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OF THE HAWAIIAN ISLANDS.

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[NO. 5.]

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Hawaiian Government six per cent bonds sold at public auction recently at a premium of  $10\frac{1}{2}$  per cent, showing the credit of the Government to be first class at home, where it is best known.

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The Oahu Railway will probably be open to the public during June, as far as the Ewa Plantation, fifteen miles from this city. It opens up a fine section of country along the seashore, for suburban residences.

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The Hawaiian Commercial Company's Plantation, at Spreckelsville, Maui, will finish grinding by the end of May, with a total of about 9,500 tons of sugar, all of which has been shipped to San Francisco.

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In answer to an inquiry as to the yield of the Watsonville, (Cal.), beet sugar factory for 1889, we would say that it was given at the time as about 1,600 tons. The beet farmers were generally satisfied with the prices paid them, though the prices varied very largely, being based wholly on the strength of the juice.

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Mr. Jaeger, who has charge of the Government nursery, has sent to San Francisco for the insect-destroying beetle, *vedalia cardinalis*, and hopes to receive some by the return of the Zea

landia, which will be due here June 7th. Whenever they arrive, there will be plenty of work for them to clean out the millions of scales now infesting the trees around town.

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The cultivation of the sugar beet has been commenced at Chino, San Barnadino County, Cal., and a factory is being erected there for the manufacture of sugar. It is claimed that the juice analyses richer than any grown in the State, which is attributed to the quality of the soil. How the juice compares with that of German beets is not stated, but California will in time, unquestionably produce as rich sugar beets as that or any other European country.

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#### *CANE PLANTING AT EWA.*

The energy with which the preliminary work on the Ewa plantation is being pushed forward is noted by all who have visited it within the past few weeks. From Mr. Lowrie, the manager, and Mr. S. E. Bishop, who is surveying on the place, and from others, we gather some points of interest. There are seventy-five acres of seed cane planted, which is three or four feet high and looking very luxuriant. It is planted according to the improved mode, in continuous line in the furrows, along which the water is led for irrigating as often as is required. The whole field is kept as clean as a garden, and the ground frequently stirred up. No wonder that the young cane grows so rapidly, and gives great promise for the future.

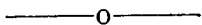
The plowing of new land for fall planting is being pushed forward vigorously, with the help of a traction engine and a gang of plows, such as are used in steam plowing. It is intended to have steam engines soon at work, which will plow more rapidly. At present six acres a day are plowed, and it is hoped to have 600 acres planted during the present fall. This will insure a first crop for 1892 of 2,500 to 3,000 tons.

The supply of water promises to be abundant, judging from the two artesian wells already bored, which are fitted with ten-inch pipes, and a capacity of 1,500,000 gallons per day to each. There are to be six of these wells, with a combined capacity of eight to ten million gallons daily, sufficient to irrigate 1,000 acres.

The soil on which this plantation is located is marvellously rich, and similar to that of Spreckelsville and Makaweli, lying, like the places named, at the base of high mountains, too hot and dry for anything to grow without irrigation, but with abundance of water capable of yielding four to six tons of sugar per acre. Cane grows wonderfully fast here, and promises to mature in fourteen months from the planting.

The new pumping machinery ordered for this plantation will be here in July, and probably be erected soon after its arrival. It is in charge of Mr. E. Kopke, formerly connected with the Kekaha, Kauai, irrigation works.

The rails for the extension of the Oahu Railway having lately arrived, the track will be laid and the cars running over the road in June, as far as the Ewa mill site, when freight and passengers will be conveyed the entire distance, fifteen miles from Honolulu. The nearness of this plantation to the port of Honolulu assists the company greatly in all its operations, and will enable them to harvest a large crop sooner, probably, than has been the experience of any similar enterprise in these islands.



Among the many tourists who have visited these islands during the past few months, is Mr. Alfred Fowler, representing the well known firm of John Fowler & Co., of Leeds, Eng., engaged in the manufacture of agricultural implements. During his stay here, Mr. F., in company with Mr. G. W. Macfarlane, has visited nearly every plantation, and expresses himself not only pleased but surprised at the perfection to which our planters have carried the art of cane culture and the manufacture of sugar. He gives the palm to Hawaii, for the development of the most scientific and skilful methods in every branch of the industry. This is not the opinion of a novice, but of a man who has visited nearly every sugar country and observed the manner in which the various branches of the industry are carried on in each, and is fully competent to express an opinion. Mr. F. will leave in the steamship City of Peking, in June, for China, the East Indies and home, and will carry with him, no doubt, the most pleasurable recollections of Hawaii and the Hawaiian sugar industry.

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*WITH OUR READERS.*

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A short historical sketch of sugar from the earliest date is inserted on page 201. The facts presented in it are not always accessible when wanted. In Scotland, in the fourteenth century sugar sold for four dollars per pound—quite a contrast to four cents a pound in 1890.

To those who are interested in the discovery of the fact that the sugarcane produces seeds, which with proper care can be made to vegetate and produce new varieties of cane, the article taken from the *Demerara Argosy* will possess special interest. The variety which has been most frequently referred to as producing seeds is the Bourbon, but other varieties will probably produce seeds in climates well adapted to their development. In these islands the Lahaina cane is so nearly perfect in all the qualities required, that it will pay to search for seeds and plants, for the purpose of obtaining new varieties.

An interesting historical sketch of sugar manufacture in Louisiana will be found on page 214, which we copy from the proceedings of the fourth annual meeting of the Louisiana State Agricultural Society, kindly furnished us by Mr. W. J. Thompson. From this account it appears that sugar culture in that State dates back only one hundred and twenty-six years. Judge Rost, the writer of the article anticipates that the time will come when 5,000 pounds of sugar will be raised per acre in that State. We trust his prediction may be realized, but protection only can accomplish it.

The comparative production of beet and cane sugar is shown on page 211, a valuable table to refer to. There would seem to be no limit to the amount of beet sugar that can be produced, as sections of each of the four great continents can produce the root in unlimited quantities, and the production will continue to increase so long as sugar can be manufactured and sold at a paying price. The quantity of sugar raised in India, stated at 2,500,000 tons, will be a surprise to many. The population of that empire is 250,000,000, and the area 720,000 square miles. As the sugar exported from India does not exceed the imports, the entire production is consumed by her own population, giving the large average of twenty pounds per head, if the statistics be correct.

A short but very emphatic statement by Gov. Warmoth on page 219, regarding the relative value of mill and diffusion work in Louisiana, closes with this statement, which will attract attention: "I wouldn't have the best mill in the State as a gift; and if I didn't have a diffusion battery, I would mortgage everything I have in the world to get one, and would never take off another crop without it." But the Governor does not have to pay \$15 per ton for his coal.

As a new Industry, "Fruit candying in Italy" will attract attention. Citrons grow more readily here than any of the citric family. Indeed the product of lemon or lime seeds, when planted, invariably yield citrons. They are easily grown, with less care than oranges or limes, and the rind is very superior, making a delicious candied fruit. The article referred to shows how the work is done, as narrated by one engaged in it, and is therefore valuable.

Following the above is a timely notice of the "Australian Lady-bug," which is just now attracting much notice. Credit is given to Mr. Albert Keobele, who first introduced this beetle from Australia to California. From another source we learn that a sufficient contribution has been secured in California to purchase a neat cottage for him in the beautiful village of Alameda, opposite San Francisco.

How they raise bananas in Honduras (page 235) will attract the attention of those interested in this fruit. It seems that they plant them there 18x18 feet, which is a very wide distance apart, and a great waste of land. Here the Chinese rarely plant them more than from six to eight feet apart each way, and produce from each hill two large bunches annually for three or four years. A good specimen of a small Chinese banana patch may now be seen opposite Mr. Paul Neumann's residence on King street. They are planted six feet apart, with not a missing hill in the entire patch. They allow but two stalks to the hill, and when the fruit is nearly ripe suckers are permitted to grow, so that they are enabled to get two large bunches from each hill every ten or twelve months. At the end of the fourth year, having taken off three good crops of from 500 to 600 bunches to the acre, they plow up the land and re-plant with new roots, generally manuring the ground well before plowing.

Some hints in the article are worth noting by those engaged in the business, but the advice to plant trees among bananas should never be followed. Trees of any kind, in banana or cane fields are an injury, on account of the roots as well as of the shade, which check the growth, and bananas or cane growing near trees always possess a sickly look, and seldom yield well. Bananas need all the sun they can get.

The production of camphor must soon become an industry of greater importance than it now is to meet the necessities of commerce, as the demand for the article is on the increase, and the price is advancing. The camphor tree, as yet, is very little known, and its cultivation is confined to very few countries. There are a number of these trees growing here, and they appear to do well. The oldest of them is in the premises of Mrs. T. R. Foster, on Nuuanu Avenue, where it was planted many years since by the late Dr. Hillebrand, is seventy-five or eighty feet high, and bears seeds abundantly.

Mr. C. Willing, of the Government nursery, informs us that four or five years ago, he distributed 600 to 800 young camphor trees, to applicants in various parts of this group, and he thinks that many of these trees are growing, though he has not heard from anyone regarding them. Those who have camphor trees should look after them, and endeavor to increase their number, as they will become valuable in time.

While speaking of trees, we would call the attention of our readers to the soft shell English walnut, which is becoming scarce on account of the demand for furniture. A single tree recently sold for \$200, and a grove of 220 trees brought \$10,600. When ten years old they bear abundantly, and are valuable for their nuts, but the wood is even more valuable. If some of our well-to-do land owners will introduce this tree and have it planted at various elevations above the sea, a few years may demonstrate where it will thrive best, and thus it may become a valuable addition to our forest timber.

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The total shipment of raisins from California for 1880, aggregated 1,644,000 boxes, representing nearly 33,000,000 pounds of raisins, an increase of 12,000,000 pounds over 1888. and double the yield of 1887. Fresno county leads with 632,000 boxes. Riverside 225,000, San Diego 130,000, Los Angeles 125,000.

## HOW THE NEW TARIFF WOULD AFFECT THE PRICE OF SUGAR.

Willet & Gray's New York sugar circular publishes some information from German correspondents regarding the cost of beet sugar for export, and makes comments on them which will be of interest here. The cost of beet sugar from Europe laid down in New York will probably fix the value of cane sugar at any American ports, after the passage of the law making raw sugar free of duty. The following is the German statement referred to :

"Our price for the quality of refined sugar, which is used principally for home use, is 26 marks for 50 kilograms, paid by grocers to refiners. The price paid by retailers is 30 marks. But you know our system of customs is as follows, say :

Spot value for 50 kilos.....	26 Marks.
Costs to port of shipment.....	1 Mark.
	27 Marks.
Less tax for home consumption....	6 Marks.
" repaid for roots .....	5.32½ "
	11.32½ Marks.
Cost, free on board in Hamburg .....	15.67½ Marks."

