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Latest quotation of centrifugals 96° test, in New York, was 3½c., with a firm market.

From every quarter of the globe come reports of extreme cold weather during December and January, with heavy and unusual snow storms in the southern American States and in southern Europe. The thermometer fell to 23 degrees in Louisiana and other places in same latitude.

A correspondent sends the following inquiry: "Is the mimosa that is alluded to in the Nov. PLANTERS' MONTHLY as an enemy to young forest growth the same kind that furnished seed for *leis?* It is a tree of slow growth but *excellent* wood, very like the *mamane*, yellow, hard and heavy, but often of a dark color near the center."

It is stated in one of our exchanges that the Canadian sugar refiners are about to enter into a combination after the lines of the American "sugar trust." The combine is to fix all prices, and dealers selling at these prices will, upon affidavit to the effect, be allowed one-eighth cent of a pound rebate, which is supposed to be the profit of a retailer. The probability is that the new system will go into effect very soon.

By recent advices we learn that it is the intention of Mr. Wibray J. Thompson of the Calumet plantation, Pattersonville, Louisiana, to visit these islands during March. He comes with the purpose of seeing the principal sugar estates and to personally inspect our mode of cane culture and sugar manufacture. Being largely interested in sugar in Louisiana, as part owner of the Calumet plantation, his visit ought to result in benefit to planters here as well as to himself. We bespeak for Mr. Thompson a kind reception from the owners and managers of such plantations as he may visit.

No better evidence of the value of some of the leading articles appearing in this MONTHLY could be furnished than the fact that many of them are copied into prominent sugar periodicals in other countries. We scarcely receive a sugar exchange without finding some article reprinted in full with the proper credit. The Manchester Sugar Cane of a recent date, one of the ablest and best of periodicals devoted to cane sugar, had two such articles in one issue. We refer to these reproductions as being complimentary rather to the able writers of them than to the editor, and to the fact that these islands now possess some of the best thinkers and writers on sugar interests that are to be found in any country.

SUGAR CROPS.—Cuba has progressed just far enough with her crop to show that there will not be as much sugar made as last year, but how much less it will be it is too early to say. Estimates are heard of not exceeding 875,000 tons, while the general figure given is 10 per cent. under last year, or say about 900,000 tons. If there is plenty of cane in the fields to be ground, the crop may exceed present expectations, by reason of the fact that much cane was left over last year, even with a crop of 975,000 tons. The cane this year being small and short, but rich in juice, may still produce a good crop, with the increased machinery and facilities for rapid manufacture. The Brazil crop is being worked more largely for homeward consumption, and the exports this way promise to be smaller than last year's. The German crop of beet sugar may have to be reduced by 50,000 tons, if latest mail advices are confirmed. Taken altogether the prospects are not encouraging for cheaper sugar in 1893 than in 1892, but rather dearer.—*Willett & Gray's Circular.*

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WITH OUR READERS.

The publication of the reports presented at the last session of the Planters' Company is concluded this issue. The number has been large, but the evidence has been clear on every page that they contain valuable suggestions—the experience of some of the most successful sugar planters in the world. That of the committee on manufacture of sugar, of which H. P. Baldwin is chairman, contains among other useful information a table (on page 11) showing the difference in value between the old contracts and the new, which went into operation on the 1st inst. It is a matter of conjecture what process of boiling, or what degree of polarization will bring the largest profit, or whether sugars of different plantations, apparently of the same standard, will prove equally profitable, some plantations making only one grade while others make several.

The enclosures accompanying the committee's report contain some valuable points in the practical mill work and boiling department, particularly that of Mr. Morrison, of Makaweli, Kauai. The suggestion made by Mr. Ross (page 23) that cane grinding should be done, where practicable, after March 1st, on account of the greater strength of the juice, is worth adopting where it is practicable. Few mills, however, have the capacity to work off the entire crop in three months, and are forced to commence work in most cases in January, to be able to clear off their entire crop before the last of it spoils. Could this change be effected, it would insure a gain of seven per cent. of sugar, as ascertained by him. Other suggestions in his letter are worthy of the attention of planters.

A valuable paper on fertilizers adapted to Hawaiian cane fields will be found on page 27, and closes the series of reports on this subject. It is so minute in details, that it cannot fail to prove not only interesting but of service to such as are seeking for light on the subject It appears to give information needed in the present emergency, when it becomes necessary to assist the growth of cane on lands which have been cropped for many years, in some instances without intelligent manuring. But the main point to be kept in sight is, that all sugar lands are not alike, and their needs vary greatly, and can only be ascertained by close and skilfull investigation.

The report on coffee and tea is reprinted, owing to an omission of one page in its previous publication, which detracted much from its value. It is gratifying to learn by late advices from Kona that tea growing is likely to prove a success. It is in the hands of intelligent men, believed to be thoroughly competent to give it a fair trial, and if successful, it may yet prove to be another opening for small farmers.

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SORGHUM OR BEET SUGAR.

In order that our readers may not consider our views as biased, we have calculated with considerable care just what the conditions are for beets and sorghum in the United States. If we consider the total number of acres planted, and the total sugar extracted in each case, we find that from 13,000 acres of beets the entire quantity of sugar extracted was 12,004,838 pounds, or an average yield of 923 pounds per acre —while from 4,000 acres of the hybrid wild-grass, known as sorghum, the total sugar extracted was 1,078,245 pounds, or an average yield of 269 pounds per acre. This difference of 654 pounds, at four cents per pound, represents $26.16 per acre in favor of beets, even under the existing trying circumstances.

Within a very few years the average extraction of sugar from beets in the United States will certainly not be less than 2,000 pounds per acre, as in Germany and France the average is constantly 3,000 to 3,700 pounds per acre.

The yield of sugar per ton of beets at Watsonville, Cal., was 225 pounds, while at Topeka, Kas., it was 60 pounds. The percentage of extraction is even more striking in the 10 per cent. at the Western B. C. Co., and the 2.7 per cent. at Topeka.—*The Sugar Beet.*

BE OF GOOD CHEER.

The changes which have taken place during the past two years, scaling down the profits in our leading industry, on which so many of our people have been directly or indirectly dependent for a living, have had a depressing effect on every side. Yet there is a silver lining to the dark cloud, and this should remind us all that there is a bright side in every adversity.

We must not forget that there is no country in the world where so prolific crops are produced with the same labor and expense as here in Hawaii. In the cane field we find that an average of three to four tons of sugar polarizing 90 deg. is often taken from plant cane, while occasional exceptional yields of five, six or seven tons are not uncommon.

So with rice, two crops can always be depended on, and occasionally three, in twelve months, giving an average of from three to four thousand pounds annually to the acre. A large portion of this rice being consumed here, a fair price and a fair profit are secured, notwithstanding that the price is now very low in the United States as well as in China and Japan. So long as our population consists of so many Chinese and Japanese, the field for rice culture will always remain a remunerative one.

Besides these staple products, there are other fields open to the industrious who are willing to till the soil and wait patiently for the reward. We might name a farmer who located in Kona some years ago, and in various ways, such as supplying firewood, timber and cabinet woods, made a fair living. Meanwhile he cleared off a small field and planted coffee, which is now in full bearing and yields a handsome income of 20 to 25 cents per pound, cash on delivery. There are others on each of the islands of our group who are in like comfortable circumstances, after years of working and waiting. And there is no good reason why they should not number thousands instead of scores.

Limes, oranges, pineapples and bananas offer equally encouraging openings to the industrious. There is not a month of the year when the supply of limes equals the demand for home consumption alone, to say nothing of export. So great is this demand that each steamer from Samoa now brings scores of boxes of this fruit, which can grow here as readily as there. Any man owning twenty acres planted in limes, can find a sale for all he can raise, and at the end of ten years may become comparatively well off. The same remarks apply to orange culture.

As to bananas, there is a stretch of land on Hawaii of forty miles in length, from Olaa on the Volcano road, to Laupahoehoe, where this fruit may be cultivated in quantities sufficient to load a steamer of a thousand tons every month, provided the vessel makes Hilo the port of departure.

In Central America bananas are delivered at the wharf for twenty-five to thirty-five cents per bunch, and are sold to the dealers in New Orleans, St. Louis and Chicago for seventy-five cents to one dollar per bunch. The same can be done with bananas raised on Hawaii, when taken hold of in a business-like way, and with the right kind of fruits.

But some may ask, where is the land to be had ? It is true that land is not abundant, but homestead claims are offered by the government and by the crown land estate, which perhaps are the best. Wherever five, ten or twenty acres can be found, the first thing to be done is to provide a house and for this and for other expenses incidental to a new enterprise, a small capital is necessary. When located, a portion of the land, perhaps a quarter of it, should be immediately planted to coffee, another quarter to orange and limes, which will grow rapidly from the start, and in three or four years will commence bearing. Ten to twenty acres in fruits are as much as any one man can take care of himself.

It goes without gainsaying, says a Florida exchange, that the individual who will take proper care of the fruit and vegetables upon his ten acre lot will have no time to hold down dry goods boxes, or hold up lamp posts, while he discourses about politics and curses the hard times. He will be so busy cultivating and marketing his fruits that he will know nothing about hard times. Of course it will take some capital to commence and carry out such a plan, as well as muscle and perseverance, but the individual who does it will be worth a small fortune in a decade of years. He will have a constant supply of fine fruits and vegetables for his table and by marketing his surplus, he will "make a good living out of the ground" right here at home. With his chickens, a few stands of bees, a horse and cow that will furnish fertilizer for his little fruit farm, he will find enough sweetness and substance in life to make it worth the living, without longing for the leeks and onions of other less favored countries. Let our soil be worked for what there is in it, and success is sure.

Again we say there is every encouragement to engage in growing fruits, and for this there is no better country in the world than Hawaii. Then be of good cheer, get a small farm and make a beginning. Patience and industry will bring the reward.

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MR. DISSTON'S SUGAR.

Speaking of his Florida enterprise, to a representative of the N. Y. *Commercial Advertiser*, Mr. Hamilton Disston said:

"We took our chances that the land was suitable for the culture of sugar cane, and, while a great deal of money was risked, we now see our way clear. This year we will make 6,000,000 pounds of sugar and draw a bounty of $120,000. Next year we will increase this output, and in a few years Florida will be a rival of Louisiana in the production of sugar cane.

"In addition to sugar cane we have this year made an experiment with rice. We have turned 1,500 acres into a rice field and are already sure of success. We can put ten times that area under cultivation next year.

"Of our original holdings we have disposed of about 2,000,000 acres, but we still have 4,000,000. This land a few years ago was as absolutely worthless as the same area of the bed of the Atlantic ocean. To-day it is a source of revenue to the State, and its value will constantly increase."

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Official data of the Russian Government enables us to report, that during campaign 1889–90, there were 220 beet-sugar factories working. The sugar production was 395,459 tons. The factories are confined to the southwest and center of the empire.

HONOLULU TEMPERATURE RECORD FOR 1892.

Weekly Averages, From Observations Made at Oahu College.

