1886

Sorghum

William Carter Stubbs

SORGHUM.

BULLETIN No. 5

OF THE

LOUISIANA SUGAR EXPERIMENT STATION

Wm. C. Stubbs, Ph. D.,

—DIRECTOR—

KENNER, LOUISIANA, DECEMBER, 1886.

—ISSUED BY—

THOMPSON J. BIRD,

COMMISSIONER OF AGRICULTURE, BATON ROUGE, LA.

BATON ROUGE:
PRINTED BY LEON JASTREMSKI, STATE PRINTER,
1886.

SUGAR EXPERIMENT STATION,
KENNER, LA., December 7, 1886.

Major T. J. Bird, Commissioner of Agriculture, Baton Rouge, La.:

I hand you herewith, for publication, a Bulletin on Sorghum, covering field, laboratory and sugar house experiments for the past season.

Respectfully,

WM. C. STUBBS, Director.

SORGHUM.

Sorghum has been used as a forage for stock in this country for many years. As such it is adapted to a wide region, and its cultivation has extended over the entire extent of the United States. In other countries it has been used for the manufacture of spirits, glucose, beer and vinegar. Its seeds have been used as a food for men and beast, and in this country a large part of the profit of growing sorghum consists in the value of its seed as a stock food. For nearly thirty years syrup has been made from it, and during that time high hopes have been entertained of its power to produce profitably sugar. The attempt to make sugar from sorghum has been made almost exclusively by Americans. In China, where the sorghum has probably been grown for thousands of years, we are told by Dr. S. Wells Williams, Professor of Chinese in Yale College, that there is no evidence that it has ever been used for either syrup or sugar making.

It is curious to read in the earlier publications on sorghum, the contradictory opinions and opposite views so positively asserted by the authors. As to the kind of sugar present; the best varfeties; the period of growth; of maximum sugar content and the exact time to work after cutting, nothing was known definitely until the beginning of the scientific investigations by the National Department of Agriculture in 1878. Since that time this Department has assiduously continued its investigations in sorghum and while we write the Fort Scott experiments in diffusion and corbonatation are being brought to a conclusion by the eminent government chemists. The publications of this department upon sorghum since '78, have been numerous and instructive and to-day every farmer has within his reach valuable and definite information in regard to this plant, the result of patient investigation conducted by trained scientists at government expense.

BOTANICAL RELATIONS OF SORGHUM.

Sorghum is one of those plants, whose origin is utterly unknown. By long cultivatioa, its habits and characteristics have been so changed, that no resemblance can now be found to any wild plant. Formerly the different cultivated varieties of sorghum were regarded as distinct species, but moderm botanists have been gradually led to the conclusion that all our sorghums and jurphees, including broom corn, chicken corn, durra, milo maize, etc., etc., are but varities of a single species—

Sorghum Vulgare. These conclusions have already inspired many seedsmen, farmers and scientists with the belief, that ultimately by selection of seed, proper fertilization and cultivation, a true sugar bearing sorghum may be obtained, which can be profitably grown and worked, instead of the true sugar cane or beet. Differentiation in plants is accomplished by extending the area of cultivation, taking in differences of soil, climate, rain-fall and manures; by careful selection of seed; by cross breeding, etc. In this way varieties are produced. Some plants have greater capacity for variation than others and sorghum is perhaps surpassed only by Indian corn, in its tendency to assume new varieties under changed conditions. Hence we find a large number of varieties of sorghum on our market, differing in every conceivable character, from content of sugar to color of seed. It is therefore of first importance in growing sorghum to select those varieties best adapted to our wants, remembering the modifying factors of soil, climate and manures.

When the Guinea or chicken corn, a true sorghum, now a a troublesome pest, over so large a portion of the South was introduced, the writer has no information, but it appears probable that its advent here was under one of the earlier varieties of sorghum and finding a congenial soil and climate, it has multiplied amazingly without cultivation, and in the meanwhile so degenerated as to lose its true name (sorghum) and receive in its stead local names, expressive of the contempt in which it is held by the owners and tillers of the soil. Perhaps it may be one of the forms of Durra or Chocolate cane, brought over in colonial tones and disseminated over the continent. It may have been crowded out elsewhere and survived only in the South. But our sugar making sorghums have come within the last thirty years from China through France, and since that time we have rapidly multiplied varieties.