"According to these figures, the wholesale grocer in Germany pays 26 marks per 50 kilograms of refined sugar (1 mark is 23 8-10c. 1 kilogram 2 1-5 lbs.), or say 5½c. per lb. United States currency, and the retailer pays 6½c. per lb. But the exporter to the United States pays only 15.67½ marks, free on board in Hamburg, which is the amount on which the ad valorem duty would be assessed, or say 3½c. per lb. The sugar described being the same quality as American granulated (which is what we asked prices for), it could be laid down in New York at say, freight, insurance and landing charges ¼c. per lb., and duty 40 per cent on 3½c., equals 1.35c. plus 3½c. cost f. o. b., say total 5c. per lb. At the same date, raw beet sugar f. o. b. in Hamburg was 12s. 4½d., or say 3.01c. per lb. for duty ; add freight, insurance and landing charges, .20c. per lb., and duty 25 per cent on 3.01c. equals 1.05c., gives total cost at refinery in New York 4.27c. per lb. Add cost of refining, say ½c. per lb., equals say 4¾c. per lb. for granulated sugar. From these figures it appears that German refined could be sold in the United States at 5c. per lb. without profit to the importer,

against American granulated at  $4\frac{7}{8}$ c. per lb. without profit to the refiner, unless it be considered that the cost of refining *raw beet sugar* is below  $\frac{5}{8}$ c. per lb., which we doubt. It costs more to refine beet sugar than cane sugar. But the ad valorem fact is, that the United States Government collects duty on  $3\frac{3}{4}$ c. and not on  $5\frac{3}{4}$ c. per lb.—thus allowing the bounty part of the value of refined to come in free of duty; and the same applies to the raw beet sugar, only to a less extent per lb. All sugar from cane countries would pay ad valorem duty on full value, because of the absence of bounties. Furthermore, the polariscope must still be applied in the United States to determine if the test of the sugar agrees with the test of the invoice—the price stated in the invoice being based on the test stated in the invoice. The appraiser cannot confirm the price for ad valorem duty without confirming the test.”

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### ORANGE STATISTICS.

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The New York *Times* thus sums them up. In order to give you an idea of the orange industry in Florida I will give you some statistics: There are in the State about 10,000 growers. The average is 100,000 and the capital invested is from \$60,000,000 to \$75,000,000. Three years ago there were produced 1,250,000 boxes, two seasons ago 2,100,000 and last about 2,500,000 boxes. From this it will be seen that the orange industry in Florida has steadily increased, and is still increasing. This, of course, has had a marked effect on the orange trade of the United States, and its influence is shown in the steady decrease of foreign oranges brought to our markets. In 1887 there were imported 1,620,000 boxes, and 127,000 cases of foreign oranges, in 1889, 1,100,000 boxes and 100,000 cases. The oranges in cases are largely imported from Valencia, and these have decreased. The latter are imported from the countries on the Mediterranean sea, where orange growing is giving way to lemon growing, lemon sprigs being grafted on orange trees.—*Florida Agriculturist.*



## CORRESPONDENCE AND SELECTIONS.

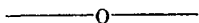
*SUGAR—ITS HISTORY FROM EARLIEST RECORDS  
TO THE PRESENT TIME.*

Heredotus, one of the earliest writers of whose works there is any record, informs us that a tribe in Africa called the Zygyantes had "besides honey of bees, a much greater quantity made by man." It is also stated that Nearchus, the chief admiral of Alexander the Great, "discovered concerning canes that they make honey without bees." Very ancient races, therefore, were acquainted with the fact that certain canes yield sweet juices, and being ignorant of any methods of purifying these juices, their sugar could not be got to crystallize, and resembled honey in consistency as well as in taste. Megasthenes, however, writes much later concerning "the India stone, sweeter than figs or honey," so that by this time some rude method of crystallizing or solidifying the juice had been discovered. The early Jewish historians make no mention of sugar, the only sweet substance habitually used by the Hebrews being honey, but Isaiah speaks of "sweet cane," and there is a disputed allusion to it in the Song of Solomon. It was not until about the commencement of the Christian era that sugar was spoken of by an appropriate name. "In India and Arabia Felix," writes Dioscorides, "a kind of concrete honey is called *saccharon*." This term is evidently adapted from the Arabic *assokar* or *shuker*, which itself is derived from the Sanscrit *sharkara*. Speaking of names, it is rather odd that the Hebrew word for being intoxicated is *shacar*, a word which is evidently closely connected with the Arabic; it is interesting, too, when we remember the ready conversion of sweet liquids into alcohol. There seems to be little doubt that the origin of the manufacture of sugar must be sought for in India and Arabia. Apart from the evidence of Dioscorides, we are always disposed to trust Pliny, to whom we are indebted for so much information concerning the manners and customs of the ancients. In Holland's translation, Book xii., chap. 8, we read, "As for sugar, there is of it in Arabia, but the best cometh out of India. A kind of honie it is, gathered and candied in certaine canes; white, this

is, like gumme (Arabicke), and brittle between a man's teeth. The graines hereof, when they are at the biggest, exceed not a filberd nutte, and serve for physicke." Sugar, as known to the ancients, was doubtless far less palatable than it is now. In preparing it the canes and the roots were frequently boiled, so that certain bitter and aromatic principles must needs have been extracted: The quality imparted to the sugar by this process might have determined its use for medicinal purposes. It is certain that sugar was only regarded as a sort of medicine for several centuries, and confirmation of this statement may be found in the fact that it is rarely mentioned except by physicians and learned men, nor with tolerable precision except by the former. The Greeks and Romans used sugar as a medicament almost entirely, and it is occasionally alluded to by the physicians of the Augustan age. During the seventh century the empire of the Saracens was scarcely inferior to that of Rome in the times of her greatest prosperity, and, we may add, rapacity. They conquered Western Asia, overran Northern Africa, and carried their arms into the south of Europe. To these semi-barbaric Saracens Europe was indebted for the manufacture of sugar—a commodity the consumption of which may now almost be taken as a measure of a nation's civilization. There are many who attribute the introduction of sugar to the Crusaders. But sugar has undoubtedly been cultivated in Spain for nearly 1000 years, and it has been asked, since the Crusaders were collected from all parts of Europe, how is it that Spain was the only country in Europe favored with this valuable commodity? Of course the Crusaders did find sugar in Syria, and they may have assisted in making it better known on their return to Europe. We read in the history of the Second Crusade that Richard Cœur-de-Lion captured seven camels laden with sugar, and that his knights found "sweet honied cannes called Zucra." These they gathered and sucked, and were "much pleased with the sweet taste thereof, with which they could scarcely be satisfied." It was long before the mechanical arts were applied to the preparation of sugar, and longer still before any method of clarifying the juice of the cane was discovered. The use of alkalis is believed to be an invention of the Moors who settled in Spain. Sugar appears to have been very little known in England till the fourteenth century. In 1329 the Lord Chamberlain

of Scotland speaks of loaves of sugar which were sold at 1 oz. of silver per lb, a price equivalent to about \$4 of our money. The manufacture was not carried on in Great Britain at this time, but small supplies were imported from Venice, where sugar refining had already become an important industry. Although old Harrison, the chronicler, speaks of sugar and wine as being a common drink amongst the upper classes during the sixteenth century, it is probable that sugar did not become an article of ordinary consumption until the middle of the seventeenth century. The sugar industry was started in Barbadoes by some English merchants in 1643. It is commonly supposed that the cane was introduced into the Western hemisphere by the Portuguese and other early European settlers, but it is decidedly stated by the first explorers in these regions that the aborigines of Virginia and other parts of America prepared sugar from the maple juice, and also from a native variety of sugar cane. The Spaniards did, however, transplant the cane, which they cultivated in their own country, and to them must certainly be ascribed the introduction of the sugar industry into Madeira and the Canaries. The history of sugar cultivation is one of successive migrations westward, due chiefly to the rapid exhaustion of the soil inseparable from the cultivation of the cane with slave labor, and to an ignorant carelessness in the treatment of the land. The opening up of new highways of commerce, the facilities of communication and intercourse amongst nations, the more scientific methods of cultivation and processes of manufacture, and the fresh sources from which sugar can now be derived, have all contributed to the phenomenal development of trade in and consumption of this commodity which has characterized the present century. In 1700 the amount of sugar consumed in Great Britain was 10,000 tons; in 1800 it had risen to 150,000 tons; whilst in 1885 the amount of sugar consumed was 1,100,000 tons. Of course the population of the United Kingdom has more than doubled since the commencement of the century, but this of itself is insufficient to account for the extraordinary increase. It has been said that, sugar being an article of luxury rather than a necessary of life, the extent of its consumption is affected by the condition of the people, as well as by the market value, and that any increase from the first of these causes is a satisfactory indication of

prosperity. That being granted, it is very comforting to note that whereas the average consumption in the United Kingdom was 16 lbs. per head in 1844, it is now nearly 70 lbs. per head. The greatest consumers of sugar are the people of Gothic and Teutonic stock; the English and their offshoots above all others. The Australian colonists consume over 70 pounds per head per annum. Nations differ widely in their ordinary tastes and habits, and especially so in respect to foods; neither wheat, rice, meat, nor potatoes, can command unanimous favor; but sugar is so agreeable and nutritious that it is universally acceptable to both civilized and savage man.—*Am. Analyst.*



### *HISTORY OF THE SUGAR CANE SEEDING IN BARBADOS.*

*(From Demerara Argosy, March 15.)*

In my paper on The Sugar Cane Breeding published in these columns of April 14th last, I said in regard to the Barbados history of the subject that—"If the reports of the meetings of the Agricultural Society of the island, and files of the newspapers or agricultural correspondence of 20 years ago or more were looked up, doubtless additional information might be gathered. I suggest the research to any one on the island desirous of writing the local history, or of compiling a bibliography of the subject." Mr. J. B. Harrison, our Government Analyst, used the opportunity of his residence in Barbados to make this investigation, both by communication with planters of the period who are still living, and by looking through the files of newspapers of the time that have been preserved. The majority of the planters of that day have passed away, but fortunately one gentleman, Mr. James Parris, who took a leading and active part in raising seedling canes, still survives, and from memory and by reference to printed documents gave Mr. Harrison some of the desired information. Few of the facts and circumstances appear to have been placed on permanent record, and with the death of the older planters much information on the subject has been irrecoverably lost. In the floating traditional knowledge which is general among the present generation of planters on the island, there is proof that raising the sugar

cane from seed had been practiced and was well known to their fathers, though its potential importance was not recognized, and its utility, was after a short experience, disbelieved in ; the whole of the plants that were raised being destroyed or allowed to perish. As recorded in these columns of January 5th, 1889, it was this floating tradition of which I have spoken, that led, in carrying out cultural experiments at Dodd's Botanical Station, to the re-discovery of natural seedlings, and from the publicity given to this re-discovery the present interest in the subject has grown. I now extract from the report of Messrs. Harrison and Bovell on the work at Dodd's Station for last year, the following narrative of the recorded notices that appeared 31 years ago in the Barbados papers, the oral information gleaned from men of that period still living, and the account of their own re-discovery of seedlings in 1858, and the experiments carried out at the station since :

#### EXPERIMENTS IN RAISING THE SUGAR CANE FROM SEED.

"Attention here was first strongly directed to this point in 1859 by the Honorable J. W. Parris, who succeeded at his estate, Highlands, in St. Thomas' parish, in rearing successfully self-sown seedlings ; and, in order that credit should be given to the pioneer in this branch of research, we have obtained the account given by Mr. Parris in a local newspaper in 1859, of his discovery, which is below reproduced, with two other extracts from the press."

