall months, 1890	74.5	92.5	38.	9.87
Winter months, 1887	59.	82.	22.	15.68
Winter months, 1888	6.6	77.	27.	17.69
Winter months, 1889	57.3	82.	31.	11.94
Winter months, 1890	62 5	81.	45.	4.53

FIELD EXPERIMENTS.

have this year been confined to the following;

1. Physiological questions.
2. Varieties best adapted to Louisiana.
3. Manurial requirements of cane.

PHYSIOLOGICAL QUESTIONS.

In this plat were conducted experiments to test the following questions:

1. What distance apart shall we give our cane rows?
2. What part of the cane is best to plant?
3. What amount of seed is required for best results?
4. Does cutting the cane injure it?
5. Is stubble or plant cane best for seed?

This plat was planted October 30 and 31, and November 4 and 5, 1889, in rows six feet apart, except in first series of questions. Each row received seventeen pounds of a fertilizer specially prepared for this plat. It was cultivated in the usual way and laid by June 26 and 27.

To determine the first question.

What Distance Apart Shall Cane Rows Be?

Rows were laid off three, four, five. six, seven and eight feet, and three taken for each experiment. These rows were exactly one-half acre in length. The were planted with our home striped or ribbon cane, using three running stalks. It germinated well in January was cut down by the cold in March, but soon recovered. On May 17 all the stalks on each experiment were carefully counted, and at harvest every stalk was again counted and the cane weighed. Each experiment was separately worked up in the sugar house and careful analyses of the juices made in the laboratory.

Below are appended the results:

EXPERIMENTS IN DIEFERENT WIDTHS OF ROWS IN PLANT CANE FOR 1890.

KIND OF EXPERIMENT.	Number of Stalks May 17.	Number of stalks harvested.	Weight of cane in pounds.	Average weight of a stalk	Number of stalks per acre.	Tons per acre.	ANANALYSIS OF JUICE.				
							Total solids	Sucrose.	Glucose.	Glucose ratio.	Purity Coefficient.
3 rows 3 feet wide.	1177	555	1848	3.33	25,900	43.12	13 0	10.00	1.67	16.7	76.9
3 rows 4 feet wide.	1156	7~4	2408	3.10	27,440	42.14	12.5	9.30	1.69	18.1	74.4
3 rows 5 feet wide.	1292	917	3034	3.31	25,976	42.47	13.5	10.45	1.61	15.4	77.4
3 rows 6 feet wide.	1207	1095	3300	3.01	25,550	38.50	13.3	10.20	1.67	16.3	76.6
3 rows 7 feet wide.	1396	1308	3766	2.88	26,160	37.66	13.3	10.00	1.47	14.7	75.1
3 rows 8 feet wide.	1382	1420	4244	2.98	24.850	37.13	12.8	9.60	1.48	15.3	75 0

A study of the above reveals the fact that in favorable seasons many stalks after attaining considerable size perish by overcrowding. This was quite apparent at harvest in the three and four-foot rows by the frequent occurrence of perfectly dead stalks several feet long. The above table also tells the tale of destruction in a most convincing manner.

The three and four-foot rows were prostrated by the blow of August 18, and never afterward recovered. The rest of the plat was but slightly injured. This prostration caused many stalks to die. Since then these experiments have not had a fair showing with the plat. The results are similar to those obtained previously, though in diminished quantities. The three-foot rows have given the largest yield and the heaviest stalk, followed closely by the five and four-foot rows. The increase of the three-foot rows over the eight-foot is barely six tons—about enough to cover the increased seed required to plant the former, while the five foot rows give an increase sufficient to cover the increased seed and very fair profit besides (over three tons per acre).

It may be remarked that the three and four-foot rows received no cultivation after April 14, the cultivator used for the rest of the crop being too wide for these rows.

The above experiments are not so impressive in their results as those of previous years, yet they plainly declare in favor of narrowing our rows. Any planter is safe in adopting five-foot rows, and upon these the two-horse cultivators can be successfully used.

What Part of the Cane is Best to Plant?

is the second question in the physiological plat. To answer this, selected stalks of cane were cut into 2 and 3 parts, i. e., tops and butts, and tops, middles and butts. Each were planted separately and three rows taken for each experiment. The ribbon cane was used for seed. The following are the results:

EXPERIMENTS IN PLANTING DIFFERENT PARTS OF THE CANE.

Kind Planted.	Number of stalks May 17.	Number of stalks harvested.	Weight of cane in pounds.	Average weight of a stalk.	Tons per acre.	Analyses of Juice.				
						Total solids.	Sucrose.	Glucose.	Glucose ratio.	Purity coefficient.
3 rows, upper half.....	1451	1364	3866	2.83	45.10	12.3	9.30	1.67	17.9	75.8
3 rows, lower half.....	1403	1211	3686	3.04	43.00	12.7	9.60	1.64	17.0	75.5
3 rows, upper third.....	1379	1065	3018	2.83	35.21	12.4	9.50	1.72	17.1	76.6
3 rows, middle third.....	1184	1281	3328	2.60	38.82	12.3	9.00	1.89	21.0	73.0
3 rows, lower third.....	1467	1309	3514	2.68	41.02	13.3	9.15	1.67	18.2	68.8

The experiment in the upper thirds of the cane is from some cause behind the others. An old road formerly crossed the plat and perhaps this may in part account for the loss of stalks between May and December.

Enough is shown, however, in the above to confirm previous deductions that the upper part of the cane was the equal, if not the superior, to any other portion for seed. Some day when the agriculture of cane shall be disconnected from the manufacture, the upper thirds of all canes will be planted and the rest at an increased price will go to the central factory. The third and fourth questions are combined in our experiments. The ques-

What Number of Stalks shall be Planted?

is duplicated in cut and uncut canes. Fortunately last year the cane was straight and could be planted without using the knife. This year, a repetition of this experiment is denied by the intense crookedness of the cane. In the first series the entire cane was planted "uncut," and in the second it was cut into lengths of twelve to eighteen inches. Purple cane was used for seed. The following are the results.

EXPERIMENTS IN PLANTING DIFFERENT NUMBER OF STALKS "UNCUT AND CUT"

How Planted.	Number of stalks May 17.	Number of stalks harvested.	Weight of cane in in pounds.	Average weight of a stalk.	Number of stalks per acre.	Tons per acre.	Analyses of Juice.				
							Total solids.	Sucrose.	Glucose.	Glucose ratio.	Purity coefficient
1 stalk uncut	749	1065	3260	3.06	24,840	33.01	13.2	9.20	1.62	17.6	69.7
1 stalk cut	641	1180	3248	2.8[illegible]	27,580	37.[illegible]7	12.4	9.00	1.56	17.3	72.5
2 stalks uncut	[illegible]09	1200	3698	3.08	28,000	4[illegible].14	13 4	9 90	1.56	15.7	73 8
2 stalks cut	775	1180	3208	2.72	[illegible]7,58[illegible]	31.42	12.2	8.65	1.57	18.0	70.9
3 stalks uncut	1375	1257	3722	2.91	29,330	43.42	13.4	10.05	1.43	14.2	75.0
3 stalks cut	997	1240	3000	2.48	28,910	35.93	13.3	9.90	1.51	15 2	74.4
4 stalks uncut	1511	1282	3900	3.04	29,890	45.50	13.4	9.50	1.71	18.0	70.8
4 stalks cut	1279	1324	3676	2.70	30,870	42.91	13.6	9.75	1.71	17.5	71.6

To plant an acre, one stalk continuously, there are required about two tons of cane, four tons for two stalks, six tons for three, and eight for four. Remembering this, it will be seen from the above that there has been no profit in planting four or even three stalks. As heretofore announced, with good cane two stalks are sufficient to insure the largest returns. Upon good lands one stalk uncut may give excellent returns. The second question, judging from the results of this year, are most positively assured. In every instance, the uncut has given a larger tonnage, with a larger stalk than the cut, and in all but one, a larger sugar content. In the spring the uncut showed a superior height over the cut, and this superiority was visibly maintained up to the prostration of the cane in September.

Judging from these experiments, cutting cane should be avoided as far as possible, and the knife used only to secure horizontal positions for the cane.

Which is Best for Seed, Plant or Stubble Cane?

The last series in the physiological plat seeks to solve the merits of plant and stubble for seed. Selected plant cane was used on the first experiment; selected first year stubble on the second; ordinary second year stubble on the third, and small third year stubble coming from planting made the year the station was established near Kenner. These were planted under

the same conditions, but in the spring it was found necessary to extend a ditch through this part of the plat to drain other plats nearer the river. It passed through the first year stubble, eliminating two rows and leaving only one, and this at a good distance from the ditch. The results of this experiment are based on one row, and are probably too high. The following are the results:

WHICH IS THE BEST SEED, PLANT OR STUBBLE CANE?