SORGHUM IN THE SOUTH.

Many speculations have been indulged in as to the adaptability of sorghum for sugar making in the South, but as far as the writer knows, no systematic attempt has ever heretofore been made. In the North and West the subject has been investigated in the field, laboratory and sugar house. A million of dollars have been spent in the erection of first-class machinery for the manufacture of sugar from this plant. As yet the success has been only partial. Even the diffusion process applied with national aid in Kansas, has failed to convince the world of the adaptability of this plant to sugar making. Early frosts, severe storms, prolonged drouths, and many other disasters have almost invariably destroyed a large portion of the cane before reaching the mill. It may therefore be asserted with some degree of positiveness, that in the North sorghum will yet remain as a syrup and not a sugar crop.

But how about this tropical plant in the South? It can be

planted from March to July, and harvested according to varieties, from July to November. If, therefore, a variety can be secured which will give a good tonnage and a medium purity coefficient, it can easily be worked up without interruption from frosts, without additional machinery, and without diminution or detriment to the sugar cane crop.

To test the above the station planted the following varieties last spring: Honduras, Link's Hybrid, Chinese, India, Stewart's Hybrid, White Seeded Sorghum, Early Orange and Early Amber.

There were three experiments in each, "a," "b" and "c"; "a" fertilized with an ammoniated acid phosphate, "b" unfertilized, and "c" with an ammoniated acid phosphate mixed with muriate of potash. Good stands were secured of the Honduras, Link's Hybrid, Chinese and India. The rest imperfectly germinated. They were planted April 5th, and given only one working each with hoe and plow. On June 2d our analyses began. The heads were just beginning to seed. The polariscope showed little or no sugar, varying from 0, 3.7 per cent, the latter found in the Chinese. July 5th another examination was made which indicated marked progress towards maturity. July 17th systematic analyses were made of each of the 24 plats, (8 varieties) and repeated July 30th, August 12th, 19th, 26th and September 3rd. The results are appended.

ANALYSIS OF SORGHUM MADE AT LOUISIANA SUGAR EXPERIMENT STATION.