Week Ending	6 A.M. (ave.)	Noon (ave.)	9 P.M. (ave.)	General Average.	Maximum.	Minimum.	Highest Daily Average.	Lowest Daily Average.
Jan. 7...	64. 9	72. 6	66. 3	67.93	78°	57°	17°	10°
„ 14...	65. 6	74. 3	66. 4	68.77	78	57	18	8
„ 21...	64. 4	73. 6	68. 7	68.90	80	56	17	5
„ 28...	68. 1	75. 6	69. 7	71.13	80	61	18	8
Feb. 4...	71. 4	74. 8	72. 0	72.73	80	67	9	3
„ 11...	68. 6	77. 2	70. 2	72.00	80	63	18	8
„ 18...	69. 5	75. 6	70. 2	71.76	80	63	16	7
„ 25...	69. 3	77. 9	70. 6	72.60	81	63	15	8
March 3...	70. 9	77. 8	71. 6	73.43	80	67	13	6
„ 10...	67. 0	75. 7	67. 5	70.07	82	58	17	9
„ 17...	68. 6	75. 4	70. 3	71.43	79	65	16	10
„ 24...	70. 4	77. 3	71. 2	72.93	80	67	12	8
„ 31...	71. 7	76. 4	71. 9	73.33	79	69	10	6
April 7...	69. 5	77. 4	71. 3	72.73	80	64	16	8
„ 14...	62. 6	79. 7	71. 3	73.54	83	66	17	12
„ 21...	70. 7	81. 4	72. 7	74.95	84	65	18	12
„ 28...	69. 1	80. 8	71. 6	73.83	86	65	11	11
May 5...	69. 6	79. 1	70. 8	73.27	84	62	21	10
„ 12...	69. 3	79. 3	71. 8	73.47	83	62	17	11
„ 19...	72. 2	81. 5	74. 2	75.97	84	67	17	8
„ 26...	73. 1	81. 5	75. 0	76.53	83	67	16	8
June 2...	73. 2	81. 6	74. 3	76.37	84	67	16	8
„ 9...	73. 6	82. 1	74. 9	76.87	83	68	15	9
„ 16...	74. 2	81. 2	75. 2	76.87	85	68	17	6
„ 23...	74. 4	81. 9	75. 2	77.17	83	72	10	7
„ 30...	74. 6	80. 9	75. 4	76.97	82	71	11	8
July 7...	75. 3	80. 5	76. 1	77.30	85	72	11	7
„ 14...	73. 8	80. 9	75. 0	76.57	83	72	11	8
„ 21...	74. 5	81. 0	75. 4	76.97	83	72	10	7
„ 28...	74. 1	82. 6	75. 5	77.40	87	65	21	10
Aug. 4..	74. 1	82. 3	76. 1	77.50	85	70	15	9
„ 11...	74. 4	82. 6	76. 9	77.97	87	69	17	7
„ 18...	74. 7	83. 1	76. 5	78.10	86	70	15	9
„ 25...	74. 6	82. 5	76. 4	77.83	85	72	12	9
Sept. 1...	74. 1	82. 6	76. 4	77.70	85	68	17	9
„ 8...	75. 7	83. 5	77. 6	78.93	85	73	11	8
„ 15...	75. 3	84. 2	77. 3	78.93	88	68	20	8
„ 22...	76. 1	83. 1	76. 7	78.63	85	72	11	7
„ 29...	75. 4	82. 9	76. 8	78.32	85	73	11	8
Oct. 6...	73. 3	83. 1	76. 1	77.50	85	66	17	10
„ 13...	75. 2	81. 8	77. 1	78.03	84	68	16	8
„ 20...	73. 6	80. 5	75. 4	76.50	84	69	12	8
„ 27...	72. 6	79. 5	74. 0	75.37	84	66	15	6
Nov. 3...	69. 6	80. 9	73. 3	74.60	85	63	20	7
„ 10...	73. 6	81. 4	75. 0	76.67	84	66	18	5
„ 17...	71. 9	78. 4	73. 9	74.73	82	66	16	5
„ 24...	68. 1	76. 5	69. 0	71.20	81	59	18	9
Dec. 1...	72. 2	79. 8	73. 6	75.20	83	67	16	6
„ 8...	69. 7	76. 4	70. 7	72.27	79	60	17	4
„ 15...	68. 9	75. 4	71. 0	71.77	79	61	17	6
„ 22...	65. 6	76. 3	69. 6	70.50	80	59	18	10
„ 29...	65. 6	76. 0	68. 5	70.03	81	58	18	10
Gen. Ave.	71.39	79.40	73.08	74.62	88	56	21	3

REPORTS READ BEFORE THE PLANTERS' MEETING.—CONTINUED.

REPORT OF COMMITTEE ON MANUFACTURE OF SUGAR.

To the President of the Planters' Labor and Supply Company:

SIR:—Your committee on "Manufacture of Sugar" has addressed circular letters to the greater portion of the planters in the country, asking for their views on this important subject, and the result of their experience.

Many have responded, and from some of the replies, we have taken extracts, more particularly statements of their sugar house work, and some of the letters that bear entirely on the subject we append to this report in full.

Since the last Annual Meeting of the Planters' Labor and Supply Company, but little change and progress has been made in sugar house methods and sugar house machinery. The extremely low price for sugar we have received for our crops the past year, due to the McKinley Bill, has discouraged and prevented planters from launching out into any experiments or radical changes in machinery that call for an outlay of money.

The Kealia Plantation, however, is an exception. Mr. Spalding has introduced a new plant into his sugar house for making a very light grade of sugar. He has purchased the patent right for this method, and for reasons of his own does not choose to make public the modus operandi. We understand that it is the Stephan process.

As is well known, our old sugar contract with the refinery, taking the New York quotation for 96 deg. polarization as our basis of valuation, $\frac{1}{8}$ cent was added for every degree of polarization above 96 deg., and $\frac{1}{8}$ cent deducted for every degree under 96 deg. Considering the extremely low price we have received for our sugar during the past year, due to the McKinley Bill, $\frac{1}{8}$ cent has been a very high valuation for a degree of polarization and this fact has stimulated planters to obtain as high polarization as possible. It has been found that the best method of obtaining a high polarization is by melting over the 2nd, 3rd and even the 4th sugars in the juice and making one grade of sugar which polarizes from 96 deg. to 98 deg.

This method of manufacturing sugar has been pretty generally adopted by the planters the last year, either wholly or in part, each one using his own way of carrying out the details of the method. Owing to the high valuation of $\frac{1}{8}$ cent that has been added to the basis for each degree of polarization, this method has undoubtedly paid in dollars and cents in the past, notwithstanding that a loss is sustained, caused by inversion in boiling over constantly the low grades of sugar, amounting probably to two or three per cent. of the pure sugar originally in the juice.

The new refinery contract, however, reads that only 1-16 cent will be deducted for each degree below 96 deg. and 1-32 added for each degree above 96 deg. so that it will be a question for each planter to ascertain by actual experiment whether it will pay to melt over the low grades of sugar.

We give herewith a table showing the difference between the price for all the different grades of sugar under the old contract and under the new contract. (See page 11.)

DIFFUSION VERSUS MILL WORK.

We have been disappointed in not getting all the data we wished relative to diffusion work the past year. We are more especially disappointed in not getting a statement of the work at Kealia. They failed to respond to our circular letter for information.

The results at Hamakuapoko mill with diffusion have never been as good as the results at Kealia. This is due largely to imperfections in the machinery and a rather poor arrangement of boilers and flues at Hamakuapoko.

We have, however, at Hamakuapoko, full data of mill work and diffusion work tried under the same conditions, steam and sugar house arrangements. Our mill work is not of the best, neither is the diffusion work, but the general arrangement. more particularly the boiler and steam arrangement being the same in both cases, we can get at a more truthful and accurate comparison between the two methods than we can by comparing diffusion and mill work on different plantations.

TABLE SHOWING COMPARATIVE GROSS CASH PRICES IN SAN FRANCISCO FOR NEW YORK BASIS, FROM 4½c. DOWN TO 3c., AND FOR POLARIZATIONS FROM 99 DEG. DOWN TO 80 DEG. AT THE PRESENT CONTRACT TERMS, AND AT THE CONTRACT TERMS PROPOSED FOR 5 YEARS.