"*The Barbados Agricultural Reporter*," March 8th, 1859, said : "In transferring to our columns the following remarks and letter from the *Liberal*, we cannot refrain from congratulating the country on there being found at last a planter who has overcome the reluctance of the race to figure in print, and communicated to the public an interesting fact within his own experience. We have not the slightest doubt that there are many gentlemen in the position of Mr. Parris equally able to give most valuable information to their brethren from time to time, if they would only follow his good example and take the trouble to disseminate stores of knowledge which are of no use when hoarded up. The *Reporter* is always open to them for the purpose, but if they prefer some other medium, it is not too proud to publish a good thing at second hand. In reference

to what Mr Parris states as to the varieties of canes growing in the same field, to which he seems to attribute the fact of having seedlings of three sorts, we would remind our readers, that it is no uncommon thing for different varieties of seedlings to be produced from the same stalk. It is indeed by propagating from seed that the endless variety of roses, to say nothing of other flowering shrubs, has been obtained, and the sweet potato has been known by actual experience to give from the seed of one slip many kinds which were either previously unknown, or of which no trace was to be found in the field in which the parent grew. So also it is notorious that the rind fruits are most uncertain when grown from seed, a Royal Family Shaddock perhaps degenerating into an article more fit for the punch-bowl than for the dessert service, and therefore it is always considered necessary to propagate such trees by off-shoots from the root.

*"The Liberal,"* February 12th, 1859, said :

"A discovery appears to have been made last year at Highland Plantation in the parish of St. Thomas, the practical importance of which, should circumstances tend to verify it, can scarcely be overrated in an agricultural point of view. It appears that sometime about the month of May, the Superintendent found growing in a field of canes that had been kept for ratoons, several grass like plants, the unusual appearance of which in the field led him to examine them closely, and he came to the conclusion that they were canes growing from seed—the seed, as he surmised, having been thrown out from the cane arrows of the previous crop. He communicated the fact of finding these plants and his views respecting them to his master, Mr. James Parris, who, at first, was rather disposed to ridicule the idea, but eventually saw reason to change his opinion. The matter having come to our knowledge in somewhat general terms, a week or two ago, we communicated with Mr. Parris on the subject, who was kind enough to afford us in conversation all the particulars connected with the discovery, and has since, at our request, embodied them in the following letter which we doubt not will be read with much interest, especially by persons interested in the cane cultivation in these colonies. The plants which Mr. Parris succeeded in raising did not arrow last year, and he proposes taking

plants from them for a fresh planting this year, and keeping the stools to ratoon, the better to ensure the chance of some one or more of them giving seed, if it be in their nature to do so under the circumstances.

J. W. Parris, to the Editor of the "*Liberal*."—"In accordance with your request, I now send you the following particulars regarding the canes established from the seed, and which are now growing on Highland plantation :

"I think it was somewhere in the month of May last year, that my attention was called to the fact of there being several cane plants growing in a field of ratoons, which the Superintendent pronounced as having grown from the seed of the cane arrow. On first examination, I thought it was a mistake, they bore so close a resemblance to guinea grass when it grows from seed ; but as there was not any of this kind of grass growing on or near the field in question, I could not account for its presence there, and this circumstance caused a stricter examination on my part, the Superintendent all the while declaring positively that they were veritable canes. After being satisfied myself that they were really canes, I caused all that could be found to be removed and transplanted to another field, but in consequence of the weather being very dry I could only save seven plants of them, and these are now alive and are growing. I intend having the plants from those put in a spot by themselves this year, hoping to obtain seed from them again.

"The field in which they grew is in that part of the estate which runs down a hill into Scotland ; the soil is very moist and is composed of clay, siliceous sand, and chalk, and had been the year previous thoroughly tilled and was in what we planters call fine heart, that is in a finely divided and pulverized state. The parent canes were very vigorous and there were several varieties growing together in the field. It appears as if there are seed from three kinds growing—the Bourbon, Transparent and Native ; that is, the plants which are growing have the appearance of these at present. I would also remark that these plants were not found growing in one spot but were scattered over a space of more than half an acre, and grew up wherever the trash did not cover the land thickly. Any further information that you or any other gentleman

might require concerning the above, I shall be most happy to afford, as far as I am able, or to show the plants as they now stand.—Glendale, February 8th, 1859.”

#### FURTHER TESTIMONY.

“ Mr. Parris has recently stated to us that he finally succeeded in planting four and a half acres with canes raised from these original seedlings, and that he estimated their yield of sugar at over four hogsheads to the acre. He, however, from what he regarded as certain objectionable characteristics which arose in the canes, finally abandoned their cultivation, and did not again turn his attention to the subject. In order to test the truth of Mr. Parris’ discovery of cane seedlings, several persons here immediately afterwards attempted to raise them from the cane arrows. This was done successfully by Mr. Carter of Bridge Cot, and by Mr. J. Wiltshire Clarke, neither of whom, however, appeared to have attached much importance to the results. At another time Mr. T. Clarke, of Cane Field, discovered cane seedlings growing from a fallen cane arrow, but did not succeed in raising them, and Mr. E. S. Sisnett found some cane seeds growing in Christ Church about the year 1861; these were allowed to grow amongst canes that were planted in the usual way, but as they were very small and thin when they reached maturity they were destroyed. In this last case the seeds appear to have come from the Bourbon canes. Next we find that the late Mr. W. Drumm paid much attention to this subject, and wrote several letters to the *Sugar Cane* upon it. He, however, stated to us in March, 1884, that whilst he had repeatedly obtained cane seed, he had never succeeded in raising canes from it, and that he believed the various instances we have mentioned to be errors of observation.

#### THE RECENT EXPERIMENTS.

“ At Dodd’s the cultivation of the different varieties of canes in large numbers and side by side has placed us in a specially favorable position for examining into this question. In January, 1888, Mr. J. B. Pilgrim, one of the overseers at Dodd’s, reported to us that in the neighborhood of one of the experimental fields he noticed that certain fine grasses were springing up, and we found at intervals from then to the middle of March similar seedlings. These were found not only on the



surface of the field but also growing in the bottom of a somewhat deep drain which had been recently dug. Much difficulty was experienced in preserving these seedlings, as they were exceedingly sensitive to the effects of exposure to the sun or wind. In June, 1888, the seedlings which had survived were transplanted, giving us about 60 plants. Certain of them were dug up with great care, and placed in water until the soil crumbled away from their roots, and were carefully examined for any traces of cane that might be on the roots. Nothing could be detected, and we were strengthened in an opinion that they were true seedling canes by the very great difference in their mode of growth from that of canes growing from the eyes of canes. A few months later we found that there were several distinct varieties amongst them. In December, 1888, we examined them with great care, and grouped them into ten groups according to their most strongly marked characteristics, and found that in many of our groups thus formed the canes graduated from one group into another. Many of these canes exhibited some of the characteristics of certain of our varieties, together with the characteristics of other varieties, but in some cases we could not even form any opinion as to their parentage, as they differed completely from any canes we had ever seen. During the latter stages of their growth these canes were examined by many planters and sugar chemists, all of whom were particularly struck with the amount of variation they exhibited, and with the fact that certain of them were entirely different from any canes they had previously seen. The canes as grouped were replanted in the usual manner, and are now in course of experimental cultivation. The remaining canes were reaped on March 8th, 1889, and fifty plants yielded 307 lbs. of cane tops, and 1626 lbs. of canes, which gave 61 per cent. of juice, of a density of 10.6° Beaume, containing 1.629 lbs. of sucrose, and .090 lbs. of glucose, in the imperial gallon. The following are the compositions of the canes, cane juice, and megass :

	Canes.	Cane Juice.	Megass.
Water.....	68.11	81.18	48.20
Sucrose.....	12.62	15.13	8.70
Glucose.....	.69	.83	.48
Ash .....	.47	.30	.75
Albuminoids.....	.33	.17	.59
Fibre.....	15.44	.....	39.60
Organic matters.....	2.34	2.39	1.68
	<u>100.00</u>	<u>100.00</u>	<u>100.00</u>

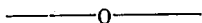
"In order to definitely settle the question of whether the sugar cane produced fertile seed from the middle of December, 1888, to that of February, 1889, most careful search was made through the fields for growing seedlings, and for arrows containing fertile seed. The search for both of these proved successful, but only on the fields in which the varieties were growing, and on which, as pointed out by us in our 1888 report, the conditions for fertilization are most favorable. The seedlings as found were transplanted into boxes, but on account of the unfavorable climatic conditions great difficulty was experienced in preserving them; on one occasion an accidental exposure to the sun for about three hours destroyed five out of seven contained in the exposed box. One seedling was found attached to a portion of cane arrow which had fallen in a damp and sheltered position. The portions of cane arrows found which apparently contained fertile seed were collected, the apparent seeds carefully separated from the spikelets of the panicles, and sown at intervals commencing on January 12th. Ten days after some of the seeds were seen to be germinating, and certain of them were removed and preserved as microscopic objects. Of the apparent seeds less than five per cent. germinated, and not more than one fourth of the germinated ones finally survived.

"As the self-sown seedlings and those raised from the seeds by ourselves reached a sufficiently advanced stage of growth (the exceedingly slow growth of the seedlings at an early age is most marked, a point which in certain previous researches may have prevented the attainment of complete proof of the fact that the sugar cane produces fertile seed, and in which mode of growth the seedlings strikingly differ from the rapid growth of canes from the buds) they were, similarly to the seedlings of 1888, transplanted into the field, and are now in course of experimental cultivation.

"As far as our experience at present shows, the conditions most favorable for the production of fertile seed by the sugar cane are found in the cultivation of varieties side by side, and in comparatively large numbers, although from observations recently made apparently fertilized ovules are to be found from time to time upon arrows of Bourbon canes growing by themselves. To secure the germination of the seeds it is necessary to sow them soon after the arrow ripens, under similar condi-

tions to those necessary with the seeds of other of the gramineæ of low germinating power.