Kind of Cane.	Number of Stalks May 17th.	Number of Stalks Harvested.	Weight of Cane in Pounds.	Average Weight of a Stalk.	Number of Stalks per acre.	Ton per acre.	Analyses of Juice.				
							Total Solid.	Sucrose.	Glucose.	Glucose Ratio.	Purity Coefficient.
Plant	1552	1342	3417	2.54	31,290	39.86	14.5	11.00	1.47	13.3	75.8
First year stubble	1029	1449	424-	2.93	33,810	49.56	15.0	11.55	1.35	11.6	77.0
Second year stubble.	1030	1281	3345	2.61	33,390	39.02	13 6	10.20	1.56	15.2	75.0
Third year stubble	1296	1207	3105	2.49	28.210	35.23	13.3	10.05	1.67	16.6	74.7

The above confirm previous results that stubble cane is the equal if not the superior of plant cane, for seed.

Perhaps this may be accounted for by closely studying the history of cane planting. For years cane has been propagated by planting the tops of stubble cane, and may not this custom have superinduced in the cane a stronger vitality in the tops over the butts and in the stubble over the plant? May not Darwin's doctrine of "selection" and "inherited habit" fully account for the fact, if indeed it may yet be called a fact?

VARIETIES OF CANE

The number of really distinct varieties of cane are believed to be few, yet under different environments, such as soil, climate, latitude, etc., these few varieties have given origin to a large number of sub-varieties—the latter in many instances differing from each other by such slight variations that almost a botanical examination is necessary to establish the difference. The Station has received over 100 so-called varieties from different parts of the world, and of these nearly seventy have been success-

fully grown. For nearly three years the Station has watched with pleasure the growth and development of these varieties. Several curious facts have been established.

1. The facility with which a varieties changes its apparent characteristics under changed conditions of soil and climate. When a foreign variety is received, it is carefully examined and its characteristic features noted in a record book. At the harvest each season, another similar but more extended record is made. A comparison of these records alone would fail to identify most of the varieties under cultivation here. This is notably the case with white canes—all having a tendency here to assume more less a colored appearance. This is partially accounted for by the difference in maturity between the foreign cane receive and its progeny here.

2. The tendency of most varieties to redden in color, particularly when stripped of their leaves and on the sunny side of the stalk. Once, early in October, samples of every variety were carefully cut and minutely examined. The peculiar dharacteristics of each kind recorded. At the same time a few standing stalks of each variety were carefully stripped of the the lower leaves and left till December fully exposed to the weather and sun. Their properties were again recorded. In many instances the most apparent properties, such as color, prominence of eyes, etc., had completely changed. The change of color is always toward red.

3. Frequently canes, when first received of widely different characteristics, have, by constant cultivation, gradually gravitated toward each other in general appearance, and to-day it is quite difficult to distinguish between them. This is particularly the case with the lighter colored varieties.

4. The gradual diminution in size and increase of sugar content of almost every variety, while undergoing acclimation.

5. The power of resisting the prostrating effects of the storms so usual here in the fall, and which frequently injure seriously our home grown or acclimated varieties. This property may be greatly modified or perhaps eliminated by acclimation.

6. The impossibility of determining the value of a cane by a few years of cultivation here. This is rendered more apparent each year, several canes which were very unpromising the first year or two are by acclimation yearly improving and may ulimately be useful and *vice versa.*

The Station is growing the many varieties now on hand with a two fold object. (1) Affording a variety adapted to our wants, and (2) of ultimately properly classifying the varieties and eliminating all closely related subvarieties. Unfortunately for the botany of cane, the nomenclature of varieties is execrable. There are no specific names, common in all countries. The same cane is known in different countries by different names, frequently the latter being only local. Hence on receipt of a foreign variety, its name gives no indication of its presence already in our collection. A few instances of this will illustrate the trouble and confusion which local names sometimes give. The Station has been cultivating the Lahaina (called after the island of this name in Hawaii, on which it was first cultivated after its introduction there by Capt. Pardon Edwards) for several years and has studied carefully its merits. For a long time the botanical gardens and stations had alluded favorably to a variety called *Keni Keni.* This variety after much effort, was secured from the director of botanical gardens in Jamaica, and successfully grown the past year. With great suprise it was found to be identical in every respect to the Lahaina, which it had already growing in quantity. Another instance, a large red cane, with a small black stripe, came to it, a few years since from the East, under the name of *Cavenge ie.* The following year the same cane came from the west under the name of Attamattie. In a collection received from the botanical garden of Jamaica last year is a cane strongly resembling the two above in every repect under the name of *Po-a-ole.* The name of a cane, therefore, gives no clue to its true variety.

Of the foreign varieties tried several are unworthy of extensive propagation, some are improving yearly under our cultivation, and may ultimately become useful by thorough acclimation, while a few are full of promise. There are some who believe it useless to attempt to acclimatize foreign varieties, and think that

energy is better expended in improving the purple and striped varieties already well domiciled. While every effort should be made to accomplish the latter, the former, too, is certainly worthy of persistent trial. There is no record of the introduction and trial in this State of any large quantity of foreign canes in the past. The small creole cane, now deemed everywhere unworthy of cultivation, was once the chief variety in this State. The purple and the striped supplanted this. Were they selected, after a long competitive trial with a great number of varieties, on account of their special adaptation to our soil and climate, or were they simply introduced by chance and became the canes of this country simply because they were found superior to their predecessor? It is unwise to conclude, without exhaustive trial, that we have the best varieties of cane *known*.

It may be worthy of remark that these two canes are grown extensively only in Louisiana and Java. In Java our purple is known under the name of Teboe Cheviron (dark violet), which there takes twelve months to mature It is often called Black Java, and this is so identical with our purple cane that the Station has stopped its separate propagation. The striped cane is grown there under the name of Batavian Striped, and this variety here is so nearly identical with our striped and with the Mexican striped that its separate cultivation hereafter will be abandoned. Private advices from Java tell us of a cane cultivated there to a limited extent which tassels in eight months; it is called Teboe Borneo, and is highly recommended for this country. The sample sent us was was dead beyond resurrection, and no effort has been made in the last few years to obtain cane from Java on account of the *sereh* disease there prevailing.

In this paper will be given, first, a catalogue of the canes under cultivation, with short description of each, and second, analysis of their juices, with tonnage per acre of those which have been under cultivation long enough to secure the necessary quantity for experimentel tests.

The canes are divided into three classes on the color line only. The first includes all canes of a white, yellow or greenish

color. The second all striped varieties, and the third all solid colors other than those given in class one.

FIRST CLASS.—WHITE, GREEN OR YELLOW COLOR.

No. 1.—*Beltran* cane, called also *Panache*, presented to the station by Mr. R. Beltran, of New Orleans, and by him cultivated extensively. Stalk long and medium size, color green yellow or white, with black bloom adhering just above nodes; eyes flat and not prominent; stubbles well. A very fine cane.

No. 2.—*La Pice*. Said to have been introduced by Mr. Burgundy La Pice, of St. James parish, from ——'s. With similar characteristics to No. 1.

No. 3.—*Tibboo Merd*. Came from Manilla islands and is a most excellent variety of cane. In color, size and black bloom (cerosin or Invertens Taylorri) closely resembling Nos. 1 and 2, but with prominent, plump, round sharp eyes. Stubbles well. Leaves broad and spreading.

No. 4.—*La Sassier;* obtained from Mr. Henry Le Sassier. New Orleans. Almost identical with Nos. 1 and 2 and perhaps from same origin.

No. 5.—*Bourbon;* from Trinadpd. When received in a mature state the stalk was yellow; under cultivation here it has a greenish white color, more or less tinged with rose where stalk is exposed. Large, plump and pointed eyes, stalks large, leaves light green and not very broad; greatly changed by cultivation here.

No. 6.—*Crystallina;* originally from Tahiti, sent by Dr. Alvarez Reynoso, of Cuba, from his private collection. A green cane with yellowish spots. Some black bloom, with upper immature joints slightly pink. Small pale green leaves. No beard. Stalks long and medium size. Eyes medium size and pointed, and very similary to No. 5.

No. 7.—*Green Cane;* came from United States consul at Havana and by him called "green." It closely resembles No. 6.

No. 8.—*Yellow Cane;* same source as No. 7. Stalks medium size. Yellow color, with rose tint at the node, and resembles closely Otaheite No. 9.

No. 9.—*Blanca d' Otaheite*: as its name imports, originally from Tahiti, sent by Dr. Alvarez Reynoso. Yellow color. Leaf sheaths full of beard. Stalks medium. Leaves broad and rather adherent. Eyes round, plump and small. Like No. 8.

No. 10—*Portier;* originally from Mauritius, sent by Dr. Alvarez Reynoso. Stalks large and of medium height. Leaves pale green, small, few and open. Color greenish and changing to yellow in maturing. Has not stubbled well. Resembles Lahaina No. 12.