N Y B's.	4½		4⅜		4¼		⅛		4		3⅞		3¾		3⅝		3½		3⅜		3¼		3⅛		3		
Pol	Price		Price		Price		Price		Price		Price		Price		Price		Price		Price		Price		Price		Price		Pol
	Old	New	Old	New	Old	New	Old	New	Old	New	Old	New	Old	New	Old	New	Old	New	Old	New	Old	New	Old	New	Old	New	
99.0	91.12	89.37	88.65	86.87	86.20	84.37	83.74	81.87	81.27	79.37	78.81	76.87	76.35	74.73	73.89	71.87	71.42	69.37	68.96	66.87	66.50	64.37	64.04	61.87	61.57	59.37	99.0
98.5	89.88		87.42		84.96		82.50		80.04		77.58		75.12		72.65		70.19		67.73		65.27		62.81		60.35		98.5
98.0	88.65	88.75	86.20	86.25	83.74	83.75	81 27	81.25	78.81	78.75	76.35	76.25	73.89	73.75	71.42	71.25	68.96	68.75	66.50	66.25	64.04	63.75	61.57	61.25	59.11	58.75	98.0
97.5	87.42		84.96		82.50		80.04		77.58		75.12		72.65		70.19		67.73		65.27		62 81		60.35		57.88		97.5
97.0	86.20	88.12	83.74	85.62	81.27	83.12	78.81	80.62	76.35	78.12	73.89	75.62	71.42	73.12	68.96	70.62	66.50	68.12	64.04	65.62	61.57	63.12	59.11	60.62	56.65	58.12	97.0
96.5	84.96		82.50		80.04		77.58		75.12		72.65		70.19		67.73		65.27		62.81		60.35		57.88		55.42		96.5
96.0	83.74	87.50	81.27	85.00	78.81	82.50	76.35	80.00	73.89	77.50	71.42	75.00	68.96	72.50	66.50	70.00	64.04	67.50	61.57	65 00	59.11	62.50	56.65	60.00	54.19	57.50	96.0
95.5	82.50		80.04		77.58		75.12		72.65		70.19		67.73		65.27		62.81		60.35		57.88		55.42		52.96		95.5
95.0	81.27	86.25	78.81	83.75	76.35	81.25	73 89	78.75	71.42	76.25	68.96	73.75	66.50	71.25	64.04	68.75	61.57	66.25	59.11	63.75	56.65	61.25	54.19	58.75	51 73	56.25	95 0
94.5	80.04		77.58		75.12		72.65		70.19		67.73		65.27		62.81		60.35		57.88		55.42		52.96		50.50		94.5
94.0	78.81	85.00	76.35	82.50	73.89	80.00	71.42	77.50	68.96	75.00	66 50	72.50	64.04	70.00	61.57	67.50	59.11	65.00	56.65	62.50	54.19	60.00	51.73	57.50	49.25	55.00	94.0
93.5	77.58		75.12		72.65		70.19		67.73		65.27		62.81		60.35		57.88		55.42		52.96		50.50		48 02		93.5
93.0	76.35	83.75	73.89	81.25	71.42	78.75	68.96	76.25	66.50	73.75	64.04	71.25	61.57	68.75	59.11	66.25	56.65	63.75	54.19	61.25	51.73	58.75	49.25	56.25	46.79	53.75	93.0
92.5	75.12		72.65		70.19		67.73		65.27		62.81		60.35		57.88		55.42		52.96		50.50		48.02		45.56		92.5
92.0	73.89	80.00	71.42	77.50	68.96	75.00	66.50	72.50	64.04	70.00	61.57	67.50	59.11	65.00	56.65	62.50	54.19	60.00	51.73	57.50	49.25	55.00	46.79	52.50	44.33	50.00	92.0
91.5	72.65		70.19		67.73		65.27		62.81		60.35		57.88		55.42		52.96		50.50		48.02		45.56		43.10		91.5
91.0	71.42	78.75	68.96	76.25	66.50	73.75	64.04	71 25	61.57	68.75	59.11	66.25	56.65	63.75	54.19	61.25	51.73	58.75	49.25	56.25	46.79	53.75	44.33	51.25	41.86	48.75	91.0
90.5	70.19		67.73		65.27		62.81		60.35		57.88		55.42		52.96		50.50		48 02		45 56		43.10		40.63		90.5
90.0	68.96	77.50	66.50	75.00	64.04	72.50	61.57	70.00	59.11	67.50	56.65	65.00	54 19	62.50	51.73	60.00	49.25	57.50	46.79	55.00	44.33	52.50	41.86	50.00	39.40	47.50	90.0
89 5	67.73		65.27		62.81		60.35		57.88		55.42		52.96		50.50		48.02		45.56		43.10		40.63		38.17		89.5
89.0	66.50	73.75	64.04	71.25	61.57	68.75	59.11	66.25	56.65	63.75	54.19	61.25	51.73	58.75	49.25	56.25	46.79	53.75	44.33	51.25	41.86	48.75	39.40	46.25	36.94	43.75	89.0
88.5	65.27		62.81		60.35		57.88		55.42		52.96		50.50		48.02		45.56		43.10		40.63		38.17		35.71		88.5
88.0	64.04	72.50	61.57	70.00	59.11	67.50	56.65	65.00	54.19	62.50	51.73	60.00	49.25	57.50	46.79	55.00	44.33	52.50	41.86	50.00	39.40	47.50	36.94	45.00	34.48	42.50	88.0
87.5	62.81		60.35		57.88		55.42		52.96		50.50		48.02		45.56		43.10		40.63		38.17		35.71		33.25		87.5
87.0	61.57	71.25	59.11	68.75	56.65	66.25	54.19	63.75	51.73	61.25	49.25	58.75	46.79	56.25	44.33	53.75	41.86	51.25	39.40	48.75	36.94	46.25	34.48	43.75	32.01	41.25	87.0
86.5	60.35		57.88		55.42		52.96		50.50		48.02		45.56		43.10		40.63		38.17		35.71		33.25		30.78		86.5
86.0	59.11	70.00	56.65	67.50	54.19	65.00	51.73	62.50	49.25	60.00	46.79	57.50	44.33	55.00	41.86	42.50	39.40	50.00	36.94	47.50	34.48	45.00	32.01	42.50	29.55	40.00	86.0
85.5	57.88		55.42		52.96		50.50		48.02		45.56		43.10		40.63		38.17		35.71		33.25		30.78		28.32		85.5
85.0	56.65	68.75	54.19	66.25	51.73	63.75	49.25	61.25	46.79	58.75	44.33	56.25	41.86	53.75	39.40	51.25	36.94	48.75	34.48	46.25	32.01	43.75	29.55	41.25	27.09	38.75	85.0
84.5	55.42		52.96		50.50		48.02		45.56		43.10		40.63		38.17		35·71		33.25		30.78		28.32		25.86		84.5
84.0	54.19	67.50	51.73	65.00	49.25	62.50	46.79	60.00	44.33	57.50	41.86	55.00	39.40	52.50	36.94	50.10	34.48	47.50	32.01	45.00	29.55	42.50	27.09	40.00	24.63	37.50	84.0
83.5	52.96		50.50		48.02		45.56		43.10		40.63		38.17		35.71		33.25		30.78		28.32		25.86		23.40		83.5
83.0	51.73	66.25	49.25	73.75	46.79	61.25	44.33	58.75	41.86	56.25	39.40	53.75	36.94	51.25	34.48	48.75	32.01	46.25	29.55	43.75	27.09	41.25	24.63	38.75	22.16	36.25	83.0
82.5	50.50		48.02		45.56		43.10		40.63		38.17		35.71		33.25		30.78		28.32		25.86		23.40		20.93		82.5
82.0	49.25	65.00	46.79	62.50	44.33	60.00	41.86	57.50	39.40	55.00	36.94	52.50	34.48	50.00	32.01	47.50	29.55	45.00	27.09	42.50	24.63	40.00	22.16	37.50	19.70	35.00	82.0
81.5	48.02		45.56		43.10		40.63		38.17		35.71		33.25		30.78		28.32		25.86		23.40		20.93		18.47		81.5
81.0	46.79	63.75	44.33	61.25	41.86	58.75	39.40	56.25	36.94	53.75	34.48	51.25	32.01	48.75	29.55	46.25	27 09	43.75	24.63	41.25	22.16	38.75	19.70	36.25	17.24	33.75	81.0
80.5	45.56		43.10		40.63		38 17		35.71		33.25		30.78		28.32		25.86		23.40		20.93		18.47		16.01		80.5
80.0	44.33	62.50	41 86	60.00	39.40	57.50	36.94	55.00	34.48	52.50	32.01	50.00	29.55	47.50	27.09	45.00	24.63	42.50	22.16	40.00	19.70	37.50	17.24	35.00	14.78	32.50	80.0

We have made several trial runs at Hamakuapoko, both in diffusion and mill work. All the cane was weighed when these trials were made, the juice and sugar carefully polarized. The results show, on an average, that we have gained at least ten per cent. more sugar from a given amount of cane by diffusion than by mill work, or say for every ton of sugar manufactured from mill extraction, we obtained 200 lbs. more by diffusion. This amount of sugar at $2\frac{3}{4}$ cents per pound is worth $5.50. The extra expense of producing this $5.50 worth of sugar by diffusion at Hamakuapoko as compared with mill work has been as follows:

Extra fuel	$ 3.99
Extra labor	28
Total	$ 4.27

This leaves a profit in favor of diffusion of $1.23. Owing to the low price of sugar it is probably all we can now claim for diffusion.

The cost of producing sugar by the diffusion process increases the total cost of producing sugar, but the gain according to above figures compensates for the extra cost, and we hope for better prices in future and a still greater advantage.

From six to eight per cent. of maceration water was used in the mill work given above. This was all that could be used without the use of some coal or wood in order to keep sufficient steam. The experience of the past few years has so improved our machinery, boiler setting and steam facilities generally that the mills that have been recently put up have been able to use from 20 to 30 per cent. of water in maceration, without necessitating the use of coal or wood in keeping steam. Such mills can, of course, boast of excellent grinding, but the same works could undoubtedly obtain a proportionally better result by the use of diffusiou, and be obliged to use but little extra fuel.

We have never tried at Hamakuapoko, and we believe it has never been tried elsewhere on the Islands, to obtain all the sugar possible from the cane by high maceration, supplementing the fuel from the cane with coal and wood. In order to obtain in this way as high extraction as is obtained by diffusion, it will probably be necessary to use more fuel than is used in diffusion.

The Colonial Sugar Co., who use mills entirely, aim at getting all the sugar they can out of the cane. Coal is cheap in the Colonies. Their extraction is not as good as diffusion gives, and they use from a quarter to a half ton of coal per ton of sugar, extra fuel, at their different mills.

CLARIFICATION OF CANE JUICE AT HIGH TEMPERATURES.

The attention of sugar planters and manufacturers has lately been called to the advantages to be gained in the clarification of sugar cane juice by subjecting it, after being properly treated with lime, to a much higher temperature than can be obtained under atmospheric pressure as in the open clarifier in use heretofore in this country as elsewhere.

An excellent paper by E. W. Deeming, read before the monthly meeting of the Louisiana Planters' Association and published in the *Louisiana Planter and Sugar Manufacturer*, of June 11th, 1892, points out conclusively that instead of a 212 deg. Fahr. temperature, the highest to be obtained in an open clarifier with thin juice, a temperature of from 230 deg. to 240 deg. Fahr., is required to effect complete coagulation of the coagulable impurities contained in sugar cane juices. To obtain the needed temperature, however, it will at once be seen that in order to have the juice so heated, it will be necessary to put it under pressure while being heated, a pressure of say twelve pounds per square inch will be sufficient. The Honolulu Iron Works Co. are at present negotiating with sugar planters for a trial of an apparatus that will receive the juice after proper liming, at a temperature of from 180 deg. to 200 deg. In this apparatus, the juice will pass continuously through the tubes at such a velocity as will keep the tubes scoured and clean. These tubes will be surrounded by live steam at such a temperature as is required to impart the required heat to the juice on its passage through them under pressure. We have now got the juice heated to say 240 deg., and under a pressure of about twelve pounds, but it cannot be delivered into an open tank at this temperature as the moment the pressure is relieved, it will vaporize and blow all over the place, so it must, after passing the heater, pass also through a set of cooling pipes to reduce its temperature about 40 deg., so that it will be discharged into the filter supply tanks at a temperature of 200 deg. These cooling pipes may be immersed in the mill, juice if conveniently located, or in the maceration water, and when diffusion is practiced, in the diffusion water, in either of which cases, the heat extracted from the juice would not be lost.

One of the newest methods of cleaning juice adopted in this country, is the bag filter, and where the proper temperature has been applied to the juice to produce complete coagulation of the coagulable impurities, no better or cheaper method, probably, could be found of cleaning the juice preparatory to its passing into the multiple effect.

It does not follow that when juice looks clear that it is free from impurities, it may be as clear as crystal, and yet be very impure. Two of the three important operations necessary in the clarification of juice may have been accomplished perfectly, viz., liming and filtration, while the third and most important operation, that of the application of sufficient heat to effect proper coagulation of the albuminous matter has been neglected, in which case the results will be that uncoagulated albuminous matter will pass through the filtering medium together with the juice and with as much freedom as the juice itself, and there it remains in the syrup in the multiple effect and vacuum pan, hindering the work in both apparatuses and deteriorating the sugar so long as it remains in contact with it, thereby largely adding to the proportion of the molasses at the expense of the sugar. Whatever kind of apparatus may in future be used for clarifiers on our plantations, let it not be forgotten that without the application of from 20 deg. to 30 deg. higher temperature than we have been able to get in our open clarifiers, we may not expect that any kind of filtering medium, however, efficient, will help us much, for unless the albumin is first coagulated, no kind of filter will separate it from the juice or syrup.

OUR FUEL, ITS COMBUSTION AND THE USE WE MAKE OF THE HEAT IT PRODUCES.

Trash or spent cane chips used as fuel have a heating value that rises or falls in proportion to the amount of moisture they contain. It is therefore of great importance that, whether milling or diffusion be the mode of working adopted in our sugar factories, powerful rollers be employed in the expression of the moisture from such trash or chips previous to entering the furnaces, and in considering this matter, we will take no notice of the loss or gain in sugar by the proper or improper expression of moisture from such fuel, though indeed, that is a point of great importance in milling.

By the application of a train of powerful rollers, say three pairs, we know from actual practice, that there exists no difficulty in reducing the moisture in either trash or chips to 50 per cent., or even less under favorable circumstances and so long as the moisture is kept at 50 per cent., either trash or chips will burn readily in well constructed furnaces, and will give out an intense heat.

As we have assumed this fuel generally to contain 50 per cent. moisture, however, it will be easily seen that, that moisture when converted into steam or vapor at furnace temperature will be of great volume, and will consequently require a swift draught and ample flue and chimney area to carry it together with the gases freely away. No chimney for steam boilers in our sugar factories should be less than one hundred feet in height from the grates, and an area of twenty-eight square feet is not too great for a chimney of a sugar factory on a plantation making two tons sugar per hour, and in no case should such a chimney be less than twenty square feet area. Hitherto, this is a matter that has been much neglected, and is responsible for the loss of millions of dollars to our planters in the past twenty years. Greater attention should also be paid to locating the chimney as close to the boiler as possible, inasmuch, as long horizontal flues are a great hindrance to the draught; great improvements have been made in this direction within the last few years, and the long underground flues so much in vogue fifteen or twenty yesrs ago have been done away with.