"The fertile seeds enclosed in the glumes are long and narrow, being from three to four millimetres in length, and .65 to .70 millimetres in breadth, and terminate in a beard from six to eight millimetres long."



### *DEVELOPMENT OF BEET AND CANE SUGAR PRODUCTION.*

Seven years ago the European production of beet sugar and the production of cane sugar in other parts of the world balanced each other within a few thousand tons, leaving out of the question the cane sugar which does not usually come into the trade of Europe or the United States, or which only figures accidentally in those markets, such as the sugars of India, China, Formosa, etc.

Last year the production of beet sugar exceeded that of cane by about 500,000 tons. This year, or this campaign, the difference will be much more marked; according to present estimates, it will considerably exceed a million of tons in favor of the beet sugar. The following table, in round figures, makes these facts clear:

	Beet Sugar. Tons.	Cane Sugar. Tons.	Totals. Tons.
1883-84 .....	2,361,000	2,323,000	4,684,000
1884-85 .....	2,546,000	2,351,000	4,897,000
1885-86 .....	2,220,000	2,340,000	4,560,000
1886-87 .....	2,730,000	2,345,000	5,075,000
1887-88 .....	2,452,000	2,470,000	4,922,000
1888-89 .....	2,765,000	2,280,000	5,045,000
1889-90 .....	3,500,000	2,278,000	5,778,000

We see that during the period under consideration the production of cane sugar has remained stationary, or even diminished, while the production of beet sugar has progressed enormously.

In the beet sugar producing countries, the raw material, the industrial appliances, and the methods of manufacture, have been steadily improved, at the cost of great sacrifices, and the quantity of sugar has been regularly increased. In the cane producing countries some progress has also been made in these

respects, but no serious attempt has been made in this direction, except when a decline in prices had brought on a crisis, that is, when the means of working, money and credit, began to fail.

In extra-European countries the development of the European production is attributed more especially to the premiums granted by the treasury in most continental countries either to raw or refined sugar, or both. The premiums have certainly played their part in the extension of the annual production of beet sugar; but there are cane sugar producing countries where the premium is more than treble what it is in Europe, and in which the production has none the less remained stationary. Louisiana, for example, is a country especially privileged in the matter of premiums; it enjoys an enormous advantage from fiscal assistance, equivalent to the customs duties, which are more than twenty francs per 100 kilos. of 88° sugar (8s. per cwt.); in spite of this, the annual production of that country remains somewhere about 150,000 tons; and Brazil, notwithstanding the subsidies granted to her sugar works, does not succeed in developing its production, which in 1883-84 was 360,000 tons, and has never since reached that figure. Guadeloupe and Martinique, which concern us more nearly, and which have for some years had the advantage of the premiums granted in the mother country are in the same position; their crop of 1883-84 has never yet been surpassed by any of the six succeeding crops.

It is the yield of sugar obtained, and the consequent reduction of the cost price, which constitutes the superiority of the European sugar manufacturer. In Europe the improvement in the cultivation and manufacture has been earlier and more rapid than in the colonies.

We must not, however, repose upon our laurels. On this continent we have reached almost the last rung of the ladder as regards the yield obtainable; in the cane producing countries there is still plenty to be done in this respect, and the position would undoubtedly be reversed, as far as we are concerned, if once those countries had attained all the progress in respect of cultivation and manufacture of which they are capable.

The extra-European countries which are making most efforts to develop their sugar production are those of North America. As yet Canada has not succeeded in creating a beet sugar in-

dustry, but some very encouraging results have been obtained in the United States. Whilst sorghum has proved deceptive, and the Louisiana production has remained almost stationary, it would seem as if they were in a fair way to attain greater success with beet sugar.

If we may believe the papers, California has two sugar factories at work, and others are about to be erected.

Some years ago a grand future was predicted for the sugar industry in Australia. Those hopes have not been realized; the production of that country appears rather to be falling off. At any rate the Mauritius sugars seem still to find a good opening in the populous centers of Australia. It is said that frequent and occasionally intense frosts present a serious obstacle to the cultivation of the cane in that country.

There are other countries in which the production of sugar has been declining for some years. Natal, for instance, is said now only to possess one factory in work. At certain intervals there are night frosts, whilst the heat at other times is great, and there is a want of moisture, irrigation is difficult and costly, and the cost of labor since the discovery of numerous mines is out of proportion to the price of sugar. It is only rarely that Natal sugar is now seen in the London market.

In conclusion it may not be uninteresting to speak of India, which is generally thought to be in a position to export to Europe and the United States more or less considerable quantities of sugar, when prices are at a high level. As we mentioned at the outset, the Indian production is not included in the table we have given. This great country exports very little sugar, at any rate, according to calculations made, it imports as much as it exports.

The exports consist of low grade sugars; on the contrary, the imports included crystallized sugar from Mauritius, and refined sugar from Europe, products which are in request among the well-to-do population, whilst the poorer inhabitants content themselves with the grey and brown sugars produced by the small native planters. Of late years especially, India has sent but little sugar to Europe and the United States. On the other hand, she has imported large quantities from Mauritius through Bombay and Calcutta. The Mauritius sugar is in especial favor; a few years ago the Mauritians got over one of the priests, ac-

accompanied by a commission, in order to prove to him, in the works themselves, that the Mauritius manufacturers do not use animal (or bone) black in the preparation of sugar. A religious prejudice forbids the Hindoos to use articles in the preparation of which animal substances like bone black are employed. Since then the Mauritius sugar has regained the esteem which it had momentarily lost owing to the interested and unscrupulous remarks of competitors residing in India.

The Indian production is estimated by the Government at 2,500,000 tons. It has not increased during the last few years. Famines have raised the price of wheat and rice; the cultivation of cereals having become remunerative, has partially replaced that of the sugar cane.

On the other hand, the native sugars have found new markets owing to the opening up of railways and routes in the direction of China and Central Asia. These new openings and the low prices of sugar in Europe have operated to prevent the latter receiving any considerable supplies from India. Such is at any rate the opinion of one who is in a position to obtain good information on Indian matters, and who has a special interest in knowing the state of the sugar trade of that country.—*The Sugar Cane*. Translated from *Increrie Indigene*.

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PAPER READ BY JUDGE EMILE ROST, BEFORE THE  
LOUISIANA STATE AGRICULTURAL SOCIETY.

PROGRESS OF SUGAR CULTURE AND MANUFACTURE.

*Mr. President and Gentlemen of the State Agricultural Society:*

The subject which I have been requested to discuss before you presents so many questions, that in order to be brief I will simply give you a general view of what has been done in the sugar business, especially during the past twenty-five years. The cultivation of sugar cane has existed in Louisiana for more than a century. Martin, in his history, states that the manufacture of sugar was commenced in 1764, that it was abandoned two years later, and was again resumed with success in 1794. Only horse power mills were used until 1825; the introduction of steam mills gave the first great impetus to the business for in less than twenty years after the crop of the

State had reached 450,000 hogsheads, or nearly 250,000 tons, being at that time nearly one-half of the consumption of the entire country. In 1888 sugar was manufactured in twenty-three of the parishes of the State ; there were in operation 776 sugar houses, of which ninety-one only were worked by horse power ; of the total number, 147 were provided with vacuum pans. We find that these sugar houses produced more than half the entire crop, the production of the larger houses having increased every year, while that of the smaller houses, on the contrary, diminished. When after the close of the war the sugar planters, encouraged by the high price of sugar, undertook to rebuild their industry, the business from 460,000 hogsheads in 1861, had fallen, in 1865, to 15,000 hogsheads. Most of the sugar land had been abandoned, the levees had been neglected, overflows were almost periodical, and a new system of labor had to be organized and adapted to the requirements of the cane crop. It took many years to overcome these difficulties, but in 1887 the crop obtained from 130,000 acres of cane, ground throughout the State, produced 285,000 hogsheads of sugar. I venture the assertion that the number of acres in 1887 does not represent one-half of the amount of land cultivated in cane in 1861. Bouchereau, in his report for 1887, claims that planters using modern machinery obtained an average of 2929 pounds per acre, or 128 pounds per ton of cane ground, while those using other appliances obtained 2510 pounds, or 103 pounds per ton of cane.

Under the old slave system, when the planter had a plentiful supply of labor and held it under control, the cane crop was, so to speak, a hoe crop, the cleaning and the weeding and the covering and the digging were all done with the hoe ; with lands well drained and thorough cultivation, the sugar crops increased rapidly up to 1861, although up to that time the manufacture had made little progress. This was all changed in 1865, and the first problem to be solved was how to replace by labor saving machinery the old hand labor which was leaving the cane fields and was becoming every day more scant and more unreliable. To this necessity we owe the introduction of various implements of immense value ; such as the cane rollers, which press the dirt on planted cane when covered with the plow, the cane shavers, which clean from the

stubble the dead wood and the winter grass, the stubble digger which, with its iron fingers revolves along the row and turns and loosens the soil about the stubble cane so that there is nothing left to do but to pull the dirt away, and finally that most useful of all implements, the horse hoe or cane cultivator, which covers or uncovers the cane, adds dirt or takes it away according to the requirements of the crop. With these improved implements, nearly one-half of the former hand labor required is done away with, but as the price of sugar kept going down the planter found he must increase his yield per acre in order to hold his own, and this necessity brought about another great step forward, the general use of fertilizers. Twenty years ago many planters objected to the use of cotton seed meal as a fertilizer for cane, claiming that it stimulated vegetation and destroyed the sugar, and at that time commercial fertilizers were used on but few plantations; to-day a large trade exists both in cotton seed meal and other fertilizers, thousands of tons are applied every year and with such good results that the demand for fertilizers increases steadily. On some of the larger sugar places the item of fertilizers represents every year an outlay of thousands of dollars, and yet the heavy expense is found to be profitable, as it has raised the average production per acre to nearly double what it was twenty years ago. Within the last five years two new factors have appeared in support of the Louisiana sugar industry: 1. The establishment at Kenner by voluntary subscription of a sugar experiment station, and the selection as director of that station of Prof. W. C. Stubbs. You know what has been done since then at the State Experiment Station at Baton Rouge, and at Calhoun, at the north Louisiana Station. I speak only of the sugar station now located at Audubon Park in the city of New Orleans; the periodical bulletins issued during the past few years from Kenner have been of vast benefit to the sugar planters; the field experiments and the laboratory work have already produced such marked results in chemical study that the station during the past season could not supply the demand for sugar house chemists in this state.