No. 11.—*Loucier* (spelt also Losier); originally from Mauritius, sent by Dr. Alvarez Reynoso. A vigorous grower. Suckers very well. Stalks greenish yellow with rose tints. Large. Leaves abundant. Greener than No. 10, and sheaths full of bristles. Eyes full, medium size and pointed.

No. 12.—*Lahaina;* from Hawaiian Islands, where it is extensively cultivated. Color green, changing to yellow in maturing. Leaves small, pale green and flared. Maturing nearly to the top. Long jointed. Black bloom. Upper portion of joint frequently larger than lower. Has not stubbled well with us. Stalks large. Tonnage heavy. Originally from Marquesas Islands.

No. 13.—*Caledonia Queen*, from Queensland. Color bright apple-green, without bloom. Stalks large, but medium height. Light green leaves. Very promising.

No. 14.—*Creole Cane;* this cane formerly extensively cultivated in this state. Worthy of a place only in a botanical collection. Well known to the older planters.

No. 15.—*Papuha;* native of Hawaiian Islands. Stalks large and tall. Greenish yellow, with faintly red narrow stripes. Suckers well, and so far stubbles well.

No. 16.—*Uwala;* native of Hawaiian Islands; stalks large and tall; color, green with white spots near node, turning red when exposed to the sun; leaves abundant, a vigorous grower, suckers and stubbles well; pith of the cane yellow.

No. 17.—*Kokea*, a native of —— Islands; stalks medium and tall, green with red stripes scarcely perceptible; a very promising cane.

No. 18.—*Bamboo;* originally from Mauritius; sent to station by Dr. Reynoso; stalks medium, amber colored with occasional rose tint; enlarged nodes (hence its name), and very large and projecting eyes; leaves adherent; suckers enormously and stubbles well. A very promising cane.

No. 19.—*Rose Bamboo;* a native of Queensland; an enormous cane, stalks frequently weighing 8 to 10 pounds, with slightly enlarged nodes, joints more or less rose colored; tall, stright cane and promising; leaves large, long sheathed and easily removed.

No. 20.—*Keni Keni,* originally from Marquesas. Received from botanical gardens, Jamaica, and is identical with Lahaina; called Keni Keni (ten cents) because it used to be sold in the streets of Honolulu for this sum.

No. 21.—*Vulu Vulu;* received from botanical gardens, Jamaica; stalks large, greenish yellow, otherwise very similar to No. 20; a promising cane.

No. 22.—*China;* received from botanical gardens, Jamaica; stalks large, green; suckers well, and very similar to No. 20; a promising cane.

No. 23.—*Salangore;* received from botanical gardens, Jamaica; stalks large, dirty white color; leaves, light green; a cane highly prized in some countries.

No. 24.—*Elephant (Green);* received from botanical gardens, Jamaica; stalks very large and vigorous; color, greenish yellow; leaves darker than Salangore; apparently a good cane.

No. 25.—*Lakoua;* received from botanical gardens, Jamaica; large canes, well suckered; color, yellow, tinged with red when exposed; leaves, dark green; a promising cane.

No. 26.—*Cuban;* received from botanical gardens, Jamaica; small green canes; suckers heavily; long joints; leaves light green; in size and appearance not promising here.

No. 27.—*Sacuri;* received from botanical gardens, Jamaica; large stalks and heavier leaves, otherwise resembles No. 26; from analysis of juice, a most promising cane.

No. 28.—*Japanese or Zwenga;* imported by Gen. LeDuc, commissioner of agriculture, from Japan. This cane was obtained

from Soniat Bros., Tchoupitoulas plantation. Its chief merit is its extreme hardiness, growing upon ditch banks without cultivation. May be useful in higher latitudes. It is a small, tall, white cane, very hard and low in sugar; stools and rattoons well.

No. 29.—*Soniat;* a few canes found in Messrs. Soniat's field, and called by them "bastard canes;" had the lower joints purple and upper joints white. They were planted first as whole canes and second cut into pieces, the purple joints in one row and the white joints in another. Three, and perhaps four, distinct varieties so far as outward appearances have been obtained. The white variety has been named *Soniat,* and will be fully described after further trial.

SECOND CLASS—STRIPED CANES.

No. 30. *Mulay;* received from botanical gardens, Jamaica; stalks large, stools well; amber with green streaks, leaves large and abundant and dark green; a beautiful cane, standing upright in row.

No. 31.—*Brisbane.* Received from botanical gardens, Jamaica; in every respect like No. 30.

No. 32.—*Green Rose Ribbon.* Received from botanical gardens, Jamaica. Characteristics like No. 30.

No. 33.—*Red Ribbon.* Received from director of botanical gardens, Jamaica. It is identical with our common striped or ribbon cane, though not yet fully acclimated.

No. 34.—*Mexican Striped.* Received from Mexico, and identical in every respect with our common striped cane, so much so that the separate growth has been discontinued.

No. 35. *Batavian Striped.* Originally from Tahiti, and hence often called Otaheite Striped. Received from United States consul at Gaudaloupe. For two years after this cane was received it was small and low in sugar content. Last year it developed into a fine cane, identical in every respect with our common striped No. 36.

No. 36.—*Cypremort Striped.* Received originally from Mr. Jules Burguieres, of St. Mary, a few large, fine stalks, and have since separately planted. Is a choice selection of our striped or

ribbon cane, and are pale yellowish green canes, with reddish purple stripes of more or less width, often almost obliterated.

No. 37.—*Tsimbic*, received from botanical gardens, Jamaica. Large cane. Color yellow with reddish-purple stripes. Leaves narrow and medium green. A very attractive cane.

No. 38.—*Ysaquia*, received from botanical gardens, Jamaica. Canes medium. Color brown with whitish stripes. Otherwise closely resembles No. 37

No. 39.—*Vituahaula*, received from botanical gardens, Jamaica. Our cane is striped with red and green, while our original description calls for a light purple color. Fears are entertained that this variety has been mixed with the next.

No. 40.—*Horne*, received from botanical gardens, Jamaica; canes medium; greenish, with reddish stripes. Worthy of future trial.

No. 41.—*Ainakea*, or Dark Rose Bourbon; originally from Maritius; received here from Honolulu. Stalks large, color green, with bright red stripes, of varying widths, foliage bright green, strongly appressed to the upright stalks, with an occasional leaf striped with purple; its size and general appearance attractive.

No. 42.--*Kanio*, or Light Rose Bourbon; originally from Mauritius; same source as No. 41; stalks smaller than No. 41, of apple green with yellow and red stripes; leaves a darker green than No. 41; not promising.

No. 43.—*Akilolo* (light striped); indigenious in Hawaiian Islands; a beautiful cane, stalks large, intensely green, with deep reddish purple stripes of varying widths, leaves medium green, moderately open top, pith slightly yellow; apparently an attractive cane.

No. 44.—*Alkilolo* (dark striped). Indigenous in Hawaiian Islands; in color, foliage and general appearance like No. 45, but much smaller in size.

No. 45.—*Manulete*, indigenous in Hawaiian Island; stalks large and tall; color, dark reddish purple, with stripes of varying width of lighter purple; foliage, deep green; midribs red, with sheaths more or less purplish; upright in growth, with adherent leaves; a promising cane.

No. 46.—*Cavengerie.* Originally from Queensland; received from Dr. Alvarez Reynoso, Havana; stalks large and tall; dark red, with faintly black stripes; closely adherent top, leaves more or less variegated with white stripes; very productive suckers, and stubbles well; tonnage very large. Its only defect is its low sugar content, which improves with acclimation.

No. 47.—*Attanattie.* Originally from Queensland; received from Honolulu; indentical with Cavengerie, No. 46.

No. 48.—*Po-a-ole.* A red cane with narrow black stripes; strongly like Cavengerie, No. 46; received from Director botanical gardens, Jamaica.

No. 49.—*Nicholls.* This name has been assigned to the striped variety, developed from the experiments given under No. 29. It is named in honor of the present governor of Louisiana, F. T. Nicholls. At present there seems to be two varieties of this striped, a light and dark.

THIRD CLASS—SOLID COLORS OTHER THAN NO. 1.

No. 50.—*Norman.* From botanical gardens, Jamaica; stalks small, numerous and erect, of light purple color; leaves pale green, with light purplish vein down the center of each. Suckers well.

No. 51.—*Grand Savanne.* From botanical gardens, Jamaica. Stalks small, very numerous—erect—light purple. Leaves dark green and broad. Suckers enormously.

No. 53.—*Naga.* From botanical gardens, Jamaica. Stalks small, but numerous. Color deep purple, nearly black. Leaves moderately heavy, but narrow. Is highly recommended as a forage plant. This cane and Nos. 51 and 50 belong to a peculiar type of canes, of which the Japanese is a familiar example. They are not promising as sugar plants save, possibly, in higher latitudes, where their resistance to cold may outweigh their sugar defects.