Date of Analysis.	Variety.		Length of Stalk in Feet.	Diameter of Large End of Stalk in Inches.	Weight of Stalk in Pounds.	Per Centage of Extraction.	Degrees Baume.	Specific Gravity.	Total Solids.	Sucrose.	Coefficient of Purity.	Condition of Seed When Cut.
July 17	Honduras,	a	8.12	1.5	3.06	67.4	6.1	1.0403	11.	7.3	66.6	Milk.
" "	"	b	6.44	1.38	.....	.....	5.9	1.0426	10.6	6.4	60.3	"
" "	"	c	6.50	1.25	1.83	67.2	6.8	1.0493	12.2	8.6	54.9	"
July 30	"	a	.....	.....	.....	.....	7.1	1.0519	12.81	.....	.....	"
" "	"	b	.....	.....	.....	.....	6.3	1.0459	11.4	.....	.....	"
" "	"	c	.....	.....	.....	.....	5.7	1.0413	10.3	.....	.....	"
Aug. 12	"	a	7.4	1.25	2.62	57.25	7.6	1.0557	13.70	9.2	67.10	Dough.
" "	"	b	7.9	.88	1.75	57.42	7.1	1.0519	12.84	7.9	61.60	Dough.
" "	"	c	8.3	1.13	2.60	51.92	6.5	1.0626	15.30	11.4	74.50	"
Aug. 19	"	a	7.8	1.12	2.62	71.5	7.1	1.0579	14.81	9.	70.2	Hard.
" "	"	b	7.4	1.12	2.75	71.5	7.5	1.0551	13.23	9.4	71.05	Dough.
" "	"	c	11.6	1.25	6.	70.	8.8	1.0652	15.90	10.5	66.03	"
Aug. 26	"	a	11.15	1.25	3.28	66.66	8.4	1.0621	15.20	10.	65.80	Hard.
" "	"	b	8.20	1.13	2.31	75.	7.2	1.0527	12.93	8.4	64.60	"
" "	"	c	8.30	1.50	4.12	72.73	7.8	1.0559	13.04	9.	69.04	"
Sept. 3	"	a	9.3	1.	2.	68.75	10.5	1.0786	18.94	14.2	74.90	Mature.
" "	"	b	7.6	1.13	2.18	64.25	6.8	1.0499	12.34	6.5	52.60	Dough.
" "	"	c	8.8	1.62	4.50	5.56	8.6	1.0834	15.50	11.9	76.77	Hard.
July 17	Link's,	a	8.41	1.12	1.53	67.60	8.5	1.0826	15.30	10.5	68.53	Dough.
" "	"	b	7.50	1.12	1.53	71.40	7.	1.0570	12.60	10.	79.30	Hard.
" "	"	c	7.00	1.25	1.44	67.40	6.8	1.0652	15.90	12.5	79.20	Mature.
July 30	"	a	.....	.....	.....	.....	10.2	1.0766	18.50	.....	.....	Mature.
" "	"	b	.....	.....	.....	.....	10.	1.0748	18.10	.....	.....	"
" "	"	c	.....	.....	.....	.....	9.7	1.0722	17.50	.....	.....	"
Aug. 12	"	a	5.11	.88	1.50	63.66	10.5	1.0786	18.94	14.00	73 9	"
" "	"	b	6.70	.88	1.12	57.14	10.1	1.0754	18.17	13.20	72.6	"
" "	"	c	6.11	.62	1.12	66.96	10.8	1.0794	19.11	14.40	75.3	"
Aug. 19	"	a	7.1	.88	1.25	68.	10.8	1.0816	19.62	15.80	81.6	"
" "	"	b	8.1	.75	1.20	67.5	10.6	1.0794	19.11	14.	73.2	"