The second great factor to which I alluded was the establishment by the Department of Agriculture of Washington of a diffusion plant at Magnolia plantation, and the continuance of



experiments at that point on the most liberal scale until the manufacture of sugar from Louisiana cane by the diffusion process was triumphantly proved and the possible extraction of 200 pounds of sugar from a ton of cane became an accomplished fact. It is now sixteen years since the first experiments with the diffusion process were attempted at Belle Alliance, in Assumption, and subsequently at Louisa plantation in St. Charles. After one or two seasons both experiments were abandoned, and it remained, after many years for the liberal policy of Commissioner of Agriculture Coleman to take up diffusion and make it a success. During the tests at Magnolia, as high as 230 pounds of sugar were obtained from a ton of cane. There are to-day eight or nine diffusion plants in Louisiana and Texas; most of them have worked but one season and have made no complete return of the work done; but it is admitted on all sides that the general success has been marked, and additional plants are already spoken of for the coming season. The increase is only restricted by the heavy cost of the first outlay; many planters would adopt it at once but for the want of capital to make it an individual enterprise, for it is manifest that if the average production of sugar mills throughout the State will not exceed 110 pounds to the ton, even if it reaches as high, diffusion with its possible extraction of 200 pounds, and even with an average extraction of 180 pounds to the ton, would every year almost double the production.

I now come to the subject of central sugar factories. In the West India Islands, where cane is cultivated, the system of central factories prevails. Stock companies with large capital have been formed for the purpose of sugar manufacture, and they have put up factories with complete plants and most improved machinery. Sugar cane is bought by the ton as raw material; the cane grower receives in payment either a money price or so many pounds of sugar for each ton of cane. The factory people have nothing to do with cultivation; they merely manufacture whatever cane is furnished to them and give their whole attention to the full extraction of the available sugar in the cane. The same system prevails in the beet sugar countries of Europe. The beet growers have no other care than to make as good beets as possible, and sell their crop

by weight to the factory. In our own country, Mr. Claus Spreckles, two years ago, put up a factory at Watsonville, in California, at a cost of \$400,000; the first season's output of sugar was 1,600 tons, and if my recollection is correct, Mr. Spreckles stated last year, before a congressional committee, that he had made a profit from this factory of nearly \$30 per ton of sugar, which would represent 12 per cent. on the whole cost of the factory. Even in the State of Nebraska, the people of Grand Island have recently agreed to subscribe \$100,000 toward the erection of a beet sugar factory sufficient to work up 5,000 acres of beets in the vicinity.

In our own State there is not to-day one central sugar factory organized on a plan similar to those I have mentioned. In the Teche country refineries have been established for the purpose of granulating syrups boiled in neighboring sugar houses, and on a few large plantations excellent results have been obtained from the cultivation of cane on the tenant system, but these are only exceptional and local results, and leave the general system of the State unchanged. In the parish of St. Mary a new enterprise has recently been started, looking to the formation of a company for the erection of a central factory in the upper part of the parish. This is a step in the right direction. It will require but one successful experience in Louisiana in ventures of this kind to make similar factories spring up in other parts of the State. This would prove such a stimulous to cane growing that we would very soon see the old sugar lands, now given up to rice culture, reclaimed for sugar, and the sugar business would again come to the front. The advantages of central sugar factories could not be presented more clearly than in the following, which I quote from an article in the New Orleans *Times-Democrat* :

"The idea of a central sugar factory means that the manufacturing and agricultural department will be separated. It goes without saying that the separation of these departments will benefit the planters and the country. Agriculture as improved and developed requires all the skill and attention that one man can give it, and especially is this true of the growing of cane. Of the manufacture of sugar, itself a well developed but still developing science, the same may be said. It is an occupation making full demands upon the time and attention

of any one man. The amount of mechanical, chemical and practical knowledge required to carry on a successful sugar house is quite absorbing and exclusive enough to exhaust the energy and capacity of any individual to the exclusion of all else."

In conclusion, let me say that in spite of occasional failures and disappointments those of us engaged in sugar manufacture in southern Louisiana have full confidence in the future of sugar. We believe it possible to go on improving until the yield per acre will be raised from 3000 to 5000 pounds. We also believe that, under the beneficent influence of the Experiment Station at Calhoun, the farmers of North Louisiana will learn to make cane growing and even sugar manufacture profitable in their section, and when this success is obtained, we may all rejoice together, for everything that tends to diversify our crops adds wealth to the country, and lands increase in value as we increase their wealth producing capacity.

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### *DIFFUSION vs. MILLING—WHICH IS THE MOST PROFITABLE?*

FROM A PAPER PRESENTED TO THE LOUISIANA SUGAR PLANTERS' ASSOCIATION BY GOV. WARMOTH.

I think we obscure the question under discussion by losing sight of the fact that the diffusion battery is only a substitute for the mill. It is another way of extracting the juice, and that is all there is about it. You can arrive at no conclusion as to the advantage of diffusion over milling by saying, as my friend Mr. Shattuck does, that he got 136 pounds of sugar by his mill in 1888, and got 199 pounds of sugar by diffusion in 1889. Nor can you arrive at the solution of the question by saying that Calumet, with her mill, got 207 pounds of sugar in 1889, and that Magnolia got 215 pounds of sugar by diffusion in 1889. The conditions are entirely dissimilar.

The fact that Calumet gets 207 pounds of sugar per ton of cane by her mill, and Magnolia only gets 215 pounds by diffusion, does not help us to the light we need, for everybody knows that Calumet gets most of her fine work in after the juice leaves the mills. She has the best of clarifiers and filter presses.

She loses nothing in her scums. She has the best of double effect evaporators, with catch-alls that lose nothing from pruning or going over. She has no settling tanks and loses nothing from inversion. She has the best of vacuum pans, centrifugals, etc., and above and beyond all these, she has Wybray Thompson.

Again, comparative results estimated in sugar give us a poor means of ascertaining what we want to know, for the reason that one crop of cane may be very rich and another very poor. We were greatly excited last spring by a gentleman from Honolulu telling us he got 288 pounds of sugar per ton of cane with an ordinary double mill; but when we learned that he had from 16 to 18 per cent sucrose, we were only surprised that he did not get more.

So Mr. Thompson's cane may be very rich and Mr. McCall's very poor. So we can't tell anything about the relative difference in milling and diffusion by the sugar obtained by the different factories. What we want to know is what is the best average extraction of juice from the cane obtained by our best mills, as against the best extraction obtained by our best diffusion batteries. When we can ascertain the difference in extraction we know it all, for the treatment of the juice after extraction is precisely the same in both cases.

I think it is fair to assume that the mills have about reached their maximum extraction. With eight heavy rollers and plenty of saturation, I don't see how anybody can get more of the juice out of the cane than our friend Mr. Thompson obtains. On the other hand, diffusion has only just begun, and I think that we are now getting only the minimum extraction which we ought to hope to obtain.

In the case of Magnolia, I consider it very poor indeed. There we have a battery too small for our work. We are obliged to rush the water through the battery in order to get off the crop in any season. We can scarcely have a cell under pressure at all. The liquid never stops, but simply runs through. Mr. Spencer thinks if we could have each cell under pressure three minutes it would greatly increase our extraction; or if we could have a finer chip, which, by the way, we must have, we would greatly increase the extraction. To sum up, we must have a large battery, so as to let each cell be

under pressure say three minutes, and a cutter which will give us a chip as fine again as we now have, and it is not too much to say that only a trace of sugar will be detected in the exhausted chips.

Calumet reports in 1888 and 1889 on one run an extraction with maceration of 78.61 per cent. I think our average extraction during the last season was 86 per cent of the juice in the cane. If I am correct, we have here with the best milling 78.61 per cent extraction, and by very imperfect diffusion 86 per cent extraction, or an increase of 9.14 per cent by diffusion over milling.

I think it is safe to say that with diffusion, as we work it to-day, we can, all the conditions being the same, increase our yield over the best milling 25 pounds of sugar per ton of cane.

As to the question as to compensation for the expense of changing from milling to diffusion, you can figure that out better than I can. I will not take the responsibility of giving advice. As I understand it, the cost of manufacture, under diffusion is increased only by the expense for the additional fuel necessary to evaporate the excess of water used in the process. What that cost is depends upon how much water you use with your mill and how much dilution with diffusion.

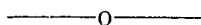
If you use 20 per cent of water with maceration and only 20 per cent with diffusion, you will use as much fuel with one as the other in proportion to the amount of juice extracted. If you use your bagasse to advantage with the mill and throw away your chips in diffusion, you will have to make up the loss with coal. If you use cylinder or double flue boilers, it will require more coal than if you use the multitubular or the latest improved boilers. These are all questions of figures which can only be decided when the conditions are known.

We burned last year a little over one pound of coal for every pound of sugar—say about six barrels of coal to 1,000 pounds of sugar. But we had the best boilers we could get. They were 20 feet long, 6 feet diameter, with 72 four-inch flues in each, and were new and clean.

As I said in the beginning, I can only give you crudely what I know about the subject. But very much like a woman I will say, I don't know that I can give you the reason for it in such a shape as to convince you, but I will say I wouldn't have the

best mill in the State as a gift; and if I didn't have a diffusion battery I would mortgage everything I have in the world to get one, and would never take off another crop without it.

We have brought up our yield of sugar to over 200 pounds to the ton of cane. We do it in spite of various losses, from too thick a chip to too small a battery, a vacuum pan which overflows, and a good deal of shappiness which we will correct another year. We go right along making 40,000 pounds of sugar a day as an average, against 22,000 pounds a day when we had a mill with as much capacity per day as our battery. We left 14 pounds of sugar in every ton of cane we worked, which we will not do another season, if we can put in a larger battery or get cutters that will make the chips finer.—*Sugar Bowl*, March 22.



### FRUIT CANDYING IN ITALY.

A good deal of interest has been drawn of late years in fruit-producing countries, especially in some of our colonies, as to the best mode of preserving fruits for exportation. That of preserving them in syrup in hermetically sealed tins has been found to answer well, and has become very generally adopted; but the process of candying with sugar is felt in some countries, and with some fruits, to be preferable, consequently inquiries are frequently made as to the *modus operandi* adopted in fruit candying countries on the continent, about which little seems to have been known out of the country where it is practised.

The following account of this industry, which has just been drawn up by the British consul at Leghorn, will therefore, we doubt not, be of considerable interest to our readers, especially to those in sugar-producing countries:

Mr. O'Neill says: "It would be a mistake to suppose that Leghorn is a great centre for this industry in all its branches. The candying of fruits, whole or cut, is carried on at many other places to a larger extent. At Genoa, and westward along the French Riviera, at such places as Grasse, this industry is carried on, and we know that in Spain and Portugal fruits are also candied, Madeira being especially noted amongst the possessions of the latter for this manufacture.