No. 53.—*Java, Light.* From botanical gardens, Jamaica. Stalks small; color light purple; leaves heavy; not a promising cane.

No. 54.—*Java, Black.* Received from Antigua. Stalks medium; color dark purple; leaves of a dark green. Identical in appearance with our darkest purple canes. Our home grown purple canes often present every shade of purple. After a cultivation of several years this cane has same characteristics.

No. 55.—*Hope.* Received from botanical gardens. Jamaica, stalks medium, of light purple, and resembles closely No. 53, except the joints are longer.

No. 56.—*Breheret;* received from botanical gardens, Jamaica; stalks medium, reddish purple; short thick joints covered with a thin coating of cerosin; upper part of sheath with a row of harmless bristles; a promising cane.

No. 57.—*Marabal;* received from botanical gardens, Jamaica; stalks large, joints long; otherwise like No. 56 in every respect; a cane full of promise.

No. 58.—*Elephant—Purple.* This is an enormous cane, light purple color; received from Mr. Ed. Drouet, of New Orleans; introduced by Mr. Eugene A. Duchamp, of St. Martinsville, in 1875; is a curiosity worthy of a place in a botanical garden.

No. 59.—*Cuapa;* received from botanical gardens, Jamaica; stalks small, short jointed; color nearly black; without bloom; very much like Ohia.

No. 60.—*Liguanea;* received from botanical gardens, Jamaica; stalks medium, longer joints than No. 59; otherwise exactly alike.

No. 61.—*Ohia;* indigenous to Hawaiian Islands; stalks medium; color a Pale brown, turning quickly blackish brown when leaves are removed; without bloom; leaves intensely green, adherent closely to stalk; midrib of sheaths of leaves purplish.

No. 62.—*Honuaula;* indigenous to Hawaiian Islands; stalks larger than No. 61; otherwise general appearance is same; a cane of promise.

No. 63.—*Papaa;* indigenous to Hawaiian Islands; smaller than No. 61; otherwise exactly alike; has little or no promise.

No. 64.—*Bird.* This is the name assigned to the purple variety developed by the experiment given under No. 29. The color of this cane is quite different from our common purple cane. It has been named in honor of Major T. J. Bird, our late commissioner of agriculture.

The following varieties were lost in transplanting.

No. 65, Tourkoury; No. 66, Batramie; No. 67, Waphendnow; No. 68, Hillii; No. 69, Bouronappa; No. 70, Pine; No. 71, Bourow; No. 72, Nain; No. 73, Queensland.

All of the varieties, except those received from the botanical gardens of Jamaica, were grown in sufficient quantity to be worked up in the sugar house. Those received from Jamaica were all used for seed except a few stalks which were submitted to analysis. They were harvested, planted and analyzed October 10 and 11. This was very early in the season for even plant cane of our home grown varieties to give high results; therefore due allowance must be made for some of these seemingly extraordinarily low results. Again experience has shown, that single-stalk analyses are far from being true indices of plats or fields of cane. Some of these canes are full of promise, while others, from their growth, general appearance and analytical results, are unworthy of further cultivation save in a botanical collection. These canes were received in August, 1889, and planted in the horticultural hall under glass, where they remained until April, when they were transplanted to the field. In transplanting, each sucker was carefully removed from its mother stalk and planted separately about two feet apart. At harvest each plant had produced a clump of many stalks, the number varying greatly with the variety. No effort was made this year to determine the tonnage per acre. Enough land has been planted to accomplish this purpose next season. A table of analyses is herewith given.

These canes were weighed and put twice through a small three roller hand mill and percentage of extraction of each variety carefully determined The new canes from bud variations and the Japanese were likewise treated and are also given for comparison.

Analyses of canes obtained from the Jamaica botanical gardens and grown for the first time upon the grounds of the Louisiana Sugar Experiment Station, New Orleans:

No. of Cane	Name of Variety	Per Cent. of Juice Extracted	Total Solids	Sucrose	Glucose	Solids not Sugar
20	Keni Keni	75.3	13.16	8.9	3.23	1.03
21	Vulu Vulu	76.7	10.10	4.0	4.75	1.35
22	China	74.3	11.46	6.1	4.00	1.36
23	Salangore	75.0	11.49	6.8	3.23	1.46
24	Elephant (green)	70.4	12.56	8.7	2.78	1.08
25	Lakoua	68.0	11.67	8.0	2.22	1.45
26	Cuban	69.0	12.43	8.4	2.94	1.49
27	Sacuri	70.0	14.91	11.2	2.04	1.67
30	Malay	73.8	9.04	3.2	4.17	1.67
31	Brisbane	74.4	11.43	6.8	3.70	.93
32	Green Rose Ribbon	71.3	9.74	3.8	4.35	1.59
33	Red Ribbon	70.2	12.30	8.3	2.44	1.56
37	Tsimbic	70.1	11.83	6.8	4.00	1.03
38	Ysaquia	72.8	8.79	2.5	4.54	1.75
39	Vituahaula	75.1	11.75	6.7	4.35	.70
40	Horne	72.8	11.54	6.9	3.12	1.52
48	Po-a-ole	74.3	9.87	4.4	4.00	1.47
50	Norman	67.2	10.70	6.0	4.17	.53
51	Grand Savanne	68.4	10.60	5.3	4.76	.54
52	Naga	66.6	12.85	7.3	4.34	1.21
53	Java Light	72.6	13.60	9.3	3.12	1.18
55	Hope	72.2	10.40	7.5	2.48	.42
56	Breheret	74.3	9.50	4.4	4.17	.93
57	Marabal	75.0	12.80	7.1	3.23	2.47
59	Cuapa	69.2	12.43	8.2	2.78	1.45
60	Liguanea	68.6	11.65	6.7	3.85	1.10
29	Soniat	74.1	12.30	7.9	2.44	1.86
49	Nicholls	72.8	12.80	9.5	2.12	1.18
64	Bird	72.6	13.20	9.9	2.43	.87
28	Japanese	58.1	10.16	2.5	5.00	2.66
58	Elephant (dark)	70 4	12.56	8.7	2.78	1.08

In the above, the red ribbon, identical in every way with that grown here generally, is lower in sucrose than many others. From this, one would infer that in acclimation the other canes would probably do as well, if not better than this variety has already done by constant cultivation here.

The remaining varieties were grown in sufficient quantities to work up in the sugar house and determine the tonnage per acre. However, with a few of these varieties, not enough seed was available to plant continuously as is usual. The stalks were

cut up into pieces of about one foot in length and these were dropped along in the row so as to fill out a given area assigned to that variety. The rows were all six feet apart and one-half acre long. Both plant and stubble canes were used for seed, on separate but adjoining plats. Our plan of operation was as follows: If possible, fifty select canes from the stubble of each variety were used to plant a row one-half acre along, and twenty-five select canes from plant cane to a row of same length. These numbers were used whenever possible, but many of our varieties were not obtainable in such quantities; therefore, whatever was accessible was planted, so as to have equal areas of all of these varieties under cultivation. Since equal numbers of canes of different varieties varied greatly in weight and length, very unequal quantities were used in planting. Therefore, the stands were very unequal. A table is given, showing the number of stalks to a row, the kind of cane used, the yield per acre and chemical analysis of the juice, with the percentage of extraction as determined by a small hand, three roller mill, running the cane through twice. There is also given the aggregate of six of the best sucrose plat results in each of our home grown canes, purple and striped, for comparison. All of the canes grown upon this station this year have been remarkably low in sucrose and high in glucose, and when these foreign varieties are compared with our home canes grown by their side, some of them appear very promising both from tonnage and sugar contents. The following are the results.

YIELD AND ANALYSES OF VARIETIES OF CANE GROWN ON SUGAR EXPERIMENT STATION NEW ORLEANS, 1890—HARVESTED 9TH, 10TH AND 11TH DECEMBER.