" "	"	c	8.8	.88	1.33	71.4	10.7	1.0802	19.30	15.30	79.	"
Aug. 26	"	a	8.3	.75	1.25	75.	9.	1.0667	16.23	11.50	70.8	"
" "	"	b	6.	.75	1.12	66.66	10.	1.0746	18.05	13.60	75.3	Overripe.
" "	"	c	6.7	1.00	1.37	63.64	9.9	1.0738	17.85	14.10	79.	Suckered.
Sept. 3	"	a	8.10	.88	1.06	52.65	10.3	1.0779	18.58	14.8	79.6	"
" "	"	b	7.10	1.12	1.62	61.54	8.6	1.0634	15.50	11.2	78.7	Matured.
" "	"	c	7.90	.88	1.37	63.64	10.	1.4746	18.05	14.2	78.6	"
July 17	Chinese,	a	6.50	.88	.91	.....	9.8	1.0730	17.70	15.00	84.7	Ripe.
" "	"	b	6.88	.88	.87	65.6	9.4	1.0709	17.	15.00	88.	Ripe.
" "	"	c	6.50	1.25	1.25	62.5	10.	1.0744	18.	16.10	89.4	"
July 30	"	a	.....	.....	.....	.....	9.8	.....	.....	13.3	.....	"
" "	"	b	.....	.....	.....	.....	9.2	.....	.....	13.	.....	Overripe.
" "	"	c	.....	.....	.....	.....	10.8	.....	.....	14.5	.....	"
Aug. 12	"	a	4 9	.62	.75	66.66	10.1	1.0754	18.17	14.2	78.1	"
" "	"	b	4 5	1.12	.50	57.14	9.6	1.0714	17.26	12.2	70.6	"
" "	"	c	6.	.62	.70	66.96	9.1	1.0675	16.35	13.	79.5	"
Aug. 19	"	a	6.1	.75	.88	70.00	10.2	1.0762	18.41	14.6	79.3	"
" "	"	b	6.1	.75	1.00	77.8	10.3	1.0770	18.80	14.4	76.6	Suckered.
" "	"	c	6.4	.88	1.00	.....	9.7	1.0729	17.56	13.4	76.6	"
Aug. 26	"	a	6.1	.88	1.00	62.5	10.8	1.0860	19.49	15.2	78.	"
" "	"	b	6.1	.75	1.18	65.72	9.5	1.0706	17.14	12.2	71.2	"
" "	"	c	6.1	.88	1.00	62.50	9.2	1.0685	16.83	12.	72.1	"
Sept. 3	"	a	5.9	.62	.62	.....	9.6	1.0714	16.96	13.	76.6	" badly.
" "	"	b	5.96	.62	.62	61.	10.1	1.0754	18.23	13.4	73.4	" "
" "	"	c	6.1	.75	1.00	62.5	9.	1.0667	16.23	12.	73.8	" "
July 17	India,	a	6.66	1.25	1.82	65.5	7.8	1.0574	14.1	10.6	75.1	Dough.
" "	"	b	6.50	1.50	1.94	69.4	8.	1.0591	14.5	11.	75.8	"
" "	"	c	6.65	.87	1.56	64.	8.6	1.0634	15.5	11.4	73.5	"
July 30	"	a	.....	.....	.....	.....	9.8	.....	.....	.....	.....	"
" "	"	b	.....	.....	.....	.....	9.7	.....	.....	.....	.....	"
" "	"	c	.....	.....	.....	.....	7.9	.....	.....	.....	.....	"
Aug. 12	"	a	7.7	1.12	1.9	.....	10.4	1.0778	18.76	14.	74.6	Hard.
" "	"	b	7.7	1.12	1.9	.....	10.3	1.0770	18.59	13.8	74.3	"
" "	"	c	7.6	.88	1.65	.....	10.3	1.0770	18.59	13.9	74.7	"