No new features in furnace construction have been introduced during the past year, the stepladder grate fed by automatic furnace feeders seems to hold its own, and the application of hot air pipes in the furnaces back, where pains are taken to keep them clean, prove a great help toward a complete and perfect combustion of the fuel, and consequent augmentation of heat.

The dimensions of furnaces in proportion to the work to be done by them is, however, still an important matter and one that might well receive more attention than it has done in the past. When the furnace is too large for the fuel to be consumed in it, portions of the bars are apt to be insufficiently covered with fuel at times, and if the ashpit doors are left open, an undue rush of cold air will enter the furnace and pass through the tubes and flues during the continuance of such a state of things much to the detriment of steam making. On the contrary if the furnace should be too small, though a less objectionable state of things than too large a furnace, there will be difficulty at times, owing to greater dampness of fuel or diminution of draught from atmospheric changes, in consuming the necessary fuel to keep up steam. There is no doubt about the trash being sufficient fuel to do all the work of the factory where milling is practiced, providing due care is taken of the heat generated by the combustion of such fuel, and that suitable furnaces, chimneys and boilers are made use of, as also that all the heating surface of the boilers is kept clean.

But, considering the immense volume of steam and gases, viz., the steam generated in the furnaces from the 50 per cent. moisture contained in the fuel together with the gases from the combustion of the fiber, constantly ascending the chimney every hour the work is going on, at a temperature three or four times greater than the working temperature of the final cells of our multiple effects and vacuum pans. It is quite evident that in diffusion as well as in milling, there is sufficient heat generated by the combustion of the chips when well freed from moisture to do the entire work of the factory without the aid of coal. Sufficient heat may easily be taken from that wasted in the chimney to make up the deficit of, say, the one-fourth or one-third ton of coal per ton of sugar manufactured which, let it be assumed, is the quantity of coal required over and above the chips in our diffusion factories.

We know that from 350 deg. to 400 deg. temperature in the chimney is sufficient to produce a good draught, and there is no good reason why the gases before ascending the chimney, should not be robbed of 150 deg. to 200 deg. heat, and this heat applied in the multiple effects and vacuum pans. Three years ago, the manager of the Honolulu Iron Works Co. patented a method, in most sugar countries throughout the world, of attaining this end. One part of the procedure is to work the steam engines and steam pumps, etc., with a slight back pressure and pass the exhaust steam through amongst the tubes of tubulous drums through the tubes of which the hot gases pass on their way to the chimney. By this means, the exhaust steam from all the steam motors is reheated to a temperature of at least 150 deg. higher than it possessed when entering the superheater. This superheated or reheated exhaust steam passes back into the boiling house, and is applied to the first cell of multiple effect and vacuum pans.

The other part of the procedure in Young's method of utilizing the waste heat usually carried off in the chimney is to convey the vapor rising from the first cell of multiple effect through another section of the superheater, on its way to the heating drum of the second cell of the multiple effect, where with its re-inforcement of heat obtained from the waste heat in the gases, it does vigorous work in the second cell; then the vapor rising from the second cell is passed through still another section of superheater, on its way to the heating drum of third cell, where with its re-inforcement of heat, it does good work in the third cell, and so on throughout as many cells as there are in the multiple effect and compartments in the superheater.

In this manner, the temperature of the gases after leaving the boilers and before ascending the chimney may be reduced as desired, and the heat extracted therefrom applied with telling effect in the vacuum evaporators and vacuum pans.

Mention has been made in the *Louisiana Planter* recently of this method having been adopted in France, in some of the beet factories, whereby an astonishing economy in fuel has been the result.

One of the hindrances to obtaining the best results from this valuable improvement is the utterly inadequate proportions of the vacuum pans and multiple effects used in many factories in this country, the smallness of these apparatuses often compel the sugar boiler, in order to get his work forward, to rush on live steam while the exhaust steam which is sufficient to do all the evaporating, perhaps, is blown away in the air, whereas if the appliances were proportionate to the work they are forced to accomplish, the live steam so squandered might be saved.

In view of the recklessness manifested in most of our factories in the management of the heat generated by the combustion of trash or chips, it is not too much to expect that in the near future, diffusion as well as milling with maceration will be carried on without the aid of coal fuel. This is a thing much to be desired, more especially, as coal laid down on most of our plantations, counting the loss in handling, costs from $10.00 to $12.00 per ton, while sugar nets but $50.00 per ton.

While speaking of squandering heat in our boiling houses, it may also be well to mention that besides the enormous loss of heat in the gases ascending the chimney, there is a very considerable loss of heat in the immense volumes of vapor leaving the final cells of our multiple effects and vacuum pans that has to be killed by a constant flow of cold water in the condensers, and by the way to this condensing water in many factories, has to be pumped to a considerable height at not a little expenditure of live steam.

By the application of a contrivance called Young's compound condenser, the vapor rising from the final cell of a multiple effect or vacuum pan may be utilized in heating the diffusion water, maceration water, or mill juice, prior to its reaching the clarifiers. By this means, two things are accomplished, one is that less water is needed for the condensation, consequently less pumping. The other is that the diffusion water, instead of entering the cells of battery at 70 deg., will enter at 130 deg., and in milling, the whole of the juice may be heated to 130 deg. by the heat of the vapor from the final cell of multiple effect on its way to the condenser : this has been accomplished.

Proper covering of steam pipes is also a very important matter, and should not be neglected.

When our sugar planters can arrive at the conclusion that, it might be worth their while to direct their attention to the many ways in which the waste heat in our factories may be utilized at a comparatively little expense the burning of coal on our plantations, except for locomotives, will be among the things of the past, whether the mode of working be diffusion or maceration.

[ENCLOSURES.]

NOTES ON SUGAR MANUFACTURE, BY H. MORRISON.

The objects of the manufacturer are comprised in, 1st, expressing or extracting the juice from the cane as free from extraneous substances as is consistent with good exhaustion of the cane. 2nd, the concentration and crystallization of the cane sugar in the juice into the most remunerative commodity at the lowest cost of production.

Both these points with their allied issues have been frequently gone over and our methods explained in detail.

Regarding the first point I may say the extraction of the juice, whether by mill or diffusion battery, remains practically where it has been for sometime, viz: in the proportion: Mill 72 to 80 per cent, Diffusion 86 to 88 per cent of the cane's weight in normal juice.

If the mill is obtaining an exhaustion of 75 to 80 per cent of the weight of cane in normal juice, we know the dilution through maceration is about as great or greater than in regular diffusion, obtaining 86 to 88 per cent. of canes' weight in normal juice.

I cannot see how a higher yield is obtainable by milling unless the cane were cut up for the rolls as we do for the diffusion battery, and even then I doubt if we would do any better than the figures quoted, for it seems cane chips cannot be exhausted of their water beyond 50 per cent of their weight by pressure from rolls.

The second point could be subdivided into many branches, some of which are: 1st, cleaning of the juice; 2nd, concentration; 3rd, crystallizing; 4th, centrifugaling, etc. We have made no noticable difference nor progress in juice cleaning for the last twelve years or more. Indeed I think we have not kept our ground in this matter. Juice from a roller extraction of 55 to 60 per cent was a purer article than when the extraction got up from 70 to 75 per cent. We have no difficulty in defecating the former and consequently made a first grade of sugar, polarizing on the average, higher than our first grade now-a-days.

If a sample of juice be carefully analysed before and after clarification, no difference, or at least very little difference will be noticed in the quotient of purity of both samples.

The *Non Sugar* is the substance which effects the mischief all through the process, according as it is proportionally low or high, so is the expense or time in evaporation and so also the destruction of crystallizable sugar.

The German beet sugar makers have found the same evil: thus in 1873 their 88 per cent sugar had 0.83 per cent organic matter for each of one per cent. mineral ash, while in 1892 the organic matter stands 1.87 per cent. for each one per cent. ash. This elevation in the proportion of organic matter is attributed in degree to the same want of care in cleaning the juice.

Baryta in place of lime has been proposed as far back as 1855, and is now again recommended, not only in beet factories but also for sugar cane juice.

It is claimed for the defecator, greater speed in working, greater yield in sugar, economy in expenses.

The value of an evaporator under vacuum is in proportion to the fall in temperature, that is, the difference existing between the steam heating the first vessel and the temperature of the juice in ebullition in the last vessel of the apparatus. This can be worked practically out by anyone.

The mechanical loss in say a triple effect is considerable, and no quick and ready method is known amongst us to arrive at an accurate conception of the amount so lost.

Mr. Rickard Schwartzkopff has a process recommended by several manufacturers for this purpose.

The water of condensation is evaporated and the residue caramalized according to his rules and compared with certain standards and so a result of comparison is obtained.

M. Horsin Deon says, the condensing water of evaporating vessels under vacuum always contains sugar, but in so varying proportions that no average is possible to be assigned, and recommends great height in the vapor pipes with slowing spaces by enlargement and proper save-alls.

In the crystallizing pan the sugar boilers art comes in evidence. A good article on sugar boiling appeared lately in *Louisiana Planter.*

With well cleaned juice, slightly alkaline, a sugar boiler ought to have no difficulty in obtaining 73 or 74 of first sugar of a polarization not below 97 and frequently higher. The polarization is of course in the first instance determined by the chemical and physical properties of the juice and when these are taken account of less prestige and less complaint also is attributable to the sugar boiler, provided he keeps his strike free and open while graining.

If a juice has worked badly in the evaporators, depositing a copious coating of sugar and organic substances with a base of lime, we may expect troublesome work in the vacuum pan.

The quotient of purity in the juice determines the quotient of the masse cuite, and from this we may calculate very approximately our yield of first sugar with its polarization.

There is a method of compensation based on the dry substance instead of the polarization proposed by a Mr. Newman, an Austrian chemist.

MASSE CUITE.	1ST SUGAR.	MOLASSES FROM 1ST. SUGAR.
Water = 4.26	= 0.83	=13.09
Dry Substance =95.74	=99.17	=86.91
	99.17—95.74=3.43 } 95.74—86.91=8.83 }	=12.26

Now 12.26:8.83::100: x, and x=72.04 per cent raw sugar first grade. Actual work to prove this gave 72.62 per cent. Such figures, however ingenious, are of little utility to us at present.

A system of crystallyzation, while the masse cuite is in continuous circulation, is being tried in European beat factories and known as Freitag's system, and is recommended in producing a great diminution in the time of boiling a strike, as much as 25 per cent in favor of the new method, while a more regular crystal is obtained. This would favor our notions that a long strike (in time) is not advantageous as some have falsely alleged.

Regarding the boiling of 2 or 3 sugars, I believe we are inclined to boil too close as a rule for good graining and easy for centrifugaling as well as for yield.

The habit of remelting 2nd and 3rd grade and so incorporating them as far as possible in our first sugars is simply a matter of what pays best and may therefore be passed over without further notice.

The exhaustion of the molasses cannot be taken below 50 per cent. of quotient purity unless by method belonging more particularly to works especially designed for working molasses.

The sugar we derive from our waste molasses is simply crystal which escaped through our centrifugals, slowly depositing and adding to their size small particles of sugar entangled among the gummy substances.

I doubt if ever 4th sugar paid the expense of securing it, but we ought to have some definite figures from some one on this subject.

Hakalau, Hawaii, October 25th, 1892.