Station Number.	Name of the Variety.	Kind of cane Planted.	Stalks per Row used in Planting.	Yield in Tons per Acre.	Analyses.				
					Per cent of Extraction.	Total Solids.	Sucrose.	Glucose.	Solids not Sugar.
1	Beltran	Stubble	50	51.45	63.8	15.30	12.1[illegible]	98	2.22
	Beltran	Plant ..	25	40.74	70.3	13.00	9.60	1.28	2.12
2	La Pice	Stubble	50	45.78	72.5	13.40	9.90	1.15	2.35
	La Pice	Plant ..	25	37.38	68.4	12.80	9 10	1.51	2.19
3	Tibboo Merd	Stubble	50	51.14	70.2	13 30	9.75	1.50	2.05
	Tibboo Merd	Plant ..	25	38.37	71.2	12.20	8.40	1.67	2.13
4	Le Sassier	Stubble	50	33.81	70.0	12.00	8.70	1.52	1.78
	Le Sassier	Plant ..	25	32.65	71.1	12.90	9.20	1.33	2.37
5	Bourbon	Stubble	50	48.09	73 90	13.10	9.90	1.61	1.59
	Bourbon	Plant ..	25	41.89	73.10	13.80	9.50	1.72	2.58
6	Crystallina	Stubble	50	45.67	71.30	12.80	8.50	1.79	2.57
	Crystallina	Plant ..	25	35.91	71.00	12.20	8 00	1.67	2 53
7	Green	Stubble	50	47.98	71.20	14.10	10.10	1.47	2 53
	Green	Plant ..	25	38.64	71 40	12.40	8.20	1.72	2.48
8	Yellow	Stubble	50	43 78	70.40	13.00	8.10	2.00	2 90
	Yellow	Plant ..	25	37.64	72.70	12.90	7.90	2.80	2.20
9	Otaheite	Stubble	50	50.29	72.40	13.20	8.20	2.32	2.78
	Otaheite	Plant ..	25	44.32	77.50	13.80	8.60	2.51	2 69
10	Portier	Stubble	50	52.39	77.00	13.10	8.60	2.50	2.00
	Portier	Plant ..	25	48 68	75.80	13.10	7 80	2.52	2.78
11	Loucier	Stubble	50	44.20	72.10	13 80	7.70	2.63	3 47
	Loucier	Plant ..	25	40.11	72.00	13.00	7.80	2.38	2.82
12	Lahaina	Plant .	25	58.23	77.50	12.00	8.70	2.07	1.23
	Lahaina	Stubble	12	20.11	9.80	13.50	7.30	2.27	3 93
13	Caledonia Queen	Plant ..	25	47.78	75.80	12 40	7.50	2.17	2.73
	Caledonia Queen	Stubble	8	30 14	77.70	13.10	8.40	2.08	2.62
14	Creole	Stubble	50	6.88	73.50	11.40	6.90	1.56	2.94
	Creole	Plant ..	25	14.91	74.10	10.00	5.50	1 47	3 03
15	Papuha	Plant ..	25	46 57	68.40	15.20	11.10	1.00	3.10
	Papuha	Stubble	18	58.91	74.60	12.90	8.90	1.25	2.75
16	Uwala	Plant ..	25	34 96	71.20	9.70	4.20	2.00	3.30
	Uwala	Stubble	39	57.75	75.10	12.80	7.80	1.72	3.28
17	Kokea	Plant ..	25	60.79	72.90	12.60	8.90	1.56	2.14
	Kokea	Stubble	30	37.48	73.80	12.70	8.50	2.50	1.70
18	Bamboo	Stubble	50	60.47	77.30	13.60	9.2	2.17	2.28
	Bamboo	Plant ..	25	49 81	66.70	13 80	9.00	2.27	2.23
19	Rose Bamboo	Plant ..	25	41.26	72.70	13.5	8.60	2.38	3.12
	Rose Bamboo	Stubble	8	29.61	74.60	14.20	8.70	2.50	3.00
34	Mexican Striped	Plant ..	25	37.68	72.20	13.70	10.00	1 67	1.63
35	Cypremort Striped	Plant ..	25	38.50	68.40	13.30	10.20	1.47	1.63
36	Batavian Striped	Plant ..	10	23.76	73.30	13.50	8.00	2.17	3.33
41	Ainakea	Plant ..	25	33 60	72.40	13.8	8.50	2.70	2 60
	Ainakea	Stubble	25	16.62	73.30	13.00	7.80	2.43	2.77
42	Kanio	Plant ..	25	57.12	75.00	13.30	7.80	2.78	2.72
	Kanio	Stubble	19	47.09	77.00	13.10	7.60	2.79	2.71

FIELD AND ANALYSES OF VARIETIES OF CANE, ETC.

CONTINUED.

Station Number.	Number af the Variety.	Kind of Cane Planted.	Stalks per Row used in Planting.	Yield in Tons per Acre	Analyses.				
					Per cent. of Extraction	Total Solids.	Sucrose.	Glucose	Solids not Sugar.
43	Alkilolo (light)	Plant ..	25	47 32	73.10	12.70	7.50	2.77	2.43
	Alkilolo (light)	Stubble	4	.....	72.80	11.50	6.10	2.94	2.46
44	Alkilolo (dark)	Plant ..	25	40.18	75.00	12.70	7.70	2.63	2.37
	Alkilolo (dark)	Stubble	23	31.36	72.20	12.70	7.50	2.48	2.72
45	Manulete	Plant ..	25	63 28	73.10	12.70	7.40	2.63	2.67
	Manulete	Stubble	25	35.42	73.20	11.80	6.00	2.63	3.17
46	Cavengerie	Stubble	50	64 96	75.70	12.30	7 50	2.78	2 02
	Cavengerie	Plant ..	25	47.48	75.20	11.50	6.10	2.77	2.63
47	Attamattie	Plant ..	25	63.62	75.30	11.60	6.50	2.94	2.16
	Attamattie	Stubble	61*	54.60	71 20	11.50	6.40	2.78	2.32
51	Java Black	Plant ..	25	39.56	65 20	14.50	11.00	1.47	2.02
61	Ohia	Plant ..	25	37.30	70 90	10 40	4.80	2.27	3.33
	Ohia	Stubble	10	.. ..	69.00	13.20	7.90	2.63	2.67
62	Honuaula	Plant ..	25	49.70	73 50	12 60	7.30	2.70	2.60
	Honuaula	Stubble	12	....	72.70	11.20	5.80	2.50	2.90
63	Papaa	Plant ..	25	50.26	77.20	12.10	6.90	2.87	2 33
	Papaa	Stubble	11	.....	77.20	13.20	8.20	2.86	1.96
	6 best exp'ments purple cane.	Plant ..	....	42 01	70.10	13.90	10.34	1.48	2.08
	6 best exp'ments ribbon cane	Plant ..	....	40.17	72.20	13 10	10.05	1.61	1.44

*Most of the canes were very small.

Several of the above canes have been grown here for over two years, the rest for three. Analyses have been frequently made of them all. An inspection of these show conclusively that the sucrose content is gradually increasing and encourages the hope that some of them will soon become valuable additions to the sugar industry of this State. Surely with the large number under cultivation, of almost every conceivable shade of color, from the deepest purple to the lightest green, of different sizes and habits of growth some few of them should be found adapted to our wants. Several of them continue the habits acquired in the tropics of growing into large, straight and tall canes and at the same time are gradually increasing in sugar. Could the tonnage obtained this year with a few of them be maintained and the sucrose be augmented to that contained in our common canes, it would profit the sugar industry more than the enactments of the

most liberal tariff laws. The Station will continue its efforts at acclimating these canes, fully impressed with the belief that its purposes will be ultimately attained.

All of these canes were diffused in quantities sufficient to thoroughly test them by this process. The larger and softer canes offered some obstacles to the comminutor at first, but this was soon remedied. With our common canes the knives projected only one-sixteenth of an inch. By placing them one-eighth of an inch they took the cane well, gave a fine chip, which was easily diffused.

Several of the above canes were grown at Baton Rouge and at Calhoun. At both of these places growth was greatly diminished and the sugar contents in many instances enhanced.

These analyses were made early in November of these canes and are herewith presented.

An examination and comparison of the tables will show to some extent the relative value of each variety upon the different soils of the State.

ANALYSES OF VARIETIES OF CANE GROWN ON STATE EXPERIMENT STATION, BATON ROUGE, LA., 1890.