Date of Analysis.	Variety.		Length of Stalk in Feet.	Diameter of Large End of Stalk in Inches.	Weight of Stalk in Pounds.	Per Centage of Extraction.	Degrees Baume.	Specific Gravity.	Total Solids.	Sucrose.	Coefficient of Purity.	Condition of Seed When Cut.
Aug. 19	India.	a	6.8	1.	1.75	68.6	11.3	1.0831	20.4	16.5	80.8	Mature.
" "	"	b	7.5	1.	1.56	69.2	10.8	1.0806	19.4	16.	82.4	"
" "	"	c	7.1	1.25	2.31	71.	.....	.....	.....	.....	.....	"
Aug. 26	"	a	6.5	1.	1.88	66.66	11.1	1.0835	20.00	15.6	78.0	"
" "	"	b	7.3	1.	1.68	57.20	10.9	1.0814	19.58	15.5	79.1	"
" "	"	c	6.7	1.12	1.88	57.20	10.4	1.0778	18.76	15.	79.9	"
Sept. 3	"	a	6.	1.12	1.56	70.8	9.4	1.0738	17.97	13.9	77.3	Suckered.
" "	"	b	6.5	1.12	1.37	63.64	10.5	1.0786	18.94	14.6	77.1	"
" "	"	c	7.9	.88	2.12	64.7	10.3	1.0770	18.58	14.2	76.4	"
July 17	Stewart's,	a	5.8	1.00	1.25	65.5	6.1	1.0443	11.	6.	55.5	Milk.
" "	"	b	7.4	1.12	1.40	69.4	7.8	1.0574	14.1	8.2	58.1	"
" "	"	c	7.8	1.12	1.44	64.0	7.3	1.0536	13.2	7.3	55.3	"
July 30	"	a	.....	.....	.....	.....	6.4	.....	.....	.....	.....	"
" "	"	b	.....	.....	.....	.....	7.1	.....	.....	.....	.....	"
" "	"	c	.....	.....	.....	.....	7.9	.....	.....	.....	.....	"
Aug. 12	"	a	6.9	1.00	1.75	57.14	9.1	1.0675	16.35	12.00	73.4	Dough.
" "	"	b	7.	.50	1.08	65.09	8.	1.0688	16.72	9.50	56.7	"
" "	"	c	8.7	1.00	1.80	55.55	7.6	1.0543	13.37	9.20	68.8	"
Aug. 19	"	a	7.9	.88	1.06	55.6	9.	1.0667	16.23	10.9	67.1	"
" "	"	b	6.7	.88	1.56	62.9	8.4	1.0631	15.20	11.1	73.03	"
" "	"	c	8.1	1.00	1.88	.....	9.2	1.0683	16.51	11.5	76.3	"
Aug. 26	"	a	8.2	.88	1.62	53.9	9.7	1.0722	17.50	12.6	72.	Hard.
" "	"	b	8.4	.88	1.26	64.1	8.8	1.0725	17.57	11.5	65.4	"
" "	"	c	7.8	.88	1.69	64.3	9.2	1.0683	16.60	12.3	74.1	"
Sept. 3	"	a	8.2	.88	1.31	.....	10.5	1.0786	18.94	14.6	76.5	Mature.
" "	"	b	7.8	1.06	1.62	62.5	9.	1.0667	16.23	11.6	71.4	Hard.
" "	"	c	7.1	.88	1.31	.....	9.1	1.0675	16.41	12.2	74.3	"
July 17	White Seeded	a	5.16	1.25	1.56	64.	8.7	1.0643	15.70	10.1	64 3	"
" "	"	b	6.75	1.25	1.81	65.	5.8	1.0422	10.5	5.4	51.4	Milk.
" "	"	c	7.75	1.12	1.60	64.8	6.8	1.0497	12.5	6.4	51.2	"
July 30	"	a	.....	.....	.....	.....	.....	.....	.....	.....	.....	"
" "	"	b	.....	.....	.....	.....	5.9	.....	.....	.....	.....	"
" "	"	c	.....	.....	.....	.....	.....	.....	.....	.....	.....	"
Aug. 19	"	a	.....	.....	.....	.....	.....	.....	.....	.....	.....	"
" "	"	b	.....	.....	.....	.....	.....	.....	.....	.....	.....	"
" "	"	c	7.	.75	.82	.....	8.	1.0588	14.42	10.	59.8	Dough.
July 17	Orange,	a	4.	.75	.75	62.50	9.	1.0669	16.3	10.	61.3	"
" "	"	b	7.25	1.12	1.50	66.66	8.2	1.0604	14.8	9.	65.6	"
" "	"	c	5.08	1.12	1.19	62.80	8.4	1.0621	15.2	9.4	61.8	"
July 30	"	a	.....	.....	.....	.....	7.6	.....	.....	.....	.....	"
" "	"	b	.....	.....	.....	.....	8.9	.....	.....	.....	.....	"
" "	"	c	.....	.....	.....	.....	9.5	.....	.....	.....	.....	"
Aug. 12	"	a	6.9	.75	1.37	.....	9.2	1.0683	16.60	11.2	67 5	Hard.
" "	"	b	7.3	.87	1.37	63.50	9.7	1.0722	17.51	12.	68.5	"
" "	"	c	7.2	.88	1.25	63.50	9.8	1 07 0	17.68	12.6	71.2	"
Aug 19	"	a	5.12	.75	.94	70.	9.5	1.0706	17.14	13.7	79.9	Ripe.
" "	"	b	6.1	.87	1.12	78.7	9.7	1.0722	17.51	13.	74.3	"
" "	"	c	5.5	.87	1.06	73.4	10.1	1.0754	18.17	.....	.....	"
Aug. 26	"	a	6.2	.87	1.06	.....	10.5	1.0786	18.98	12.1	63.8	"
" "	"	b	6.4	.75	1.18	66.66	10.	1.0746	18.05	11.5	63.8	"
" "	"	c	5.7	.75	.75	.....	.....	.....	.....	.....	.....	"
Sept. 3	"	a	4.1	.88	.88	57.20	9.8	1.0730	17.67	13.4	75.8	"
" "	"	b	6.8	1.00	1.12	53.60	10.8	1.0762	18.43	13.5	73.2	"
" "	"	c	6.2	.88	1.06	55.60	10.5	1.0786	18.94	14.	74.4	"
July 17	Amber,	a	5.60	1.00	1.13	67.60	8.	1.0591	14.5	10.4	71.7	Milk.
" "	"	b	5.66	1.12	1.03	63.70	8.2	1.0604	14.8	9.2	65.5	"
" "	"	c	6.00	1.12	1.4	63.70	8.2	1.0604	14.8	9.6	64.8	"