H. P. Baldwin, Esq., Chairman, etc.—Dear Sir: I am in receipt of your circular letter of 17th inst, but I am afraid I can add little to that already known to you upon the subject. Our mills at Hakalau are double crushing, 5 roller type and our sugar house arrangements, although much similar to many of the mills on the Islands, are not perhaps, as perfect as those of more recent construction. I therefore prefer not to offer any statement of results obtained here, which doubtless can be surpassed by those of great facilities, from whom I think it would be more interesting to obtain data.

As an expression of opinion upon matters relating to efficiency and economy, with the machinery, and means at command I would state three points in our methods, which to my mind are not receiving, in many instances, the attention their importance deserves. In the first place I think we are behind in our methods of applying maceration, as compared with some other countries, notably Queensland, where the intermediate bagasse carrier is enclosed and sprays of hot water and steam injected upon the bagasse during the entire journey between the first and second mill, thereby keeping up the temperature until the bagasse enters the maceration rollers;

the speed of the carrier is also arranged so as to keep the bagasse as long as possible under what may be termed the diffusing process, the application of which after all varies only in degree from that of the diffusion battery. From published reports in that country this system has given results closely following diffusion, applied to ordinary 5 roller mills. The next part which I have observed does not appear to receive the care and attention, the importance of the process would warrant, is that of defecation and clarification. No doubt the urgent necessity of efficiency and economy has been dinned into the ears of all our sugar boilers of late, with no doubt beneficial effects; yet from my own observation I have in many instances seen this process of first importance relegated almost exclusively to an assistant, or mill hand of barely a season's experience, who however well he understands his part, it is performed more or less in a perfunctory manner, while the sugar boiler devotes his almost entire attention to pan-boiling, which to my mind is a much more routine or mechanical part.

The third point I would refer to is the practice here of commencing harvesting operations in the month of January. Could circumstances permit of our crops being havested during the month when our juices are known to be at their best, it is evident a large gain would result; upon Maui and Hawaii the juice usually attains its maximum of density and purity several months later than we are in the habit of milling the cane. Here at Hakalau, it usually stands 14 to 15 brix in January, rising gradually to from 19 to 20 in March, at which point it remains with little variation for the following three months. It is very evident therefore that the gain would be great could we delay operations until March. It would, roughly speaking, mean a gain for about *two months work* of about 35 per cent, taking the two extremes of density quoted as a basis. The difference of a point on the brix scale, or say that between 15 and 16 means practically 1 per cent by weight more sugar in *100 of juice.* This on a casual glance may not appear much, but when the percentage is calculated upon the sugar in the juice, or soluble solids, it is a gain of 1 in every 15 or nearly 7 per cent. Further it is evident the gain in sugar must increase with the density of juice at a greater ratio than this, for it is known that the higher the density the greater the co-efficient of purity, much of the gums and albuminous matters being, as is supposed, transformed into sucrose.

In conclusion, I would mention a system I adopted here last season, and which as far as I am aware is original, whereby the juice extracted at the maceration mill is defecated and clarified separately. It is well known that the juice expressed at the second mill contains much more impurities in the form of albuminous matter, than that from the first mill, besides being impregnated with dust or finely crushed fibre in its descent to the mill-bed, it washes from off the surface of the lower roller, a great part of which it is impossible to arrest by the finest strainer, and it passes into the clarifier and unless eliminated, works mischief at every subsequent stage. By keeping this juice separate and giving it special treatment, the impurities are far easier removed than if diffused throughout the entire juice. I find one clarifier sufficient to handle it separately, even when macerating up to 15 per cent dilution. I had erected over the clarifier reserved for this purpose, a small tank to receive the juice while the clarifier is settling and discharging. Evidence of the greatly increased impurities in this juice can be seen from the mass of the scum and dirt removed from each clarifier, as compared with that from juice from the first mill. I am satisfied that better clarification is obtained in this way and consequent better results in the vacuum pan. Yours, etc.,

GEO. ROSS.

WAINAKU, HILO, HAWAII, November 7th, 1892.

HON. H. P. BALDWIN, Chairman Committee Sugar Manufacture, Honolulu.

DEAR SIR: In reply to your inquiry, I would say that during the past season, I have boiled over all my third sugar making only No. 1 and 2 grades, and am satisfied there has been a small gain, but owing to not having all my No. 4 dried off I am unable to give you accurate information in time for this meeting.

Filter bags have been used in this district in place of cleaning pans, and from all the information I can gain there is very little to be gained by their adoption as it takes more labor to work them, and the only possible saving is in a little steam, while I think there is an advantage in being able to apply heat to certain juices when necessary, and if there is anything to be gained by boiling back the lower grades the best place is the cleaning pan where the impurities are removed from said sugars.

I understand that in the Colonies a number of minor economies are practiced that might be adopted in our mills, and one of these is the straining of the juice automatically. I am preparing to do it the coming crop, and trust it will be successful, thus saving two men each shift, or four men in the 24 hours.

I have noticed since the adoption of the superheaters that our smokestacks burn out more rapidly, owing to the lower temperature of the gasses, and the greater moisture in the stacks. I am lining mine with asbestos to see if that will preserve them. I remain,

Yours, etc.,

JOHN A. SCOTT.

HALAWA, KOHALA, November 7th, 1892.

HON. H. P. BALDWIN, Chairman, etc.

DEAR SIR: I shall refrain from mentioning in detail the several systems now in use for extracting the juice from the sugar cane. But would draw your attention to a system recently introduced into the Colony of Queensland. But for a detailed statement of the same, I would refer you an article in the July number of the *Sugar Cane.*

It is claimed that an extraction of 90 per cent is now obtained in that Colony by the following method: An enclosed carrier is constructed between the first and second mills, and so arranged that the trash is 10 minutes or more in travelling between the two mills, and instead of hot water being applied only on one portion of the carrier, as it leaves the first mill, (which I believe is the usual practice) steam is applied right up to the time the trash is fed into the second mill. We can readily see what effect this diffusing agent will have upon the trash, instead of saturating our trash with hot water, which has all to be evaporated again. With steam, we expand the trash and so open up the fibre, that the trash is presented to the second mill in a good condition for final extraction.

This article speaks of one gentleman adopting this system though in a very crude way, yet the result was a net gain of 13 gallons of juice per ton of cane, and the density in each case was 10 Beaume.

With the exception of Mr. Young's new three two-roller mills, I question whether an average extraction of 85 per cent is exuded by our best maceration mills on these Islands. So that here is a possible 5 per cent to be obtained without any costly outlay.

Following up the expressed juice, we all realize that our next great object is the complete separation of extraneous matter, so as to bring it as nearly as possible to the state of sugar and water alone. Many systems are in vogue for the accomplishment of this desired result. And I am of the opinion that the best natural process extant, is our antiquated method of clarification, to be immediately succeeded by rapid boiling and cleaning in our new and improved shallow cleaning pans, after which precepitation should follow. Then pass the juice by hydrostatic pressure through bag filters, when I am convinced we will have a juce as pure as it is possible to make it; without investing in any artificial or chemical appliances or other expensive apparatus, about which we read a great deal without very much practical result being shown.

We all endeavor to produce sugar which will polarize on an average 96 or 97 per cent, so as to obtain the maximum price now offered. Every one has been striving to obtain this desired result, through making but one grade of sugar only. I will state one which is simplicity itself and adopted by my neighbors and myself in Kohala. We have a cooler or shallow tank, situated in the sugar room, for convenience, into which hot juice from the clarifier or cleaning pan is drawn, say about 30 gallons, and then whatever quantity of second or third sugar which may be thought sufficient to melt at one time is also put in; a small piece of half inch steam, lime is introduced to, and laid along the bottom of the cooler when steam is turned on, and in a few minutes the milling of the charge is complete. The contents are then pumped back, either to the clarifier or to the double effect receiving tank. This system works well and is economical, and a fine grey sugar, without any perceptible increase of molasses is the result from which an average polarization of 97 per cent has been obtained by two well appointed plantations in this district.

Hoping these few common place observations may be of some use to you.

Yours, etc.,

THOS. S. KAY.

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FERTILIZERS ADAPTED TO HAWAIIAN CANE-FIELDS.

TO THE CHAIRMAN OF THE COMMITTEE ON FERTILIZERS:

On several plantations application of artificial manures or fertilizers being a recognized necessity, and the probability apparent that in the near future on mostly all other plantations alike necessity will arise, I beg to offer some remarks, more as suggestions for thought than otherwise, on what appear to me to be the most economical sources of supply.

But before proceeding further let me disclaim any wish or intention to pose as an agricultural chemist, for I have not the slightest claim to that distinction: the suggestions I desire to offer are the outcome of ten years' agricultural experience in conjunction with considerable reading of the foremost scientific authorities.

With this brief explanation permit me to proceed with the subject matter of this letter. Now of the four dominant manures necessary to plant growth, nitrogen, phosphoric acid, potash, and lime, I propose to deal more particularly with the first two; and regarding the last two merely remarking, *en passant,* that potash is generally abundant in soils formed from primitive and igneous rocks, and lime would be sufficiently supplied by applying phosphoric acid in the form I shall presently suggest. The question then arises how is nitrogen to be obtained in the easiest way and the cheapest? From the manure markets supplied in the form of either ammonium salts, nitrate of soda, guano, bones, soot, shoddy, wool refuse, rope cake, or spent iron oxide, etc., it will cost from fourteen to twenty cents per pounds minus freight, etc., charges, according as it is in a readily assimilable and non-volatile form.

Estimating on the price of a known San Francisco firm of $2.80 per unit of ammonia in sulphate of ammonia we have the cost at just fourteen cents per pound, or $67.20 per ton, (2000 lbs.,) taken on a basis of 24 per cent. ammonia. Other charges for analysis, purchase commission, freights, wharfage labor and cartage,, landing and transport (at plantation), and cost of application will total a further cost of $17.00 per ton, equal to an additional six cents per pound, bringing up the total cost to $96.08 per ton, equal to twenty cents per pound.

If 200 pounds per acre of sulphate of ammonia were applied at one time the cost would be about $9.60 for 48 pounds of ammonia, equal to about 40 pounds of nitrogen. Again, if as much as 250 pounds per acre were applied, but in two dressings at different stages of growth, there would be an addition to the soil of 60 pounds ammonia—about 49½ pounds nitrogen—at a cost of $13.00, minus any charge for the second dressing. This should, and probably would prove an all sufficient dressing for each separate crop of plant and rattoons on those soils that are showing marked signs of exhaustion. On less exhausted soils probably two-thirds of the above larger dressing would be sufficient. Let us see how it works out.

Chemical analysis goes to show that there are required from 2000 pounds to 2250 pounds of nitrogen to form the albuminous matter of 1000 tons of cane, and assuming that to be fairly correct, and estimating the general weight of cane per acre in one instance 40 tons, and in a second 50 tons, there would be required respectively from 80 to 90, and from 100 to 113 pounds of assimilable nitrogen per acre. Now as most agricultural chemists are agreed that in seasons favorable to nitrification from 30 to 50 pounds of nitrogen per acre are available from the sources of the soil, crop residue, seed, and rain we may reasonably conclude that the balance of fertility in regard to nitrogen would be fairly well maintained, especially as under this climate, with a fair average rainfall, nitrification will be longer continuous the year through than in more temperate climes. But in seasons of long continued drouth nitrification would cease, drouth being inimical to the life of the nitrifying organism.

I will how pass to the consideration of the application of nitrogen to the soil in a totally different form, and by means much more in keeping with the workings of nature; also in full accord with the usages of practical agriculture, as well as in consonance with the teachings of the foremost agricultural chemists of the day. And, further, I think I shall be able to show that this application of nitrogen can be achieved at relatively no cost at all, certainly at a trivial cost compared with the application of nitrogen in the various forms of artificial manures.