“Moreover, upon inquiry I find that in this city of over 100,000 inhabitants only seven establishments are occupied in the manufacture, and that these seven, when in full working, only employ about 200 hands. Leghorn can hardly, therefore, be considered a great centre of the fruit candying industry. It does, however, I believe, occupy the first place in Italy, and, perhaps, throughout the Mediterranean, for the preparation of the candied citron and orange peel so largely used in all branches of confectionery, for the citron is brought to us for this purpose from Corsica, from Sicily, from Calabria and other southern provinces of Italy, from Tunis and Tripoli, and even from Morocco, and the candied peel of the fruit is exported hence to North America, to the United Kingdom, and to Hamburg, for distribution throughout Germany. Sugar also is imported for the purpose of the manufacture from Egypt. The wood of the boxes in which the candied peel is packed reaches us from Trieste, and the immense earthenware vessels necessary for the saturation of the fruit in sugar syrup are made in the neighborhood of Florence. On all sides I hear that Corsica produces the citron of the finest quality, those of Sicily and Calabria are regarded as slightly inferior, whilst that which comes from the African Coast is held in still lower repute, and, indeed, appears to be of a different variety, being larger, and having a smooth instead of the rough granulated surface generally characteristic of the citron. The African citron is probably somewhat deficient in the essential oil which forms the medical property, and gives the flavor to the rind. The oranges imported into Leghorn, whether for consumption or for candying, are nearly all brought from the islands of Sicily, Sardinia, and Corsica. I shall perhaps convey the clearest impression of the treatment of the fruit, and the processes through which it passes, if I follow it through the various stages of its preparation, from its arrival at this port to the moment of its departure hence in cases filled with boxes neatly packed with the cut candied peel. In all the countries I have mentioned above as contributing the raw fruit for this industry, it is treated in the same manner for the over-sea passage. The fruit is simply halved, and placed in hogsheads or large casks filled with a fairly strong solution of brine, the fruit being halved merely to insure thorough preservation of the rind by an equal saturation

of the interior as well as the exterior surface. In these casks it arrives at the doors of the manufactory. The first process to which it is then subjected is the separation of the fruit from the rind. This is done by women, who, seated round a large vessel, take out the fruit, skillfully gouge out the inside with a few rapid motions of the forefinger and thumb, and, throwing this aside, place the rind unbroken in a vessel alongside them. The rind is next carried to large casks filled with fresh cold water, in which it is immersed for between two and three days to rid it of the salt it has absorbed. When taken out of these casks, the rinds are boiled, with the double object of making them tender, and of completely driving out any trace of salt that may still be left in them. For this purpose they are boiled in a large copper cauldron for a time varying from one to two hours, according to the quality of the fruit, and the number of days it has been immersed in brine. When removed from this cauldron, the peel should be quite free from any flavor of salt, and at the same time be sufficiently soft to absorb the sugar readily from the syrup, in which it is now ready to be immersed. The next process to which the rind is subjected is that of a slow absorbtion of sugar, and this occupies no less than eight days. Needless to say that the absorbtion of sugar by fresh fruit in order to be thorough it must be slow, and not only slow but it must also be gradual—that is to say, the fruit should at first be treated with a weak solution of sugar, which may then be gradually strengthened, for the power of absorbtion is one that grows by feeding.

“The fruit (and this holds good more especially with the rind) would absorb with difficulty, and more slowly and unequally, if plunged at once into a thick syrup, than if gradually treated with weak solution, easier of absorbtion, and by which it has been thoroughly permeated first. It is a knowledge of this fact that governs the process I now describe. The fruit has now passed into what I may call the saturating room, where on every side are to be seen long rows of immense earthenware vessels about four feet high and two and a half feet in extreme diameter, in outline roughly resembling the famed Etruscan jar, but with a girth altogether out of proportion to their height, and with very short necks and large open mouths. All the vessels are filled to their brims with citron and orange peel in



every stage of absorption, *i.e.*, steeped in sugar syrup of, roughly speaking, eight different degrees of strength. I said before that this is a process that occupies almost always eight days, and as the syrup in each jar is changed every day, we may divide the mass of vessels before us into groups of eight. Take one group of this number, and we are able to follow the fruit competely through this stage of its treatment. With vessels of such great size and weight, holding at least half a ton of fruit and syrup, it is clearly easier to deal with the syrup than with the fruit.

"To take the fruit out of one solution, and to place it into the next stronger, and so on, throughout the series, would be a toilsome process, and one, moreover, injurious to the fruit. In each of these jars, therefore, is fixed a wooden well, into which a simple hand suction pump being introduced, the syrup is pumped from each jar daily into the adjoining one.

"How is the relative strength of the syrup in each jar regulated?" is the next question.

"The fruit itself does that," is the foreman's reply; and this becomes clear from the following explanation: Number your group of jars from 1 to 8 respectively, and assume No. 1 to be that which has just been filled with peel brought straight from the boiler, in which it has been deprived of the last trace of salt, and No. 8 to contain that which, having passed through every stage of absorption but the last, is now steeped in the freshly prepared and therefore the strongest solution of syrup used in this stage. We prepare daily a syrup of the strength of .30 degrees, measured by the 'provino,' a graduated test for measuring the density of syrup,' continued the foreman, 'and that is poured upon the fruit in jar No. 8. To-morrow the syrup from this jar, weakened by the absorption from it by the fruit of a certain proportion of sugar, will be pumped into jar No. 7, and so on daily through the series. Thus No. 1 containing the fruit itself regulates the strength of the syrup, as I said.' 'But if the syrup has lost all its strength before the seventh day, or arrival at jar No. 1?' we ask. 'Care must be taken to prevent that by constant testing with the 'provino,' is the reply; 'and if that is found to be the case, a little stronger syrup must be added to the jar.'

"A slight fermentation next takes place in most of the jars, but this, so far from being harmful, is regarded as necessary,

but of course it must not be allowed to go too far. There is yet another stage, and that, perhaps, the most important, through which the peel has to pass before it can be pronounced sufficiently saturated with sugar. It is now boiled in a still stronger syrup, of a density of forty degrees by the testing-tube, and this is done in large copper vessels over a slow coke fire, care being taken to prevent the peel adhering to the side of the vessel by gentle stirring with a long paddle-shaped ladle. The second boiling will occupy about an hour. Taken off the fire, the vessels are carried to a large wooden trough, over which is spread a coarse, open wire netting.

"The contents are poured over this, and the peel distributed over the surface of the netting, so that the syrup—now thickened to the consistency of treacle—may drain off the surface of the peel into the trough below. The peel has now taken up as much sugar as is necessary.

"Now comes the final process, the true candying of the covering of the surface of the peel with the layer of sugar-crystals which is seen upon all candied fruits. To effect this a quantity of crystallized sugar—at Leghorn the same quality of sugar is used as is employed in the preparation of the syrup—is just dissolved in a little water, and in this the now dried peel, taken off the wire netting, is immersed. The same copper vessels are used, and the mixture is again boiled over a slow fire.

"A short boiling will suffice for this, the last process, for the little water will quickly be driven off, and the sugar upon cooling will form its natural crystals over the surface of the fruits. Poured off from these vessels, it is again dried upon the surface of the wire netting, as before described. The candying is now complete, and the candied peel is ready for the packing room, to which it is carried off in shallow baskets. In the packing room may be seen hundreds of boxes of oval shape, or if I may so speak, of rectangular shape, with rounded corners, and of different sizes, for each country prefers its boxes to be of a particular weight, Hamburg taking the largest, of fifteen and thirty kilos., the United States of America preferring smaller, of ten and twelve kilos., whilst England takes the smallest, of five kilos., and one containing about seven English pounds. The wood of which the tops and bottoms of these boxes are made comes to us in thin planks from Trieste, and a skillful packing

is generally done by women, and the boxes are lined with white paper. They are then packed in cases of 100 kilos., ten of the smaller American boxes filling a case. The candied peel is now ready for export.

"I think I have now spoken of all that need be noticed in the actual manufacture of candied citron and orange peel at Leghorn.

"There are, however, a few reflections upon the very existence of this industry here which seem to me suggestive and instructive ones. In my inquiries into the course of the industry I find that the fruit itself, and every ingredient and article necessary to the preparation of the candied peel comes to us from abroad. The fruit of the best quality is from Corsica; Egypt furnishes the sugar. England provides the fuel, distant provinces of Italy contribute a portion of the raw product, and the wood for the boxes in which the peel is exported. The province of Leghorn provides nothing but the labor necessary to the manufacture. Nor is this industry one that has fallen into Livornese hands from any specially acquired local handicraft or skill. How, then, does this industry exist here in these days of keen international competition? No doubt it is mainly supported by the large drawback granted by the Italian Government upon the duty paid on the chief and dearest ingredient in manufacture—sugar. The customs tariff in force imposes a duty of 76.75 lire upon 100 kilos. of the sugar used (classed in the tariff as of second class) but grants a drawback of 60.50 lire upon a hundred kilos. of the exported article. Without this large measure of support there can be no doubt this industry would immediately and wholly collapse. With it even, it finds it difficult to hold its ground. Exporters tell me that the United Kingdom is beginning to call for the fruit to be sent to it direct from the countries of production in the same condition that it reaches Leghorn, viz., steeped in brine, and the manager of one of the factories I visited confirmed this with an air of very natural chagrin by telling me that he had himself seen 600 hogsheads of fruit shipped in brine in one vessel last year from Bastia to England.—*Gardner's Chronicle.*

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"VEDALIA CARDINALIS."

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## THE AUSTRALIAN LADYBUG AS THE ORCHARDISTS' FRIEND.

There has been issued from the State Printing Office a pamphlet by Geo. Rice, Quarantine Officer of the State Board of Horticulture, entitled, "Historical Sketch of the Rise and Downfall of the Cottony Cushion Scale," which recites at length the story of the ravages made by this pest in the orchards and gardens of this and other states, and the various methods pursued to exterminate it. The pamphlet concludes with a chapter showing how the Australian ladybug (*vedalia cardinalis*), or ladybird, as it is known in Europe, came to be introduced in this state, and of its successful crusade against the pest referred to.

The value of the ladybug as an exterminator of the cottony cushion scale has been fully demonstrated in this city. A year ago there were few gardens that were not infested with it, some trees and shrubs being literally covered, and looking as if they had been in a snowstorm. The ladybugs were turned loose on the trees in Capitol Park and other places, and the result has been an apparent extermination of the scale. At all events, trees that were white with them a year ago have now scarcely a scale upon them.

Referring to the matter of the discovery of the ladybug's enmity to the scale, and its introduction into California, Mr. Rice says:

"We had heard that there was a parasite in Australia that had almost entirely exterminated the cottony cushion scale, and it was to get these parasites that Mr. Koebele was sent to Australia. The parasite was known as the *Lestophones*, a minute fly that punctured the scale, laid its egg, which hatched out into a grub that made its meal of the scale, changed into a fly, to again repeat its work.