After July 17th, the Guinea corn took such complete possession of this plant (early amber) that it was almost impossible to distinguish the one from the other.

Several analyses of Guinea corn were also made at various dates—giving of total solids 10-13 per cent.—sucrose 4 to 8 per cent.

An inspection of above will show that the *Chinese* was the first to ripen—reaching maturity early in July. After that period it began to throw out suckers at each joint which soon formed heads; so that when cut, Sept. 13th, each stalk had from five to ten heads of ripened seed. This variety though early and rich in sugar, is too small for profitable working into sugar. It produces however, an enormous amount of seed.

Link's Hybrid reached maturity the last of July, remained nearly stationery in this sugar content till cut Sept. 13th. It suckered but very little. It gave stalks of medium size and very fair quality, and promises to be one of best adapted sorghums for sugar at the South.

Honduras is one of the largest sorghums, many of its stalks cutting nine feet for the mill, and weighing four pounds after being stripped and topped. It is a late variety, reaching maturity in September, and has only a moderate sugar content. Under proper manuring and cultivation it may be made an excellent sugar producing variety. There is however, an intensely red coloring matter on its stalks and leaves which highly discolors the juice, and which is not easily removed—a very objectionable feature. Experiments in labaratory showed that it could be removed by bone black.

The *India* sorghum reached maturity in August, remained nearly stationary till September, at which time suckers had appeared with heads forming rapidly. After that it lost rapidly until ground on 13th. It is however, a fine sorghum, of good size, and large sugar content, and worthy of further trial.

Stewart's Hybrid did not ripen till September, and even then its per centage of sugar was comparatively low. Results this year are not promising for this variety.

The same may be said about the *White Seeded* sorghum.

The *Early Orange* is fair in size and quality, and may perhaps yield to proper treatment and make an excellent variety for the South.

The *Early Amber* could not be thoroughly tested. A very bad stand was obtained, and the vacant spots were soon occupied by Guinea corn, making identification of the former difficult and hazardous.

On the 13th and 14th September, all the above varieties were cut and sent to the mill. Our vacuum pan and centrifugals had not then been put in place. Accordingly the juices from these

sorghums after defecation with sulphur and lime, were concentrated in evaporating pans and left under the hopes of graining them in a few days in the pan. But the vacuum pump ordered from New York was delayed till late in October, and when received and put in position, all the syrups had more or less undergone fermentation.

The results of harvest with analyses are however given.

RESULTS AND ANALYSIS OF MILL-JUICES.

VARIETY OF CANE.		Yield per acre, lbs.	Per cent of Extraction	Raw Juice. Total Solids.	Raw Juice. Sucose.	Raw Juice. Glucose.	Syrups. Total Solids.	Syrups. Sucose.	Syrups. Glucose.	Coefficient Purity.
Honduras,	a	34.050	63 5	13.50	9.7	....	59.4	41.6	....	70.
"	b	28.80	61.4	13.42	8.	....	64.8	41.4	....	64.
"	c	30.900	63.7	12.6	8.	....	66.6	50.	....	75.
Links,	a	19.050	57.	18.2	13.2	....	....	....	....	....
"	b	17.850	58.	17.82	12.9	....	64.8	46.2	....	71.
"	c	21.375	59.	17.64	12.7	....	....	....	....	....
Chinese,	a	12.900	....	15.84	10.9	....	59.4	44.2	....	74.
"	b									
"	c									
India,	a	15.525	....	16.92	11.9	....	....	....	....	....
"	b	15.000	....	16.02	12.	....	66.20	49.4	....	74.6
"	c	13.900	....	17.64	13.1	....	....	....	....	....
Stewart,		.....	....	16.56	11.9	....	....	....	....	....
White Seeded,		.....	....	16.02	10.8	....	....	....	....	....
Early Orange,		.....	....	17.64	13.1	....	59.4	....	....	....
Early Amber,		.....	....	16.56	12.1	....	44.2	....	....	74.4

The results for the syrups were obtained by double polarization.

The last four were not weighed—they were analyzed seperately but were concentrated with 3 and 4.

The station was greatly disappointed in not working the above syrups in the pan. The delayed machinery was not put in place till the last of October, and by that time nearly all the syrups had fermented.

However our kind and always obliging neighbors, the Soniat Brothers, placed at our disposal, a patch of sorghum, (Early Amber) which had been sown for stock feed July 14, (after the Chinese variety had shown its highest amount of sugar on the Station). Of this sorghum they cut and delivered to the Station two and a half tons. At 10 a. m. grinding began. The cane was not fully ripe, analysis giving 12.8 total solids, 9.3 sugar and 71. purity coefficient.