In the farming world it has been a common custom for centuries past to add to the fertility of the soil by the ploughing in of "green crops," so-called; and it has for long been known to practical men that after *certain kinds* of green crops so ploughed in, and indeed, following such green crops grown for hay, wheat and other cereals produced abundantly without any extraneous aid in soils of fair average fertility. Thus it came to be known of a certainty that cereals following a crop of clover, or beans, or peas, or vetches, or any leguminous crop, would in ordinary seasons, yield productively.

But it is only of recent years, after above half a century of patient research, that science has at last solved the mystery of a most interesting problem in the domain of agriculture, to wit, the relation of the leguminous order of plants in regard to the accumulation of nitrogen. Empirical practice had been before her for centuries, but as it were groping in the dark, discerning only the proved fact that following the growth of certain crops, cereals flourished apace unassisted. Practical men had also demonstrated the fact that clovers, vetches, beans, and other leguminous crops did not show any appreciable benefit for the application of nitrogenous manures, but beyond that fact they could not advance. It has therefore remained for science to come to the aid of the perplexed agriculturist; and the light she now sheds on this hitherto obscure matter is so full and so clear, her teaching so emphatic, and so plainly in accord with the workings of practical men that there is no longer reason for doubt or hesitation in the agricultural world, and all who run may read.

To Germany belongs the honor of this discovery of the absorption and fixation of the free nitrogen of the air by leguminous plants. Prof. Hellreigel being the first to demonstrate, practically the truth of a theory advanced occasionally by a few chemists. There then quickly followed other and more extended practical experiments by German, French, American and English chemists each and all confirming beyond doubt the truth of this discovery by Hellreigel.

Prof. Paul Wagner, who is among the highest of German authorities, and whose experiments have been most exhaustive in further instance of this special power of leguminous crops, cites the example, among others of the estate of Dr. Dehlinger, near Darmstadt, whereon *the whole of the nitrogen required for corn, root and other crops is produced from the growth of leguminous crops ploughed into the soil.*

Now let us inquire into the more practical part of this question, that is to say the growth of leguminous crops as a means of increasing both the fertility of the soil and the production of sugar.

Of the lugiminous crops common to ordinary agriculture, I have practical knowledge of only seven, clover, vetches, lucerne, sainfoin, beans, peas and lupins, and of these I regard vetches, with a proportion of beans for support, as best for the purpose. Chemists tell us that the first four, (clover, vetches, beans, peas,) are about of equal value as accumulators of nitrogen, and that teaching is in accord with practical experience, looking to the after growth of corn, etc., crops. But whereas clovers are somewhat slow of growth, vetches are quick; also they produce a more abundant leaf growth than beans or peas; and as quickness of growth and abundance of produce will be two dominant factors, vetches are likely to give the best results. And further, with vetches (also called tares) one has the advantage of two sorts of seed, spring and autumn sown; the two kinds are relatively the same, there being no more difference between them than between spring and winter wheats; also whereas clover seeds are capable of being, and are, much adulterated with vetches that is not so, the exception is to find an unclean lot of vetches seed. Next to vetches I would prefer to stand by lupins. The production of a crop of vetches for green manuring could only proceed between the harvesting of a crop of rattoons and the following plant cane, so that this mode of improving the soil, must progress by degrees; but as vetches would be in bloom within five months from the time of sowing, and should be ploughed under as they came into bloom, a considerable proportion of the land might be thus manured each year. There is not, perhaps, any present need to explain the practical procedure for the growth of vetches, so I will pass that by to estimate for the general average cost of a mixed crop of vetches and beans, 8-11th vetches, 3-11th beans, in other words 2½ bushels of uetches and one bushel of beans. So far as I can learn vetches are not grown in the States, and beans (common field horse beans) are not a general crop, also I cannot find any market quotations for the latter; therefore, for the present I must base my estimate on the prices in the chief British market, there vetches and beans of from 63 to 64 pounds per bushel can generally be bought, vetches 5s. 6d. to 6s.; beans 4s. to 4s. 6d., per bushel. We will assume the prices respectively at the higher rates, to include bags and delivery aboard ship, and the cost per acre will run thus:

Seed—160 lbs vetches $4.92; 60 lbs beans $1.52=	$6.44
Seeding and extra harrowing and rolling, say,	3.56
Total........................	$10.00

A good crop from the above seeding, inclusive of root growth, would weigh about 14 tons, consisting of some 4 tons dry, nitrogenous matter yielding from 150 to 200 pounds of nitrogen. But in order not to form too high an estimate of the production of nitrogen, let us assume it at 160 pounds per acre. And if we suppose that of this there is produced

From the formed nitrates of the soil.........	60 lbs
From fixation, etc., of free air nitrogen.......	100 "
Total........................	160 lbs

we have a net clear gain of 100 pounds of nitrogen per acre from a source unattainable by growing cane.

We have seen before that a crop of cane 40 tons per acre requires from 80 to 90 pounds of assimilible nitrogen; therefore by the ploughing in of a green crop as instanced, there would be added to the soil nitrogen in an assimilable and available form equal to nearly 2 crops of cane of 40 tons per acre each; and of this amount of nitrogen no less than 100 pounds would be clear net gain. And estimating the money's worth of this nitrogen on the same basis as before, we arrive at the following results:

By net gain 100 pounds nitrogen @ 22¾ cts.=	$22.75
Less cost of crop producing the above........	10.00
Profit balance.................	$12.75

Now still further to place the object I have in view beyond the probability of failure, I would propose to expend this balance per acre of $12.75, or a part of it, on the purchase of phosphoric acid lime and potash, and apply these manures to the soil previous to sowing the green crop. All nitrogenous crops make large demands on the soil for these three manures; and we may readily assume that in order to have intensive accumulation of nitrogen, there must of necessity be active, vigorous growth of the nitrogen accumulating plant.

Now we might in fairness claim that the cost of supplying phosphoric acid, lime and potash to the soil previous to the growth of the nitrogen accummulator should be charged to the following two cane crops since all is returned again to the soil for their benefit, and the necessity for manuring cane crop is yearly becoming more apparent. Also it would be reasonable to assess the gain of nitrogen above 100 pounds per acre seeing that the green crop has done the work of elaborating 60 pounds of nitrogen from the soil, and will return it again to the soil in a condition, as regards the above ground growth, more favorable for assimilation by the cane crops. And furthermore we should not lose sight of the several advantages to be derived from the addition of such a large body of humus producing material to the general bulk of the soil, and the after-influences it would promote towards the maintenance of general fertility.

The following are the most important characteristics, known to chemists and practical men, of the body called humus. 1. It is the principal nitrogenous ingredient of soils; a plentiful supply of humus in a soil gives a corresponding increase of nitric acid 2. It greatly favors the production of carbonic acid whereby the solvent power in a soil is largely increased. 3. It has capacity or absorption from the atmosphere, and fixation of ammonia, which it retains with great tenacity; also for the retention of phosphoric acid and potash; and as the fertility of a soil is closely connected with its power of retaining plant food this action is of great importance, (this is one of the principle reasons why clay soils are generally more fertile than sandy soils). 4. It contains in itself a considerable quantity of saline and earthy matters which are liberated as the organic part decays. 5. Of all soil ingredients it has the greatest capacity for retaining water. 6. It adds warmth to soils owing to the darkened color it gives them whereby the sun's rays are the more attracted. 7. It directly serves the alimentation of plants—this on the authority of the eminent French chemist Deherain, according to his latest researches.—But that would not be so with a newly ploughed in green crop, for considerable time must elapse for thorough decay, and extreme dissemination of this organic matter and intimate admixture with the finely comminuted mineral elements of the soil. 8. It serves the important function of improving the texture of the soil; heavy clay soils it renders lighter and more porous, whereas to light sandy soils it gives compactness and solidity.

Surely then it becomes most desirable to secure to the soil in plentiful supply a property possessing so many varied and useful functions.

One other word may yet be said in favor of this proposed green cropping in that it would tend to preserve the formed nitrates of the soil from being washed away in times of heavy rainfall. Exposure of a bare soil to the elements during heavy rains always results in considerable loss of nitrates even from strongly retentive clay soils. According to experiments conducted by Sir J. B. Lawes on his estate at Rothamstead, England, the average loss of nitrogen per acre per annum from unmanured land, estimated from analyses of the drainage water only, was nearly 20 pounds, and it is said, "nearly the whole of this loss occurred during the period of the year *when there was either no crop on the ground, or but little growth.*"

The soil at Rothamstead is a heavy loam resting on a clay subsoil, and the average rainfall for 28 years, 28½ inches; therefore we may resonably assume that the free porous soil of these Islands would show a greater loss of nitrogen in those districts where the average rainfall is above 50 inches per annum. But on the other hand, the natural formation of the soil nitrates would probably be greater in these Islands where the climatic influences throughout the year so much longer favorable to the production of soil nitrates, so that this extra loss from heavy rainfall and natural porosity of soil, thus leaving the loss per acre here about equal to the loss per acre at Rothamstead.

The system known in the farming world by the name "bare fallow" can alone be advantageously carried out on heavy soils, and in moist warm summers; but it has almost died out, owing, chiefly, to a continuance of ungenial and wet summers, and the low price of wheat, but also, in part, to an improved practice of working heavy lands. On light lands, and medium loams, the system is never followed, the earning power of the soil being wrought to the full by a constant succession of crops. I therefore venture to express the opinions that the soil of these Islands, in so far as I know it, should not, in general, be bare of a crop for longer than one month at a time if it is to be wrought to yield as cheaply and as productively as seems to me possible. With these words I will conclude by remarks on the application of nitrogen to the soil.

I now come to the consideration of the second part of the subject matter of this letter, to wit, the application of phosphoric acid to the soil in a suitable form and as cheaply as possible. As to the benefits likely to accrue from almost every soil from the application of phosphoric acid at the proper time and in a form suitable to soil, and suitable also for rapid assimilation by a growing crop, there is not any doubt; but as phosphoric acid is not assimilable with equal rapidity from each and every fertilizer, the results from various fertilizers will vary considerably. Also certain forms of phosphatic fertilizer suit certain soils, and what would best answer on sandy soils would not equally suit clay soils; and, again, what would suit clay soils would probably prove of little, if any, benefit on chalk soil.

The various substances yielding phosphoric acid, and used as fertilizers, are so generally known it is not necessary to tabulate them here; what we are chiefly concerned to know is the percentage of water soluble phosphoric acid and assimilable and available phosphates, and from what substance the phosphates are derived; so for purposes of comparison we will select the long tried superphosphate, and the recent soluble basic slagphosphate, for these are the cheapest two forms in which quickly soluble phosphoric acid can be applied to the soil. A good average grade superphosphate will contain 13 per cent soluble phosphoric acid, yielding 21.4 per cent monocalcic phosphate (equal to tricalcic phosphate rendered soluble 28.3 per cent).

A good average soluble basic slagphosphate will contain 18 per cent soluble phosphoric acid, yielding 29.6 per cent monocalcic phosphate (equal to tricalcic phosphate rendered soluble 39.2 per cent).

We thus see that the difference in favor of the slagphosphate will be as much as 5 per cent of soluble phosphoric acid, say 8 per cent monocalcic phosphate (equal to 11 per cent tricalcic phosphate rendered soluble), and this would represent a money value of $7.10 per ton in favor of the slagphosphate on a basis of $1.42 per unit of the phosphoric acid from the same 'Frisco firm before allude to. Now since basic slagphosphate can be bought for £2 5s. 0d. per ton (2240 pounds) F. O. B., at the ports of London or Liverpool, we can thus make a full comparison between the cost of the two manures per ton, assuming that the 'Frisco price includes delivery F. O. B.