Variety.	Per cent. Extraction.	Total Solids.	Sucrose.	Glucose	Solids not Sugars	Purity Co-efficient	Glucose Ratio
Purple	65 79	15.0	12.1	2.65	0.25	80.66	21.90
Striped Mexican	64.78	16 0	12.4	2.00	1.60	77.50	16.13
Rose Bamboo	66.34	12.8	9.9	2.77	0.13	79.34	27.98
Hanuala	64.20	12.4	7·4	2.94	2. 6	57.67	39.73
Ohia	70.43	13.1	8.1	4.07	0.93	61.83	50.24
Papaa	70.77	12.6	7.3	4.21	1.06	57.86	58.08
Otaheite	74.12	14.4	8.7	4.24	1.46	60.41	48.78
Kokea	72.28	13.5	9 5	3.41	0.59	70.37	35.89
Lahaina	75.99	13.3	8.7	3.65	0.95	65.41	41.95
Akiaola	70.81	13.8	7.8	5.04	0.96	56.52	64.61
Ainakea	72.41	12.4	7.4	4.66	0.34	59.68	62.97
Crystallina	71.75	16.5	12.9	3 21	0.39	78.18	24.88
Yellow	70.94	14.1	9.3	3.12	1.68	65.96	33.55
Kanto	69.53	9.9	3.0	5.7	1.20	30.30	190.00
Cavengerie	70.64	11.0	6 0	4.07	.93	54.54	67.83
Loucier, (No. 1)	70.30	14 0	8.7	4.68	0.62	62.14	53.79
Green	69.90	14.0	9.0	3.03	1.97	64.28	33.55
Bourbon	68.75	14.5	11.3	2.04	1.16	77.93	18.05
Black Java	70.64	15.5	12.9	1 73	0.87	83.23	13 41
Portier	70.08	13.4	9.1	2.69	1 61	67.91	29.56
Blancad' Otaheite	75.68	13.5	8.5	4. 8	0.92	62.96	48.00
Loucier (No. 2)	6·.00	12.5	7.6	3.92	0.98	60.80	51.58
Japanese	54.30	15.1	9.0	3 29	2.81	59.60	[illegible]

ANALYSES OF VARIETIES OF CANE GROWN ON THE NORTH LOUISIANA EXPERIMENT STATION, CALHOUN, LA.

Number of Experiment.	Name of Variety.	Total Solids.	Sucrose.	Glucose.	Purity Coefficient.	Glucose Ratio.
1	Japanese	13.4	9.9	3.0	70.85	30.7
2	Bourbon	15.90	14.49	.93	90.50	6.11
3	La Pice	15.60	14.20	1.05	91 05	7.39
4	Crystallin	15.13	13.20	1.28	87 24	9.84
5	Blanca d'Otaheita	14.87	11.40	1.67	76.66	14.64
6	Po tier	15.09	12.50	1.21	82.83	9.68
7	Loucier	13.47	9.80	1.85	73,49	18.87
8	Cavengerie	14.47	10.30	1.55	71.17	15.04
9	Creole	13.29	8.90	1.64	67.06	18.42
10	Panache	16.24	13.50	1.11	83.12	8 22
11	Rose Bamboo	15.30	12.60	1.84	82.36	14.60
12	Lahaina	14.50	11.70	1.56	80.69	13,34
13	Tibboo Merd	15.50	13.10	1.11	85.51	8.47
14	Kokea	13.60	10.90	2.00	80.04	18 35
15	Manulete	13.70	11.60	1.82	84.61	15·68
16	Uwala	14.80	12.20	1.56	82.43	12.79
17	Alkilolo	14.80	12.40	1.60	83.78	12.90
18	Papaa	14.00	11.50	1.66	82.14	14.43
19	Honuaula	13.60	10.90	1.84	80.44	18.25
20	Attamattie	14.00	11.10	1.80	79.28	16.21
21	Ohia	13·20	11.	1.95	83.33	17.72
22	Purple	15.90	14 49	.95	90.50	6.11

MANURIAL REQUIREMENTS OF SUGAR CANE.

Before giving the results of an extensive series of experiments with fertilizers, it is perhaps best to give the accepted views of the action of the chief ingredients which go to make up these wares.

Commercial fertilizers consist chiefly of one or more of the following ingredients: Nitrogen (ammonia), phosphoric acid and potash. By intelligent planters and farmers the question is frequently asked: Under what conditions can we most profitably increase the returns from our soil by the use of commercial fertilizers? When, where and what kinds should we use? The first two questions are easily answered. The last is very difficult to decide, especially for the growth of sugar cane on our lands. Fertilizers should be used whenever crops are grown which do not attain their maximum production on account of a deficiency in the soil of one or more of the above ingredients. But the deficiency of plant food is not always the cause of small returns. Water, so essential to all crops and needed in great abundance by some, is frequently in this climate productive of great harm.

A drought may call for artificial irrigation—and excess of rainfall for drainage (open or tile). Want of porosity, so common in black clay lands, seriously impedes root development.

Some soils bake or cake after every hard rain, and thus work disaster to the plant. A great defect with many sugar lands in this state is the impermeability of surface water, forming unless high ridges with deeply ploughed middles prevent stagnant water at or near the surface, which brings disaster and sometimes death to a rapidly developing plant. Occasionally land may be deficient and in its absence the increased difficulty of the plant absorbing a sufficiency of food. Humus, so essential to every soil in this climate, is frequently badly needed.

Climatic conditions of a purely local character may temporarily prevail, such as alterations of temperature—hot, parching winds, as in southwestern Kansas, often destroying a crop in a few days. It may, therefore, be asserted that whenever a soil from a physical, chemical or climatic defect, forbids the growth of large crops, even when well supplied with fertilizing ingredients, then the *application of commercial fertilizers is a waste.* The amelioration of its environments is now more needed by the plant than manures. Better seek a remedy in irrigation, drainage, deep ploughing, better cultivation, harrowing, hoeing, incorporation of vegetable matter, etc. After these ameliorating conditions are established, then, and not till then, should liberal manuring be practised. It should be borne in mind by the planters that every improvement in the quality of the soil increases its capacity for absorbing large quantities of manure and the transmutation into maximum crops. Heavy plant growth and excellent soil culture mean an enormous conversion of plant food into crops. Where the largest crops are producible there will be the heaviest demand for manures. Hence rich soils can successfully appropriate heavy applications of fertilizers, while poor soils must be fed with great care. Perfect all the other conditions of heavy plant growth, and then there will be demand for commercial fertilizers, not a demand to appease hunger, but one to "fatten." In fattening our domestic animals we first perfect all the conditions of digestion, and then give

them all they *will eat*--not what they *need*. Our object is to transform a larger amount of plant food into fat and muscle within the animal's frame than is required for its maintenance, and this we accomplish by a carefully compounded ration known to be both digestible and palatable. In successful stock breeding, we first select animals known to possess intensive powers of converting plant food into fat, and then supply them with the specially prepared food in great abundance. So, too, in farming, whenever practicable plants of known capacity for absorbing fertilizers should be cultivated, and then these plants should be stimulated to a most intensive assimilation of plant food by the application of suitable manures. While the better class of soils always respond more liberally to fertilizers than poorer ones, still the latter under favorable conditions often yield remarkable results. Great care is needed to see that the favorable conditions are fully attained, and unless they are, very unsatisfactory results too frequently follow the use of commercial fertilizers. Sometimes the use of fertilizers overcomes the unfavorable surroundings. They cause a larger and deeper root development in early growth and thus enable the plant to withstand a subsequent drought. They frequently cause an early shading of the ground, thus preventing surface hardening, and enable the sugar planter to give an early "lay by" to his crop.

These brief remarks will show that fertilizers can be successfully used on both fertile and poor soils.

To this assertion every sugar planter is ready to ask: What forms of fertilizer shall we use to attain a maximum crop of cane, containing a maximum amount of sugar, and in what quantities and when shall we apply them? After five years of patient investigation upon poor and rich soils, with every kind of fertilizer accessible, the station must answer that this question as to sugar cane has not yet been satisfactorily solved, and its solution compared with other crops is fraught with great difficulties.

It can grow maximum crops of cane, but it has not yet succeeded in putting maximum sugar content in them. In fact, it is almost ready to exclaim: Can it be done? Is not excessive

tonnage incompatible with large sucrose content? The question is yet an open one, and some day *may* be solved. It is quite easy to tell which one of the three ingredients is needed by our soils to grow large crops of cane. Both phosphoric acid and nitrogen seem to be needed, while potash in any form gives no increased returns. That our soils abound in potash is shown by field experiments with potash, by their chemical composition, and the abundant growth of a certain class of plants which are large potash consumers, viz: cow peas, white clover, etc.

Nitrogen, the most costly ingredient of fertilizers, must be applied with care, since an excess may cause an abnormal development of the plant and a very low sugar content, and any residues not used by the crop may be lost by leaching during the winter.

Fortunately there are two unfailing sources of this element to the sugar planter—first, cow peas turned under, a crop which has recently been shown beyond further cavil to have enormous capacity of abstracting and appropriating this element from the air, and second, cotton seed meal, a contribution from the neighboring cotton fields. The cotton seed meal also contains goodly percentages of phosphoric acid and potash. This substance, however, should never be used alone, unless the soil gives unmistakable evidence of an abundance of mineral food. On account of its leaching properties, nitrogen should never be applied until just before it is needed by the plant, and every attempt at storing away a surplus of this ingredient in the soil is uneconomical and irrational. It is estimated that at best, plants can utilize only two pounds out of every three given to the soil.