The juice was very slightly sulphured, limed to neutrality, skimmings carefully removed, brushed, concentrated and sent to vacuum at 22° B. It then readily grained, and was centrifugalled at once, giving 80 pounds first sugars. The skimmings,

settlings and some of the juice, were neglected, the sole object being to make sugar out of sorghum. The molasses was at once boiled to string sugar, and in 24 hours had grained prettily—3 gallons of masse cuite yielding 7½ pounds of second sugar—the masse cuite weighing 12 pounds to the gallon—a yield of nearly 21 per cent. of second sugars.

The following data are taken from the records of the sugar house and labaratory:

Weight of sorghum, 2½ tons.

Mill extraction, 62.3 per cent.

One gallon juice required, 135 grains lime for neutrality.

One portion treated to neutrality and concentrated to 22.2° B.

Another portion treated to neutrality then made slightly acid with superphosphate of lime and concentrated.

Masse cuite made 286 pounds.

Sugar from masse cuite, 80 pounds.

Molasses from masse cuite, 206 pounds.

Analysis of Sugar.		Analysis of Molasses.	
Sugar	93.40	Total solids	75.4
Glucose	1.05	Sugar	51.4
Ash	.74	Ash	5.97
Water	4.81	Ash soluble in water	4.56
	100.00		

ANALYSES OF MILL JUICES, OCTOBER 22.

	Degrees Baume.	Specific Gravity.	Total Solids.	Sugar.	Glucose.	Acid Calculated as Malic	Ash.	Purity Coefficient.	Kind of Juice.
Expt. 1	7.1	1.0519	12.8	9.1	2.62	.0504	.....	69.	Raw Juice.
" 2	7.1	1.0519	12.8	9.5	2.65	.0378	.9875	74.2	" "
" 3	7.3	1.0536	13.2	8.6	2.48	.....	.....	64.4	Sulphured Juice.
" 4	7.2	1.0527	13.	8.2	2.47	.....	.....	63.	" "
" 5	7.2	1.0527	13.	9.1	2.24	.....	.....	70.	Limed Juice.
" 6	7.3	1.0536	13.2	8.9	2.38	.....	.....	67.42	" "
" 7	7.3	1.0536	13.2	.....	2.48	.....	.....	.....	" "
" 8	22.2	1.1825	40.6	26.1	8.24	.....	.....	64.2	Concentrated.

ANALYSES MILL JUICES, OCTOBER 23.

	Degrees Baume.	Specific Gravity.	Total Solids.	Sugar.	Glucose.	Acid Calculated as Malic.	Purity Coefficient.	Kind of Juice.
Expt. 1	7.7	1.0566	13.9	9.7	2.21	.05	69.78	Raw Juice.
" 2	7.6	1.0555	13.7	8.7	2.63	....	63.50	Sulphured Juice.
" 3	7.7	1.0566	13.9	8.4	2.76	....	60.40	" "
" 4	7.9	1.0583	14.3	8.8	3.03	....	61.50	" "
" 5	8.	1.0591	14.5	8.1	3.00	....	55.80	" "
" 6	8.1	1.0596	14.6	8.6	2.57	....	58.8	Limed Juice.
" 7	7.8	1.0574	14.1	8.6	3.29	....	60.9	" "
" 8	8.4	1.0621	15.2	9.1	.....	....	59.8	" "
" 9	22.	1.1801	40.2	23.7	9.39	....	58.95	Concentrated Juice.
" 10	21.	1.1707	38.3	23.1	8.78	....	60.30	" "
" 11	26.2	1.2229	48.2	29.1	10.68	....	54.30	" "
" 12	18.	1.1432	32.8	18.8	.....	.....	.....	Scums and Settlings.

In the sulphured juices above, besides the acids of the juice there was from .07 to .10 of sulphurous acid added by sulphuring.

After working this cane which was only partially ripe, low in sugar, and with so low a purity coefficient, our regrets at our inability to work some of the varieties grown on the station, were very greatly enhanced. If with this second crop, grown between July 14th and October 22d, and with no special attention either in cultivation or manure, so decided a success was obtained, we have, we think, from comparison of analytical results, every reason to have expected far better results from several of the varieties grown on the station. Now however, further tests as to the adaptability of sorghum as a sugar crop in the South are to be postponed until another season. In the meanwhile the station can only offer some suggestions. There are several varieties of sorghum which promise good tonnage, with fair quantity of sugar. These, by proper cultivation and manuring, and selection of seed, may become valuable adjuncts to the sugar cane in Louisiana. It is possible to grow two crops in a season on the same land. The seed from sorghum are valuable stock food and may be used as a substitute for corn and oats. They contain starch in large quantities and it has been suggested that they would make an excellent glucose syrup.