"Mr. Albert Koebele left San Francisco for Australia August 20, 1888, and arrived at his destination in due season. He immediately sent a supply of the *Lestophones* to this country, which were duly taken care of on their arrival. In the meantime Mr. Koebele went to work to thoroughly investigate the scales, their parasites and their workings, and was not long in discovering what our Australian friends *had not* done, that the

'boss' scale destroyer was an entirely different kind of a parasite. It was the ladybird, the *Vedalia Cardinalis*, he found to be the principal enemy of the cottony cushion scale, and he was not long in dropping Mr. Fly and making the acquaintance of her ladyship, Miss *Vedalia Cardinalis*. He captured and shipped several colonies of beetles and their larvæ. The first importation reached here November 30, another December 29, 1888, and still another January 24, 1889. These colonies were sent to the Wolfskill orchard, in Los Angeles, and Dobbins' and Chapman's orchards at San Gabriel, under the care of Professor D. W. Coquillett, of the Entomological Staff, Department of Agriculture. They soon multiplied and increased something after the form of a geometrical progression. Mr. Wolfskill and his foreman, Mr. Alexander Craw, who knew all the time 'that there must be such an enemy in Australia,' together with Professor Coquillett, distributed thousands to the anxious orchardists, who, hearing of their wonderful work, flocked in to get them. The same work was going on at the ranch of Colonel J. R. Dobbins, at San Gabriel, where the Colonel and his help gave their entire time to making up and distributing colonies to all who came for them, and they came from far and near.

"While the good work of the *Vedalia* was going on in Southern California, the little ladybug was distributed by the State Board of Horticulture throughout Central and Northern California, wherever an orchard, garden or shrub was known to be infected with cottony cushion scale.

"By December 1, 1889, the work of exterminating the cottony cushion scale was practically accomplished. The money value of this *Vedalia* to the orange growers of this state has been incalculable. The saving of the orchards already infested, the protecting of the others that were sure to be blighted by this terrible curse, to say nothing of perpetuating an industry that it seems will be the king of all our horticultural pursuits, is simply grand, and cannot be estimated in the usual dollar and cent test.

"In this connection we think it proper and just that some fitting memorial should be presented to Mr. Albert Koebele, who came near sacrificing his life in his search for this ladybug, and its introduction into this country."—*Sacramento Union*.

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*CALIFORNIA FRUIT AT THE EAST.*

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Two agencies have been at work for some time with unusual energy to introduce the fresh fruits of California into the Eastern markets. A choice collection of the products of the state in a large railroad car is traveling all over the country, under the name of "California on Wheels," at the expense of the California State Board of Trade and the Southern Pacific Company. This display is admirable in many respects, and has been visited with pleasure by a good many thousand people in the various cities where it has stopped. The State Board of Trade likewise maintains in San Francisco a large permanent exhibition of native fruits. At the same time the fruit-raising industry has now attained sufficient importance to make it valuable in a business way to Eastern wholesale and retail merchants. Some of the largest dealers are accordingly sparing no pains to familiarize the people of the East with the merits of the oranges, grapes, pears and other orchard growths of the Pacific coast. Such efforts as are made along this line have been favored by the building of new railroads in some parts of California, and a gradual reduction of freight rates either in connection with or apart from this competition. In Southern California there were formerly bitter complaints of the Southern Pacific's charges, but since the opening of the Atchison, Topeka & Santa Fe lines the orange-growers, at least, have had no grounds for fault-finding.

Most of the table fruit, with the exception of oranges, received in the East from California comes from the Northern part of the state. Sacramento is the center of this trade. California pears were the first fruit to come this way, and are now annually received in large quantities. Their size is remarkable, flavor good, and price usually high. The range of varieties now in growth is extensive. Most of the crop is canned at home, and the shipments of fresh fruits are not likely to exceed the demand for years to come. The California producers hold that the fertility of their soil and the dryness of their climate insure the retention of the freshness and flavor of the fruit longer than is usually the case with the product of other localities. Pear trees begin to bear in California the third year from planting, but do not reach their full output until the sixth or seventh

year. An orchard in full bearing, if well cared for, ought to yield 1000 boxes to the acre, for which \$1 a box, or 2½c. a pound, would be a fair price.

Among table fruits, however, the grape bids fair to maintain the lead in importance in the Eastern market. Grapes are raised in California for three principal purposes—for the table, for raisins and for wine. Each form of consumption has its peculiar district. Raisins are produced most profitably and extensively in the San Joaquin valley, and wine grapes still further north, though in Southern California neither branch of the business is unknown. Table fruit is talked of more than formerly as a possibility at Fresno and elsewhere in the San Joaquin district, but as yet has reached no commercial importance there. At Stockton, on the other hand, and in the other parts of the state tributary to Sacramento, grapes for the table are raised of superior quality. Chicago has hitherto been the principal market, but a new field for distribution is opening in New York, Boston and other Eastern cities. Several varieties are produced equally well. Tokay grapes sell on the Atlantic coast better than any other kind, though at home they are considered inferior to the Cornichon and the Emperor. The Muscatel, or raisin grape, is not generally shipped for table use, on account of its peculiar flavor. Tokay fruit the past season netted probably 4@5c. a pound, or more, to the producers, when sold in the New York market. The same grapes retail at 15c. and upward.

The New York agents of the California Fruit Union estimate the receipts here of California grapes of last season's production at 34,000 double crates, and express the opinion that 160,000 such crates could be sold here at a net price of not less than four cents a pound for the grower. Owing to a short crop in Spain, the arrivals of Almeria grapes have been unusually small, or about 150,000 barrels, against 225,000 barrels last season. Only the very firmest, handsomest and best-packed fruit commands full prices. Shippers from California in former years have subjected themselves to losses by carelessness or negligence in packing. With care a market on the Atlantic coast is assured, inasmuch as the greater part of the receipts come at a time when fresh fruit from nearer points is scarce. A remarkably successful producer of fruit in a statement in

*California*, a San Francisco journal, says that last year from fifteen acres of land his gross receipts for Tokay and Cornichon grapes amounted to \$16,000. Most of the vines in this vineyard are fourteen years old, and are abundantly irrigated. After deducting freights, commissions, cost of irrigation, cultivation and labor of every kind, the net receipts were \$8,343, or \$556 per acre. This is a striking exhibit. It must, of course, be taken as exceptional rather than ordinary.

Peaches ripen in May in the country around San Jose and continuously thereafter until November. California peaches, as well as pears, are of magnificent size, and excellent for canning and drying. They find a ready market during the early months east of the Rocky Mountains, but the amount sold fresh as yet can hardly be called extensive. Plums grow luxuriantly, and would be raised more generally if a better market were at hand. The great obstacle to financial success in the production of all these fruits is, of course, the enormous cost of transportation across the continent. The domestic market is small, and the foreign market 2,000 or 3,000 miles away. Fast time is now made by fruit trains during the season, and the latest devices in car-building insure the preservation of the fruit in good shape, but the hindrance of vast distances has not been, and perhaps never will be, fully overcome.—*Bradstreet.*

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### SUGAR BEETS.

FROM BULLETIN NO. 11. COLORADO STATE AGRICULTURAL COLLEGE  
FOR APRIL.

The beet (*Beta vulgaris*), a plant of the order *Chenipodiaceæ*, has long been cultivated for food. It is a native of Egypt and the Mediterranean border, where it is found growing in its wild state. Under cultivation, we find several well-marked varieties, which differ in their quality, color, sweetness, etc. The beet is a lover of a sandy, quick soil, in which the roots can easily penetrate; and as an aid to this, good, deep plowing and a finely pulverized seed bed are essentials to success. The climate also has quite an influence on the final result. The spring should be warm and dry, with plenty of moisture



as the season progresses, and not too much heat. In Colorado, where irrigation is practiced, the two conditions above named are perhaps more nearly realized than elsewhere.

In Spon's Encyclopedia, Vol. V., 1882, it is stated that the beets are usually sown about 16 inches apart, on land that has not received fresh fertilizers or manures, as these cause the plants to take up too much nitrogen, and thus the sugar content is much reduced. It is thus much better to manure a preceding crop well, and, preparing the soil thoroughly, use no fertilizers for the beets. Not only is the total yield heavy, but the single specimens often grow to wonderful size.

In the countries of Continental Europe, the effort is to grow the beets that shall weigh from two and one-half to four pounds, as by experiment, these give the greater per cent. of sugar. The same authority also states that the formation of sugar is favored by dry weather and unclouded sky in autumn. Here again is a condition which is found in perfection in Colorado, and should give us a high per cent. of sugar in our beets, provided all other conditions and circumstances are carefully noted. In general for Colorado :

1. Prepare a deep and well pulverized seed bed.
2. Sow in drills about eighteen to twenty inches apart, so as to admit of horse culture between the rows, using from seven to eight pounds of good seed per acre.
3. Irrigate judiciously and keep clear of weeds. Cultivate thoroughly during their early growth.
4. When well up, thin so that there shall be one thrifty plant every six or eight inches (some say ten to twelve), and take care not to injure the plants in this process.
5. In cultivation take care to preserve the leaves and to throw some earth to the plants each time. The portion of the beet which grows above ground does not contain much sugar.
6. Harvest when ripe and preserve free from frost.

Every person who secures a good stand should have no difficulty in producing at the rate of twenty-five tons per acre. (The average for Europe is said to be twenty-three tons). Indeed, the effort must be to produce twenty-five rather than forty tons.

In practice, sugar has been extracted in various ways :

*First*—By means of pressure to extract the juice after crushing, slicing or grating the beets.

*Second*—By means of maceration in hot water until all the saccharine matter is extracted.

*Third*—By the process of diffusion, which is a modification of the second, and an excellent means of breaking up the cell walls and extracting the sugar.

This process is sure to revolutionize the method of sugar production from cane and sorghum, as well as with beets. Our sister State Kansas (see Report State Board of Agriculture, January, 1890), has published the results of beet sugar production at Medicine Lodge, in that State; 4.7 acres were raised, which produced 60.23 tons cleaned beets, from which were manufactured 10,158 pounds of sugar and 380 gallons of syrup. The production was more than one ton of sugar per acre, and not under the most favorable circumstances. A skilled expert from Germany was engaged to look after the culture and manufacture of the crop. The appliances not being the best, he claims that the best results were not obtained.

Where sorghum can be raised, the same company can manufacture sorghum into sugar until the heavy frosts come, when the beet crop can be worked with the same diffusion plant, as most of the machinery can be used for both.

The sugar sold readily at the factory for six cents per pound, and the demand exceeded the supply.

What has been accomplished in Kansas can also be performed in Colorado and Nebraska; and near Grand Island, in Platte Valley of the latter State, a large area of sugar beets will be raised this year (1890) and a large and costly plant will work the crop for sugar.