The agricultural properties of phosphoric acid are almost the reverse of those of nitrogen. It can be stored away in the soil, remaining almost in the same place in which it is deposited. It does not leach. Indeed, a surplus of phosphoric acid in a soil is needed to produce, under average conditions, the maximum crops. Too large a surplus is, however, not economical or rational, and may, perhaps, sometimes be injurious. This is particularly true of the soluble phosphates. It is now conceded by every one that strong applications of phosphoric acid hasten the

maturity of plants, especially when the latter are not supplied with a surplus of nitrogen. This is particularly the case with cotton. The plant becomes yellow early in the season and prematurely ripens its fruit and dies. This fertilizer has been used to extend the cotton crop northward, and frequently serves the hill planter in forcing his crop to maturity before the cotton and boll worms accumulate in sufficient quantities to destroy it This ingredient is said to have a quickening effect on all the vital functions of the plant—causes it to prematurely ripen and die. The ripening process is but a cessation of activity in the manufacture of vegetation material and the transference of these ready-made products through the leaves and stalks to the fruit. The presence of a surplus of nitrogen prevents or rather retards this cessation of activities and the plants remain green a much longer time. An excess of phosphoric acid frequently causes an excessive early plant production, requiring a correspondingly large amount of nitrogen, and the latter, unless in large quantities, is soon exhausted and a nitrogen starvation ensues, and the plant prematurely dies. Hence, in poor soils, this application of excessive quantities of soluble phosphates to cotton frequently diminishes the yields. The cotton "burns up." The plant is starving for nitrogen, and the hot, dry weather, usual in summer, is more injurious to a starving plant than to one well fed. The cotton, under heavy doses of phosphates, exhibits an early, luxuriant development, which is sustained as long as the limited supply of nitrogen lasts. When this is exhausted, it starves to death. An application of nitrogen, as soon as the plant shows signs of decay, will often resuscitate it.

Potash is far more abundantly found in soils than either of the other ingredients discussed, and few soils in Louisiana need as yet this ingredient in manures to grow any crop. Where needed, it can be cheaply supplied with some of the German salts, either the crude form of kainite or the refined products sulphate and muriate. They perform their best results when applied some time before the growing of the crop which they are intended to benefit. Kainite contains much common salt, and the latter has a binding effect on the soil and enhances its power

of retaining moisture. On very light soils an application of kainite is frequently beneficial from this effect, even when the soil contains an abundance of potash. On stiff, heavy soils, *per contra*, it may be detrimental. To that class of plants known as nitrogen gatherers (cow peas, clovers, etc.,) potash is of great importance, and the luxuriant growth of these crops upon a soil unmanured is the best index that it holds an abundance of potash.

With the above facts fully established it would seem on first glance to be an easy task to determine a fertilizer which would give a large tonnage with high sucrose percentage. A little reflection may, however, dispel this allusion; if not, the review of a number of carefully conducted experiments will surely dissipate it. A large crop of cane can certainly be made by the application of fertilizers, whenever the other conditions of heavy crop growth are perfect, but will this large crop of cane be rich in sugar? Rarely. One would suppose, from analogous results with other crops, that excessive quantities of soluble phosphates would prematurely ripen cane and give it a large sugar content.

Perhaps so; but then our large tonnage is eliminated. Our sugar cane, under the most favorable circumstances, grows only about eight months, and, with the varieties we cultivate, this is just now about two-thirds as long as they ought to grow. In tropical countries they are rarely harvested under twelve months, and frequently longer. Therefore the power of prematurely ripening them here is relative, not absolute, and when any condition interposes to stop the activities of growth it must be done at the expense of the *size* of the crop. The manures suitable for heavy tonnage will rarely give maximum sugar content, and *vice versa*. Seasons favorable to enormous field results seldom give satisfactory yields per ton in the sugar house. It is, however, known that excessive quantities of nitrogen frequently give "very green cane," whose juices annoy greatly the sugar maker. Therefore manures containing nitrogen should be mixed with phosphates, in order to prevent this injury. But then this mixture in quantities will give a large tonnage. A large tonnage means nearly always a long period of growth to the cane. A

long period of growth here means immaturity, and immaturity is antagonistic to high sugar content. It now seems improbable to combine excessive tonnage and high *sucrage*. A high *sucrage* with low tonnage, or high tonnage with low sucrage, appear now as the horns of the sugar planter's dilemma. Each individual planter must exercise his own judgment in selecting the horn he will pursue.

In the excellent report recently issued by Prof. J. R. Bovell of the results obtained on the experiment fields in Barbados, and received since the above was written, is found, on page 28, the following among his conclusions:

"No. 8.—No information has yet been obtained with regard to increasing the richness of the canes, either by the manures or by growing them from portions of the cane rich in sugar."

If in Barbados, where cane reaches perfect maturity and even bears true seed, no means has yet been found whereby the sucrose content can be increased, surely we can hardly hope to accomplish such a desirable end here where our cane never fully matures.

Perhaps out of the large number of foreign varieties of cane under cultivation one or more *may* be found of higher sucrose content and with equal or higher tonnage than the canes we now cultivate. This seems at present our last hope of increasing the sugar in our canes.

This was the first year's experiments at the Sugar Experiment Station. Prior to our occupancy it was a part of Audubon Park and had not been in cultivation for years. It had grown annually the native grasses (chiefly the deep-rooted paspulums), which were sometimes cropped for hay, but more frequently left upon the ground to decompose. By this treatment the soil had become so heavily charged with organic matter as to give but little recompense to the application of nitrogenous manures. This long rest had doubtless served to accumulate on the surface soil an increased quantity of mineral matters in a readily available form. In short, this soil had every physical and chemical condition of "new ground," and subsequent results have shown similar action.

Plats 3a, 3b and 3c were devoted to manurial questions. The first to potash, the second to phosphoric acid and the third to nitrogen. The questions asked are: (1) Do these soils need each of these ingredients to grow a maximum crop of cane? (2) If so, in what forms shall these ingredients be used? (3) In what quantities per acre? The potash has been used under the forms of kainite (12 per cent. of potash), sulphate of potash (50 per cent.), muriate of potash (50 per cent.), ashes of cotton seed hull (20 per cent.) and nitrate of potash (46 per cent.) The phosphoric acid has been used as dissolved bone-black (14 per cent. soluble), acid phosphate (14 per cent. soluble), bone-black (24 per cent. insoluble) and bone meal (24 per cent. insoluble), South Carolina floats and Thomas slag were to have been used, but failed to reach us in time.

The nitrogen was fusnished in the form of cotton seed meal (7 per cent. nitrogen), dried blood (12 per cent.) sulphate of ammonia (21 per cent.), nitrate of soda (14 per cent,), tankage (6 per cent.) and fish scrap (6 per cent.)

In using the above such quantities of each were taken as to represent equal quantities of nitrogen and potash and soluble phosphoric acid. In the insoluble phosphates the same number of pounds were used as with the soluble—since the cost was about the same. The substances were also used in one and two rations. Nitrogen was used at the rate of 24 pounds (one ration) and 48 pounds (two rations) per acre, soluble phosphoric acid 36 pounds (one ration) and 72 pounds (two rations) and potash 25 pounds (one ration) and 50 pounds (two rations.) In experimenting with any one ingredient, of course, all of the others were present in excess.

The following was the cultivation of all the plats planted October, 1889: Offbarred and scraped January 20; again offbarred February 27; further scraped March 1. Pulverized middles with disc harrow; fertilized and middles split out April 16. After that cultivation was done with Mallon's improved caltivator, laying by June 27. The cane was harvested November 10 to December 1. All of the cane was cut down by the freeze March 3.

PLAT 3A, POTASSIC MANURES.

In this plat, nitrogen and phosphoric acid are the constants and potash the variable. The first was used at the rate of forty-eight ponnds per acre the second seventy-two pounds, while the third twenty-five and fifty pounds in the various forms. In this plat, there are two experiments without manure and two without potash. The expression nitrogen phosphate is used in the table as an abbreviation of forty-eight pounds nitrogen and seventy-two pounds soluble phosphoric acid. The word nitrogen carries with it the quantity used, twenty-four pounds. The nitrogen was furnished this plat under the forms of nitrate of soda and dried blood, and the phosphoric acid as acid phosphate. Ashes of cotton seed hulls are used alone, with nitrogen and with nitrogen phosphates.

The following are the field and laboratory results:

PLAT 3 A.—POTASSIC MANURES—RESULTS.