The comparison of costs is as follows:

SUPERPHOSPHATE, per ton		(2000 lbs)
13 per cent phosphoric acid @ $1.42=	$ 18.46	
Purchase Commission .2½	.46	Per unit
First to Honolulu	3.00	$2.08½
" " Plantation	4.00	
Plantation landing and hauling charges	1.20	
Per ton	$27.12	Per lb .10$\frac{4}{10}$c

BASIC SLAG, per ton		(2240 lbs)
18 per cent phosphoric acid @ 2s. 6d	$10.80	
Purchase commission 2½	.27	Per unit
First to Honolulu	12.00	$1.57
" " Plantation	4.00	
Plantation landing and hauling charges	1.20	
Per ton	$28.27	Per lb .7c

There would probably be a few other minor charges on each fertilizer, but not affecting the comparison, which we see is greatly in favor of basic slag. And this favorable comparison could be increased were we to put a value on the lime contained in each manure, which, valued as low as half a cent per pound would show a further difference of $2.50 per ton in favor of the basic slag. And if we assume an application of 400 pounds per acre of phosphatic fertilizer the relative costs for each would be

SUPERPHOSPHATE,

400 pounds per acre=52 pounds phosphoric acid, costing	$5.40
Less value of lime	.40
	$5.00

BASIC SLAG

400 pounds per acre=72 pounds phosphoric acid, costing	$5.04
Less value of lime	.94
	$4.10

Phosphoric acid in superphosphate cost.... $.9\frac{8}{13}$c per pound.
Phosphoric acid in basic slag cost......... $.5\frac{4}{6}$c per pound.

These figures showing that 500 pounds of basic slag will not cost more than 400 pounds of superphosphate, and yet will give 38 pounds per acre more of phosphoric acid; in other words 550 pounds of superphosphate will be required to produce as much phosphoric acid as 400 pounds of basic slag, and will cost $2.82 per acre more. Beyond this I think it will not be necessary futher to recommend basic slag.

In regard to the application of potash, I would like just to add that I think it could be more advantageously applied in the form of kainite than in any other form. The present price in London or Liverpool is about 50 shillings per ton on a basis of 13 to 14 per cent of potash. Probably at German ports the price would be lower since the great bulk of kainite is got from Stassfurt.

Hoping these suggestions will prove of some hereafter benefit in helping towards the cheaper production of sugar in these Islands. I beg to remain,

Yours very trully

WM. T. GREIG.

Paauhau, Hawaii, Dec. 1892.

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REPORT OF COMMITTEE ON COFFEE AND TEA.

To the President of the Planters' Labor and Supply Company:

SIR:—In the PLANTERS' MONTHLY of November, 1891, there appeared very interesting communications on the culture of coffee from Messrs. J. M. Monsarrat, R. Rycroft, A. Sunter and Chas. C. Miller, Manager of the new Coffee and tea Company in Kona. There was also a paper from the pen of Wm. G. Wait, of the same Company, on the subject of tea culture, and recommending it as a plant that might be successfully and profitably raised in the district of Kona.

All who are interested in the culture of coffee on these Islands should read these letters, especially that of Mr. Miller, who goes very carefully into the subject, telling how the nursery should be prepared and planted, then in regard to the preparation of the ground, the care and handling of the young plants, and the probable yield of each.

I do not propose, in this paper, to dwell upon these subjects, but will try and give a few statistics showing the amount of coffee now growing on the Islands, our exports during the past and prospects of coffee culture in the near future.

It is an easy matter to gather facts in regard to the amount of *sugar* produced on the Islands during a year, as it is all produced on plantations where accurate figures are kept, giving the whole number of tons made, the tons per acre, etc.

When I began to get information about coffee, I found it almost impossible to get any correct figures. Coffee has been raised in small patches, varying from one acre to ten, or perhaps twenty in extent. I had the pleasure of visiting the district of Kona in April last, and saw many of the patches of coffee growing, most of it among the rocks and trees, and none of it having the care and attention that it should have. It would seem as though the coffee growers in Kona would be glad to welcome among them experienced cultivators, like Messrs. Miller and Wait, who are only too glad to show how coffee plants can be raised to produce two or three pounds to the tree instead of but about half a pound, as at present. A very different feeling seems to have prevailed however, and much was done at first to throw obstacles in the way of the new enterprise they represented, until the old hide-bound methods of cultivating, or I should say, neglecting to cultivate coffee are abandoned, it will be useless to look for any great success.

Upon inquiry as to the amount of coffee in cultivation in Kona, I found that no one seemed to know ; nor could any one even guess at the number of pounds produced per tree or acre. It can be easily seen under these circumstances that it is impossible to give any accurate statistics.

The manager of the new plantation expects to keep an accurate account of everything in connection with the growth and yield of the coffee and tea. The yield per tree and per acre at different altitudes, and under various temperatures, so that the statistics that will be gathered during the years to come will be of great interest and benefit to those starting new plantations. As near as I can ascertain, without actually going through the district, there are now planted and growing in North and South Kona about one thousand acres of coffee, most of it old, and bearing small crops through neglect and ignorance of the care the plants should have.

In the district of Hamakua, the Messrs. Horner, Barnard and others are planting and caring for the plants according to approved methods, and the results are already proving their wisdom. In the Hamakua and North Hilo districts there are about 170 acres planted in coffee, thirty-five acres of which are beginning to bear, and more is being planted all the time.

In the district of Puna there are probably 100 acres growing, only a small part of which is bearing this year. Mr. Rycroft's plantations being the largest at present in the district. The district of Kau has perhaps thirty acres in coffee. This makes about 1,300 acres of coffee growing on the Island of Hawaii. On the Island of Maui at Kaanapali, Mr. W. Y. Horner has wisely planted over sixty acres, and will soon have over 100 acres growing, and this I understand is doing finely. There may be as many as twenty acres planted on the Makawao Homestead lots, owned by the Portuguese. On the Island of Molokai, Mr. R. W. Meyer has perhaps ten acres planted out, and I understand that Dr. Mouritz at Pukoo intends soon to plant a number of acres. I have been unable to gather any information in regard to the amount of coffee raised on either Oahu or Kauai, but it will be seen that there are about 1,325 acres of coffee now growing on Hawaii, Maui and Molokai. There will be more coffee harvested next year than ever before, and the amount will increase very rapidly after that, as the new plantations come into bearing. Let me here commend the wisdom of the Messrs. Horner, the Honomu Plantation Co., and the Kau plantation owners, in planting some of their upper lands and sheltered valleys in coffee. It does not interfere with the cane culture, and will in a few years pay better than sugar ever can again. Why cannot many other plantations utilize their valleys and upper lands, that may now be lying idle?

The new Kona Coffee Co., of Kona, will have by the end of this month 120 acres of coffee planted and growing beautifully, and they have in their nursery about 200,000 plants from four months to a year old. They expect to plant next year about fifty acres more and will probably sell to other planters a large number of plants. The company has already a pulper of the most approved kind, and as soon as the trees now planted come into bearing they will have all the machinery necessary for pulping, peeling and separating the berries. The coffee that is raised by the natives and Chinamen now in Kona, and put upon the market is all of a mixed grade, the good, the bad, the green and the ripe, all put in together and none of it properly cured and dried. When the coffee now raised and cared for in the proper manner is picked and carefully peeled and separated and cured with the best machines known, and sorted into two or three grades, the No. 1 and 2 coffee thus produced will be an entirely different article and bring a much higher price than the mixture that is now sold as Kona coffee. Two years from this, or in 1894–5 there ought to be raised on the Islands over 1,000,000 lbs. of coffee, and after that more every year, until the coffee industry will rival and perhaps surpass the sugar interest. It is impossible to get the correct figures showing the amount of coffee raised here during the past twenty years, but through the kindness of Mr. W. Chamberlain of the Custom House, we are able to present the following table showing the amount exported from Honolulu since the year 1870:

1870	415,111	lbs.	1882	8,131	lbs.
1871	46,929	"	1883	16,057	"
1872	39,276	"	1884	4,231	"
1873	262,625	"	1885	1,675	"
1874	75,496	"	1886	5,931	"
1875	165,677	"	1887	5,300	"
1876	153,667	"	1888	7,130	"
1877	131,045	"	1889	43,673	"
1878	127,963	"	1890	88,593	"
1879	74,275	"	1891	3,051	"
1880	99,508	"	1892 (9 mos.)	13,098	"
1881	18,912	"			
Exported in twenty-three years				1,806,754	lbs.

These figures do not of course show the amount of coffee raised on the islands during the twenty-three years, as a large amount is used here to supply the home consumption.

I think it will surprise everyone to know that, during the years since 1881, 877,409 pounds of raw and ground coffee were *imported* into Honolulu from abroad, against 215,782 pounds exported during the same period.

This is supposed to be a coffee producing country, and yet during the past twelve years we have imported from abroad 661,627 pounds *more* than we have *exported.*

If the Legislature of 1888 had not foolishly killed the bill asking for assistance in starting the cultivation of coffee on a large scale and after the most approved methods the coffee industry would have been four years ahead of where it is now, and we should not find ourselves in the deplorable situation we are now in with all our eggs in one basket. We hear of a new enterprise being started in Puna on a large scale, and another in Kona with foreign capital. We wish all these new efforts to extend the culture of coffee on these islands great success, and trust it may be but the beginning of a great expansion of this industry.

It would be of great benefit to all who wish to plant coffee, whether small holders of land or large companies, to have a Coffee Planter's Union established for the purpose of collecting information and statistics on the subject, and of giving such information to all coffee planters on the islands.

The only report we can make in regard to the culture of tea on the islands is that a little is growing at Makaweli on Kauai, and a small patch at Kukuihaele planted several years ago by Mr. Purvis. It is doing very well, but is not being utilized in any way.

The only attempt at tea culture on a scale to be of any use to the country has been made by the Hawaiian Coffee & Tea Co. A nursery has been planted with seeds from Ceylon and the trees have done finely. Five acres have been cleared and planted at an elevation of about 2,000 feet, and Mr. Miller writes that they are doing finely. Five more acres will be planted next year when the plant are large enoughs. A crop can be expected from tea plants in two years after planting. The company is also planting cacao, or chocolate plants, and intends planting on a large scale if they do well. By having a variety of crops a large number of laborers can be profitably employed, and help to simplify the labor question, which is a vexed one at present.

I remain gentlemen, very truly yours,

WM. W. HALL.

Chairman of Committee on Coffee and Tea.

Honolulu, November 14th, 1892.

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AGRICULTURALLY SMALL! COMMERCIALLY GREAT!

[BARBADOS AGRICULTURAL GAZETTE.]

Is this the present aspiration of the politicians of Barbados! It would appear so; but upon what system of Political Economy founded, we are at a loss to understand. That such is to be our policy we gather from the dictum of a prominent member of the House of Assembly, "that members should refuse their support to every measure involving expenditure until the harbor scheme has been carried out." Everybody knows that harbor extension is urgently required, but to say that everything else is subordinate, and must wait until this scheme may, perchance, be perfected, is equivalent to saying, that every other public measure in Barbados, involving expenditure, must be deferred until Doomsday, and relegated to dim futurity; for at the snail's pace at which harbor improvements are likely to proceed, it is very probable that we should continue to stagnate for a century at least; and we venture to predict that the end of this policy will be that we shall neither have harbor nor anything else—nothing, indeed, to attract more than a few schooners to such harbor as we may have. So far from having a harbor, or any need for one, our neglect of other matters would reduce us to the condition of Shakespeare's old man, bereft of all; Sans everything.