The experience in Kansas has taught them that there should be an expert chemist with every diffusion plant, in order to insure good results; that there must be a beet-sugar expert to take charge of the work, for while such a person can easily make sugar from sorghum, a sorghum or cane sugar worker will have great difficulty in getting good results with beets, on account of the particular treatment they require. Prof. Cowgill, State Sugar Inspector to the Kansas State Board of Agriculture, recommends the following conditions, which are as valuable for us in Colorado as for the farmers in Kansas:

“Select carefully the location as to ability to supply good cane or beets, and an abundance of good water.

“Provide sufficient ready capital.

“Contract with a thoroughly competent and responsible machinery company.

“Secure the best business management.

“Secure competent skilled operatives.

“Contract with reliable, careful farmers.

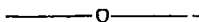
“Secure carefully selected seed of known purity.

“Observe the above requirements, and you have gone a long way on the road to success. The absence of any one of these conditions will entail loss, and probably failure.”

The single success and several failures prove the truth of the above position.

C. L. INGERSOLL,

Director.



### *THE BANANA INDUSTRY IN HONDURAS.*

The following notes, written from personal experience of Mr. Wm. Van Diepen, of the cultivation and export of bananas in British Honduras, will be of use to those who contemplate taking up the industry in this colony. It is evident that our system of planting and cultivation will have to be greatly modified to produce the large bunches required by the market, and any hints farmers or planters may be able to gather for their guidance in advance will save them the cost of experience:

*Planting.*—In British Honduras bananas are planted 18 x 18. In planting at this distance apart the first year's crop may thereby be a reduced one, but the cultivator will have his reward in the subsequent yield. Besides in wide planting the better opportunity is afforded of self-reimbursement to the planter in the shape of inter-culture, such as of cocoa, rubber, corn, peas, etc.

Bananas so planted give 134 holes to the acre.

The price paid per acre for planting is fifty cents. No small suckers are used for planting, but the largest are collected and cut into quarters. Care should be taken in quartering the stools not in any way to injure the eyes.

Three or four months after planting a number of small suckers will have sprung up; these, with the exception of two or three of the strongest, should be destroyed. This is done by bending them down, and on no account would I advise a cutlass

to be used, as cutting them down bleeds them, and consequently takes away from the strength of others. The freedom with which it shoots makes the cultivation of the banana most profitable, as the plant renews itself with off-shoots at different degrees of its development, and it follows that each plantation offers at the same time trees whose branches are laden with fruit fit to cut, trees whose branches are full of blossoms, and young off-shoots promising a future plenty. In the best situations three trees are counted to each cluster of bananas, sometimes four, in general they obtain five trees in two years.

*Reaping.*—Care should be taken not to reap the fruit until just the day before shipping. In Honduras, where banana plantations are situated along the banks of the rivers, the steamers anchor at the mouths of the different rivers, awaiting the craft with fruit to come out. In Demerara, where there is no such facility, and fruit in many instances has to come from a great distance, extra time should be allowed. From November to April the bananas are cut much fuller than during the summer months. I have experienced in Honduras that fruit cut too full in summer did not last the four days' voyage to New Orleans. Here in Demerara, I should deem it necessary to cut the fruit fully fourteen days before the bunch becomes full; this would allow two days for cutting and transporting, and twelve days for the voyage.

Twelve months from the time the banana sucker is planted it attains maturity, each bunch weighing from thirty to ninety pounds. I would advise not to cut the stalk long (a practice in Demerara), as it takes up extra room in the steamer. After the bunch is cut, the planter may with safety expect two or more bunches from the younger shoots during the next nine months.

*Replanting.*—Unless the banana tree is required for shade, replanting should be done at least every five years.

*High Winds and Heavy Rains.*—High winds do occasional damage, but the farmers' first care should be to leave the forest and under-bush north and east of his plantation. He will find this the safest protection. In Honduras, where the banana plantations, as stated before, are situated along the banks of the rivers, one rod of bush left was found sufficient protection. Should the weight of the bunch cause the tree to sway, it is easy enough to support it with a stick or bamboo. In 1882

there was a serious falling off in the banana crop of Honduras, owing to a severe drought and high winds, but I have never heard of heavy rains doing damage; it must be remembered, however, that the land is much higher than in Demerara, and naturally all depends on good drainage.

*Selling the Fruit.*—Winter is the best market time, as “domestic fruit” (as the Americans call it), is then scarce in the United States; besides this, the bananas naturally last longer in winter than in summer. In order to make the fruit come in in December, the Demerara farmer should be ready to plant at the end of November.

June, July, August and September are positively the worst months for selling fruit. In fact, during these months the seller is at the buyer’s mercy, whilst in winter he can sell almost anything.

[A table of shipments made, which we omit, shows that bunches containing less than eight hands, are not desirable for shipment.—Ed.]

In Honduras the contractors pay fifty cents Belize currency, equal to about 1s. 6d. for bunches of eight hands and upwards; and half that price for bunches under eight hands; bunches of six hands are very seldom saleable. It would be unfair to fix the price per hand, as it stands to reason that large bunches have larger hands than small ones. In fixing the price here, we should not lose sight of the fact that the steamers which carry the fruit from Honduras to New Orleans are subsidized by Government to carry the regular mails.

*Banana Fibre.*—When the fruit has arrived at maturity the stem that bore it is felled and left to rot on the ground, but this might be turned to advantage for its fibre if the stalks were split open and, after being exposed to the sun and air for some time, packed in bales. As far as I can remember one tree gives four pounds of fibre, which would be equal to 600 pounds of fibre per acre.

*The kinds of Banana* chiefly cultivated in British Honduras are the fig, the doubloon and the China. The first most resembles the banana cultivated in Jamaica.

*Note in Conclusion.*—There is no culture that can be undertaken with more confidence than that of the banana, for if climatic influences should sometimes have a prejudicial effect

on the crop, they could never completely destroy the prospect of a harvest, as the certainty would always remain of that to be obtained from the surviving and stronger off-shoots or suckers. No other vegetable production presents similar advantages.

Before closing I must not lose the opportunity of recommending to those who intend growing cocoa as well as bananas, to use the rubber tree as a shade. If planted at the same time, in five years, (when the banana tree is no longer of any use as shade for the cocoa), it becomes a good and permanent protector for the cocoa tree, besides being very valuable as a tree in itself.—*Demerara Argosy.*

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### THE CAMPHOR TREE—POSSIBLY ANOTHER INDUSTRY.

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“The camphor tree is fast coming into notice in this State. We have several here at St. Francis, which are growing nicely, and were not injured in the least during our late cold spells.”  
—*St. Francis, Lake County, Facts.*

It would probably pay our people to look into this matter of the cultivation of the camphor tree quite closely. The product of this tree has always been of great commercial importance, owing to its medicinal and other virtues, but its importance and consequently the demand for it promises to be greatly increased on account of its use in the manufacture of smokeless gunpowder, which is now attracting the attention of the war departments of American and European governments. In fact since it became known that camphor was the principal ingredient of all the smokeless powder that has so far been produced, the price of the article has more than doubled in value, and promises in a very short time to advance still higher, and it is doubtful if a sufficient quantity of it can be produced to supply the demand.

So far as we have heard the camphor tree does well in our State, and unlike other tropical trees which have been tried here is not affected by our cold spells.

The camphor tree proper from which the camphor of commerce is produced, is a native of China, Japan and Formosa, the greater portion of the camphor being produced in the

latter place. It has been proven time and again that the plants of oriental origin do remarkably well in Florida, for this reason, if no other, we think that the camphor tree could be successfully grown here.

The camphor *officinatum* belongs to the natural order of *lauraceae*, which family is very numerous, containing nearly five hundred species, most of them being of tropical origin, but of a rather hardy nature, but able to withstand a considerably higher temperature than that in which they originated. The English laurel and our common sassafras are both members of the same family as the *camphora officinatum*, from which the camphor is made. The avocado pear, which is extensively cultivated in some sections of south Florida is likewise of the same family.

We are told that there are a number of camphor trees in the vicinity of Tallahassee which have withstood the cold of that section for nearly a quarter of a century.

We are unable to give any information as to the profits that could be expected from these trees, but are of the opinion that it would be considerable in the course of time. In order to extract the camphor gum it is necessary to destroy the tree, or at least to prune it greatly, that is to cut off the limbs or branches, which are necessarily somewhat injurious to the tree. In the extraction of the gum, the wood of the branches and trunk is cut into small fragments and introduced into a still with water, and heat applied, which generates steam and carries with it the camphor gum in vapor. This vapor passes through fine straw which is placed at the head of the still, the camphor solidifies and is deposited around the straw in minute grains or particles, about the size and appearance of raw sugar or coarse sand. This accumulation is camphor in its impure state. The particles are detached from the straw and introduced into large globular glass vessels in quantities of about ten pounds. It is then re-heated. The first steam that arises is allowed to escape through a small aperture; and thereafter this aperture being closed the camphor re-solidifies in the upper part of the flask, as a semi-transparent cake, leaving all impurities behind. The flask is then cooled and broken by throwing cold water upon it and the camphor is taken out and sent to market.—*Florida Agriculturist*.

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*KANSAS BEET SUGAR.*

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The splendid success at Medicine Lodge, Kansas, with the experimental lot of sixty tons of beets, producing over 10,000 pounds of sugar, or over 166 $\frac{2}{3}$  pounds per ton, that we published last week, is of more importance than most people would think probable at first glance.

The experience of these gentlemen at Medicine Lodge in making sorghum sugar has served them a good purpose. They have been able at once to handle beets with success and without that long apprenticeship that they have had with sorghum.

Kansas may yet bless the day she tried to make sugar from sorghum, even if sorghum be abandoned, because it has paved the way to the successful production of beet sugar.

The production of sugar from any plant is a complex industry, usually requiring great skill and much experience, and now that Kansas has the skill and the experience, she can shift from sorghum to the beet in one year if she wants to.

From what we know of the beet culture the soil of Kansas is well adapted to it. If there be too little rain there is some compensation in the increased sweetness of the beet. The wonderful success at Spreckels' factory at Watsonville, California, where irrigation is practiced, shows that there is now but little doubt of the rapid expansion of this industry.

There seems to have been some trouble about the hand labor required in beet culture, our American farmers being somewhat restless about farm drudgery and wanting now to do all the farm work with some kind of a machine.

There can be no doubt that machines will soon be produced that will do all the work that needs to be done. The Kansas people have suffered so much from the loss of crops that they should surely be willing to do the hand work now necessary in beet culture and get several thousands of acres planted for 1890, and they will never regret the effort. With the complete manufacturing outfits now at their doors, and the proof at Medicine Lodge that they can succeed, they should go ahead now and confirm their success at once.

The harvest of over 3,000,000 tons of beet sugar in Europe, shows what we can do here in the United States. Let Kansas and Louisiana lead in the good work.—*Louisiana Planter.*