Number of the Experiment.	Fertilizers Used Per Acre.	Yield per Acre in tons.	Analyses of Juice.					
			Total solids. Brix.	Sucrose.	Glucose.	Solids not Sugar.	Glucose Ratio.	Purity Coefficient.
1	210 pounds kainite	43.86	12.9	10.00	1.85	1.05	18.50	77.50
2	210 pounds kainite and nitrogen phosphate	40.08	12.2	9.20	2.00	1.00	21.80	75.40
3	420 pounds kainite and nitrogen phosphate	39.74	14.1	11.20	2.00	.90	17.90	79.40
4	Nitrogen phosphate	35.52	13.1	9.10	1.92	2.08	21.09	69.40
5	50 pounds sulphate potash	37.69	----	9.00	1.92	----	20.00	----
6	50 pounds sulphate potash and nitrogen phosphate	38.45	12.6	9.10	1.92	1.58	21.09	72.20
7	100 pounds sulphate potash and nitrogen phosphate	39.78	13.10	9.10	2.17	1.83	23.84	69.40
8	No manure	37.94	11.70	9.15	1.79	.76	19.60	78.20
9	50 pounds muriate potash	35.91	11.50	8.60	1.79	1.11	20.80	74.80
10	50 pounds muriate potash and nitrogen phosphate	37.56	----	8.90	1.76	----	----	----
11	100 pounds muriate potash and nitrogen phosphate	36.59	12.60	9.55	1.61	1.44	16.90	75.80
12	Nitrogen phosphate	37.78	12.90	8.80	----	----	----	----
13	200 pounds ashes cotton hulls	38.71	12.60	9.15	1.67	1.78	18.20	68.20
14	200 pounds ashes cotton hulls and nitrogen	40.76	13.10	9.70	2.00	1.40	20.60	74.04
15	200 pounds ashes cotton hulls and nitrogen phosphate	40.46	13.50	9.60	2.00	1.90	20.80	71.10
16	No manure	37.05	13.50	9.40	1.92	2.18	20.40	69.60
17	108 pounds nitrate potash and nitrogen phosphate	41.21	----	10.55	1.56	----	15.00	----

PLAT 4 A, PHOSPHORIC ACID MANURES.

In this plat the nitrogen and potash were the constants and the phosphoric acid the variable. The nitrogen was furnished in the form of sulphate of ammonia, and the potash as sulphate, both highly desirable forms. There are experiments also with gypsum, to see how far this necessary ingredient of every soluble phosphate is accountable for the good effects of the latter. The nitrogen is supplied at the rate of 48 pounds per acre and the potash 50 pounds. Basic mixture then means 230 pounds sulphate of ammonia and 100 pounds sulphate of potash. The soluble phosphoric acid is supplied at the rate of 36 pounds (one ration) and 72 pounds (two rations) per acre. The same number of pounds of insoluble phosphates are used as with the soluble phosphates.

The following are the field and laboratory results:

PLAT 4 A—PHOSPHORIC ACID MANURES—RESULTS.

Number of the Experiment	Fertilizers Used Per Acre.	Yield Per Acre in Tons.	Analyses of Juice.					
			Total solids. Brix.	Sucrose.	Glucose.	Solids not Sugar.	Glucose Ratio.	Purity Coefficients.
1	258 pounds dissolved bone black	48.89	13.5	10.35	1.61	1.54	15.6	76.60
2	258 pounds dissolved bone black and basal mixture	38.64	12.6	8.90	1.85	1.85	20.8	70.60
3	516 pounds dissolved bone black and basal mixture	40.11	13.2	9.25	1.79	1.98	19.3	70.00
4	Basal Mixture	39.22	12.6	8.80	1.92	1.88	21.8	71.60
5	258 pounds acid phosphate	38.87	13.7	9.50	1.47	2.73	15.4	69.34
6	258 pounds acid phosphate and basal mixture	39.90	12.5	8.70	1.25	2.55	14.3	69.60
7	516 pounds acid phosphate and basal mixture	40.85	14.4	9.60	1.56	3.24	16.2	66.66
8	No manure	38.36	14.4	9.60	1 61	3.19	16.7	66.66
9	516 pounds bone black	38.17	13.5	9.30	1.85	2.35	19.8	68.80
10	516 pounds bone black and basal mixture	38.89	13.5	9.20	2.00	2.30	21.7	68.10
11	516 pounds bone meal	39.20	13.9	9.70	1.89	2.33	19.4	69.71
12	516 pounds bone meal and 100 pounds sulphate potash	37.89	14.6	9.80	1.92	2.88	19.5	67.10
13	516 pounds bone meal and basal mixture	37.46	14.5	10.30	1.79	1.96	17.3	71.40
14	Basal Mixture	35.90	13.7	9.80	1.85	2.05	19.4	71.60
15	258 pounds gypsum	37.80	13.9	9.40	1.85	2.65	19.6	67.40
16	258 pounds gypsum and basal mixture	36.40	14.6	10.40	1.67	2.53	16.0	71.20
17	No maure	38.50	14.2	10.10	1 85	2.25	18.3	71.10
18	516 pounds gypsum	36.05	13.7	9 90	1.56	2.24	15.6	72.30
19	516 pounds gypsum and basal mixture.	35.70	13.3	9.65	1.67	1.98	17.4	72.50

PLAT 5 A.—NITROGENOUS MANURES

The phosphoric acid and potash are the constants in this plat, with nitrogen as the variable. Acid phosphate (14 per cent, soluble) furnished the phosphoric acid, while as in plat 4a, sulphate of potash supplies the potash. Soluble phosphoric acid is used at the rate of 72 pounds per acre and potash 50 pounds. Mixed minerals means then 576 pounds acid phosphate and 100 pounds sulphate of potash per acre. The nitrogen is used at the rate of 24 pounds (one ration) and 48 pounds (two rations) per acre.

The following are the field and laboratory results:

PLAT 5 A.—NITROGEN MANURES—RESULTS.

Number of Experiment.	Fertilizers Used Per Acre.	Yield per Acre in Tons.	Analyses of Juice.					
			Total Solids Brix.	Sucrose.	Glucose.	Solids not Sugars.	Glucose Ratio.	Purity Coefficient.
1	350 pounds cotton seed meal	40.46	14.6	10.7	1.59	2.31	14.8	73.2
2	350 pounds cotton seed meal and mixed minerals	39.98	12.6	8.9	1.61	2.09	18.0	70.6
3	700 pounds cotton seed meal and mixed minerals	42.91	13.3	9.0	1.92	2.38	21.3	67.6
4	Mixed minerals	36.33	13.3	9.1	1.85	2.38	20.3	69.1
5	200 pounds dried blood	35.43	13.0	8.5	1.92	2.58	22.5	65.3
6	200 pounds dried blood and mixed minerals	35.91	13.1	9.2	1.85	2.05	20.1	70.2
7	400 pounds dried blood and mixed minerals	37.80	13.5	9.9	1.85	1.75	17.8	73.3
8	No manure	36.47	13.5	9.75	1.85	1.90	18.9	72.2
9	115 pounds sulphate of ammonia	38.99	13.5	9.80	1.85	1.85	18.5	72.7
10	115 pounds sulphate of ammonia and mixed minerals	37.94	12.6	8.70	2.08	1.82	23.9	69.0
11	230 pounds sulphate of ammonia and mixed minerals	40.46	13.5	9.50	1.85	2.15	19.4	70.3
12	Mixed minerals	40.74	13.5	9.55	1.79	2.16	18.7	70.7
13	160 pounds nitrate soda	39.36	13.5	9.50	1.85	2 15	19 4	70.3
14	160 pounds nitrate soda and mixed minerals	39·01	13.7	10.30	1.85	1.55	17.9	72.9
15	320 pounds nitrate soda and mixed minerals	37.59	14.2	10.55	1.79	1.86	16.8	74.2
16	No manure	36.30	14.5	11.00	1.61	1.89	14.6	76.3
17	400 pounds tankage	37.17	13.6	10.40	1.67	1.53	16.0	76.4
18	400 pounds tankage and 100 pounds sulphate potash	38.48	13.2	10.00	1.61	1 59	16.1	75.7
19	400 pounds tankage and mixed minerals	39.20	13.0	9.65	1.67	1.68	17.3	74.2
20	400 fish scrap and mixed minera's	45.99	14.4	11.45	1.43	1.52	12.5	79 6

The above experiments cover nearly every possible formula by which the various brands of commercial fertilizers are manipulated, Every raw material available has been secured and their combinations represent in quality if not in proportion in which they are mixed many of the standard fertilizers sold on our markets. The experiments just given have failed to give the information desired. From a scientific standpoint they are failures. No deductions of even a probable character can be drawn from them. There are many reasons for their failure.

1. The newness or rather freshness of the soil as hitherto explained, which induced on all of the experiments, even where no fertilizer was applied, a most extraordinary growth.

2. These plats had to be leveled before occupying them with the cane, thus exposing in places the subsoil, thus making many inequalities in the plats.

3. Early in the fall all of the cane was severely prostrated by a storm, and in its prostrate state assumed a new growth, which continued until harvest.

4. The unusually favorable season, which has everywhere given the largest tonnage ever known before in this State, with a generally low sucrose content.

This unusually large crop has been productive of no positive scientific benefit, and the experiments must be repeated another year.

The Station is indebted to the Standard Guano and Chemical Company and Planters' Fertilizer Company, both of New Orleans, for the fertilizers used in above experiments.