We can hardly believe that it is seriously contemplated to concentrate attention upon a single object, and to allow other matters to stagnate. It may be, indeed, well to consider whether harbor improvement is our most urgent need. We believe, that although of great, and, almost, equivalent importance, yet that importance is subordinate to the importance of what we may here designate our productive department. Without production, we have nothing to export, therefore no need of ships; and, consequently, no need of harbor improvements. The merest tyro in the science of Political Economy, which after all is concentrated common-sense, must know that without exports there can be no imports, and that the very base and foundation of trade is exchange of commodities. Ships are carriers of merchandise, and do not frequent places which offer no freight. Exports and imports must, therefore, be balanced, else there can be no trade, no necessity for ships, and no need for harbors to accommodate them. So far we think common-sense admonishes us, that to maintain our trade we must also maintain our production, and that if we wish to become commercially great, our primary duty is to take care that we do not become agriculturally small. The truth is, that if we wish the expenditure on our much needed harbor to be a profitable expenditure, we must equally foster, and liberally encourage, the productive department of agriculture, on which the prosperity and success of the whole entirely depend. Let us banish from our minds at once, and for ever, the fallacy that it is possible for us to be, at one and the same time, commercially great and agriculturally small.

It was surely never intended that such a construction should be put upon words, as, unfortunately, they carry on their surface; our commercial prosperity must have a material foundation, and, be it great or small, must be the resultant of internal industry and productiveness. Perhaps it was intended that the *statu quo* should be observed in all things until the harbor improvements could be completed : but even with this construction we cannot agree : for standing still and waiting upon events in agricultural matters means certain loss. The Fabian policy, most excellent for tiring out an opposing force, or preventing meddlesome and unnecessary interference, may, if misapplied, degenerate into an artifice for barring progress. Without doubt, the one great and primary want of Barbados is increased production ; another hogshead —even another half-hogshead per acre, as the result of the same expenditure, makes all the difference in the year's prosperity : this additional yield, this substantial profit, means increase of purchasing power, and greater demand for imported articles : and, more than this, profitable results react upon, and stimulate every other branch of industry, so that the artisan and laborer become partakers of the general prosperity. But how are we to obtain this extra ton, or even half ton, without acquiring and applying the necessary knowledge? And how are we ever to obtain this knowledge if the agricultural department is to be starved until the harbor improvements are affected ? We know very well how the Germans and French have doubled the yield of beet root, and we know, too, that in these countries the agricultural department is not starved, nor in any way forced to play second fiddle to other departments, but that, on the contrary, every facility has been afforded for practically utilising modern scientific teaching. By means of selection of seed, application of assimilable plant food, and scientific, and, therefore, economical manufacture, increased yield has been obtained, and waste prevented. Hitherto our efforts have been of the most desultory character, such experimental results as we have obtained are due to the energy and foresight of individuals, who have worked patriotically in the interests of a community quite willing to take hold of and profit by any suggestion that promises "money," but very unwilling to spend even the money so gained on further experiment. Notwithstanding the fad which has taken possession of some peoples' minds, and which persuades them that it is only necessary to split up the cultivable land of Barbados into garden patches, and to stop all tillages on a large scale, in order to create a sort of utopia in which no man need work; where roasted pigs will run about crying "come eat if you please;" to which ships, laden with the industrial products of two hemispheres, will gladly bring their freights, expecting no return, we still hold by the old idea that all human prosperity is based upon industry, and that industry is the parent of commerce. This being so it is necessary to maintain and increase those industries, and this we cannot do unless we apply to them the scientific knowledge of the day: and this is impossible without a scientific station equal to the agricultural requirements of our island.

It is hard to believe that the old agricultural instincts are passing away from our people; if so, we are, indeed, moribund, (we mean the present generation, and not the island, for the fertility of our sea-girt garden will remain, no matter what men may think,) but we can assure those who believe that commerce can survive the extinction of industry, that they are deceiving themselves. No place can be commercial, unless it is also industrial; there are apparent exceptions, but only apparent, for the importance of non-industrial places results from the very necessities of Commerce. Hongkong is of very vital importance to British trade in Chinese waters; and Gibraltar, we know, keeps open to our commerce an important sea-gate. None of these exceptional advantages pertain to Barbados; we are commercial only in so far as we are productive, and when we cease to be industrial we shall have no need of imports because we shall have no purchasing power, and freight-seeking ships will have no necessity to seek that fine harbor on account of which such great sacrifices are to be made. The fact is this, the harbor is a great want simply because we are industrious; because we do produce and attract ships, which, as any casual observer may testify, throng Carlisle Bay during the reaping season.

But, after all, it is not so very difficult a matter to get our harbor; the engineering skill exists in abundance, and can be readily bought, but the difficulty really consists in acquiring that agricultural skill which will enable us to compete successfully against our rivals, and maintain those exports upon which, alone, the necessity, for the harbor depends. Whence will come this knowledge? Do we look for heaven-sent geniuses, born-planters, ready equipped with all that science can give? If so, we shall look in vain. The beet-growers found no royal road to increased production, nor shall we; they have solved problems, and are still at work; we have solved none, and are still idly, vainly expecting the impossible, and try to persuade ourselves that all we have to do is to build a harbor, and establish Utopia. By all means let us effect our harbor improvements; it is an urgent want, but not so urgent as the maintenance of our industries; and, in order to maintain those industries, it is necessary to select the best possible plants,—all varieties that may be of economical value—to encourage the rearing of seedlings from sugar cane, and other useful plants, so that they may be intelligently propagated. Plant food, the treatment of different soils, the rearing and selection of animals for different purposes, are all subjects which have been barely touched upon in this island, but which afford ample fields of research to the experimental scientist. The office of the experimental observer is to prove the economical utility of things, rejecting the worthless, and selecting the useful, which he hands over to the practical agriculturist for the general good. There is no department of human industry which can dispense with the expert; this exact knowledge is the foundation of industry; it enables men to work on sure lines, and prevents them from ignorantly wasting their energies by working in wrong directions. Knowledge enables men to work in right directions, but that knowledge cannot be obtained second hand; a large, and very practical part of it must be obtained on the spot, and is necessarily influenced by local conditions. The general principles of agriculture are the same, but, still, it is quite evident, that experiments at Kew and at Rothamstead, or men trained to grow wheat or turnips at Cirencester, will hardly meet our tropical requirements. No, we want, and must have, local work, local experiments, by means of which we may learn to select the good—that which is good for us—and to separate the chaff from the grain, in obedience to the law of our own necessities. Unless we do these things effectually, our efforts will never be attended with profitable results, commensurate with the care and toil which we expend, in our own rough way, in attaining our ends. Our horizon is limited, and we cannot bring ourselves to believe that it may be enlarged: nor can we persuade ourselves that the secrets of nature willingly, gladly disclose themselves to him who diligently sets to work to unravel them. Let us but apply our minds to the task and we shall find that our possibilities are enormous, and that the Aladdin's lamp of science will discover to the student those secrets which nature hides only from the ignorant. At present we toil in a roundabout way, endeavoring to lift weights which by means of lever and pulley would become as playthings in the hands of children.

We, Barbadians have lost faith in our country; her wonderful productiveness, and recuperative power, are things which we no longer prize; her solid industry is nothing to us, we may safely discard it, and gather commercial greatness from the clouds. And not only so, but, as West Indians, we are blind to the importance of the rich fertility, and wonderful possibilities of our own West Indian Province. We are as ignorant of these things as were the ancient Britons of the latent force that lay buried in the coal mines of their country. West Indian possibilities are enormous, and so, also, are those of our own island. Our industrial energy is the lever of the West Indies, and therein possesses an intrinsic value; it is a factor in the future progress which wise men foresee, and for which all loyal West Indians will strive. In the meantime, let us foster and strengthen our industrial system, so that practice and science may combine to augment those industries out of which alone can be evolved the commercial prosperity of Barbados, and the commercial greatness of West India. With such a consummation our harbor will never be big enough.

GRAPE CULTURE IN FLORIDA.

[FROM THE FLORIDA AGRICULTURIST.]

At our last meeting I was requested to prepare an article on grape culture to be read before you to-day. I have been growing grapes under glass in New York State for twenty-five years; my experience in South Florida is limited to one and one-half years. I find that growing grapes in New York under glass and growing grapes in South Florida in the open air are two different things.

Those grown under glass were all foreign varieties, such as Black Hamburgs, Madresfield Court, Muscat of Alexandria, Muscat Cannon Ball, White Syrian, Palestine and others. Some grown out of doors were Concord, Delaware and other varieties. The Niagara was considered only a second class grape in New York, where it turns out to be a first class. This last season I have been experimenting with some foreign varieties purchased from Baron Von Luttichau, some of which are Chasselas Luttichau, Duchess of Bercleugh, Madiline Blue and others, and am sorry to say that thus far they have been a complete failure, but hope at a later date to give a better account of them. Thus far I have found the Niagara to do the best of any, and will give my short experience in South Florida, trusting it may be a benefit to those contemplating going into grape growing for the first time.

I selected my highest location and had the land thoroughly cleared from trees, stumps and rubbish, then had it plowed and hurrowed in the opposite direction.

In preparing trellis for vines set posts twelve feet apart in the rows and the rows ten feet apart. Used two strands of wire, the first one stretched and fastened securely two feet above that.

In planting vines, if they are Northern grown, plant the latter end of March or beginning of April. If they were brought here in winter months they would start to grow as soon as they reached this warm climate, and a sudden cold spell would destroy the tender growth. If they are of Southern growth they can be dug up as soon as they cast their foliage, cut back and transplanted to the vineyard in December or January.

In planting dig a large space, put in the fertilizer, mix it well with the top soil, spread out the roots, giving them plenty of room, draw in the soil well over the roots, then give it a pail of water. For fertilizer, use pure ground bone and Mapes' fruit and vine mixed.

As soon as the vines start to grow rub off all the buds but two. Only one is needed, but the insects are likely to attack one, or perhaps both. After they have grown up insert a wooden peg in the ground and tie a cord from it to the top wire to tie the young vine to. Keep all laterals pinched in so as to keep a single cane. When the cane reaches the top wire train it along the wire. The first season they need to make all the vine and roots they can.

After the vines have matured their wood and the season is on hand for pruning, if they have made a good growth prune back to the first wire. Never sacrifice the vine for the fruit. Only strong vines bring forth good fruit.

There is one compensation one does not have in the North, the fruit can be cut the second season. What greater pleasure can a man have than to cut fruit of his own raising; to walk through row after row of thrifty vines and pick the golden bunches of luscious grapes, healthful, strengthening and invigorating. I would like to see Avon Park's 20,000 acres, from end to end, one vast vineyard, shipping fruit to the North by the ton.—GEORGE EDMINSTON.

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RECENT BEET SUGAR ITEMS.

[FROM THE SUGAR BEET.]

The beet-sugar industry in Holland is of considerable importance, viewing the size of the country; in 1889, there were thirteen sugar refineries. Sugars are exported to England, Sweden, and Germany. Total export of beet sugar, 9,600 tons.

Some idea of the profits in beet-sugar-making may be realized by the following figures. At the Barum, (Germany) beet-sugar factory, the receipts from sugar and molasses were $360,793. Cost of beets, $169,407; taxes, $60,938; cost of manufacture, $80,797, or a total of $311,152, leaving a profit of $49,641.