If good varieties of sorghum could be obtained which would yield sugar in paying quantities, (and the experiments here rather indicate such a probability), the costly and extensive plantation machinery now used only about sixty days in a year, could begin work in August on Sorghum, and continue till No-

vember, grind cane during November and December, and then devote January, February and March to the conversion of sorghum seed into glucose syrup.

This would keep the machinery going at least six months in a year, and would enable the planters to do at their own sugar houses what is now done for them as soon as their syrups and molasses reach the markets of the world, viz.: Mix them with glucose syrups. If there be money in mixing, and from the prevailing custom one would judge so, why not the planter enjoy the profit?

The above are some of the possibilities of sorghum. Will they be realized? *Nous verrons.*

RECORD OF WEATHER—KEPT BY LOUISIANA SUGAR EXPERIMENT STATION, FOR JULY.

Date July.	THERMOMETER. 9 A. M.	3 P. M.	9 P. M.	Minimum	Maximum	RAIN FALL. Inches.
1	79°	85°	82°	71°	89°	
2	86°	90°	85°	75°	95°	
3	86°	91°	85°	70°	95°	
4	87°	93°	79°	74°	96°	.07
5	83°	90°	86°	74°	94°	
6	81°	90°	79°	74°	93°	
7	84°	83°	81°	70°	91°	
8	83°	89°	82°	72°	92°	
9	78°	79°	79°	73°	85°	.35
10	76°	81°	80°	72°	85°	.32
11	84°	84°	79°	73°	85°	.07
12	82°	85°	81°	74°	92°	.16
13	81°	75°	80°	73°	90°	1.32
14	84°	89°	87°	72°	91°	
15	82°	90°	81°	75°	91°	
16	82°	85°	78°	71°	85°	
17	82°	86°	79°	69°	88°	
18	87°	88°	79°	68°	88°	
19	86°	90°	82°	71°	94°	
20	87°	90°	81°	73°	95°	
21	86°	91°	81°	72°	95°	
22	80°	80°	78°	77°	83°	
23	86°	82°	77°	72°	88°	
24	86°	86°	82°	73°	91°	
25	86°	86°	82°	75°	93°	
26	84°	86°	80°	77°	92°	
27	86°	86°	83°	76	95°	.36
28	86°	87°	82°	76	88°	.47
29	85°	88°	82°	75°	94°	
30	86°	89°	82°	75°	96°	
31	85°	89°	80°	76°	96°	
				Total		3.25 inches.

Highest Temperature...96°
Lowest Temperature...68°

RECORD OF WEATHER KEPT BY LOUISIANA SUGAR EXPERIMENT STATION FOR AUGUST 1886.

Date	THERMOMETER:					RAIN FALL.
August.	9 A. M.	3 P. M.	9 P. M.	Maximum	Minimum.	Inches.
1	82°	88°	81°	93°	76°	.42
2	85	87	80	93	76	.01
3	82	87	81	93	75	
4	86	90	83	93	75	
5	86	91	84	96	76	
6	82	88	79	97	77	.27
7	83	89	84	89	74	
8	82	86	77	87	72	
9	86	81	79	91	68	.17
10	83	86	79	87	72	
11	83	85	79	91	76	.21
12	84	89	81	91	70	
13	85	90	82	95	71	
14	82	.....	.....	93	74	
15	84	91	85	93	75	
16	82	95	85	95	77	
17	85	86	82	94	75	.16
18	85	91	82	93	74	
19	83	89	79	91	76	
20	86	91	81	92	75	
21	84	84	80	90	75	
22	82	.....	80	86	76	
23	82	90	81	91	70	2.1
24	77	88	82	89	66	
25	85	87	78	89	75	
26	81	86	.....	86	72	
27	.....	84	81	89	73	
28	83	86	75	87	71	.61
29	79	84	80	88	73	.23
30	80	82	75	82	72	
31	80	85	76	85	72	

Total.....4.18 inches.

Highest Temperature.....97°
Lowest Temperature.....66°