THE

# PLANTERS' MONTHLY

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OF THE HAWAIIAN ISLANDS.

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The latest quotation in New York for Cuban centrifugals of 96 deg. test was 3 cents per pound.

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The three beet sugar factories in California have had a very prosperous season, and the total product of sugar is largely increased over the previous year.

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Persons interested in coffee culture will find the article on page 537 one of the most valuable published. It treats of the industry from the seed to the salesroom.

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The exports of rice from Japan for the year 1892 are stated to have been 1,216,666 piculs, equal to 150,258,251 pounds. With the Japanese and also the Chinese, rice is the staple food of all classes.

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Those wishing to secure this periodical for the year 1894, should send their orders in without delay, so as to commence with the January date. Bound volumes can be supplied for any of the past seven years. Also, missing numbers furnished.

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It is stated that the Russian beet sugar factories are to be consolidated under one management, and under the official direction of the Government. Whether this step is taken by order of the Government is not stated. It, however, has the appearance of being an imperial sugar trust.

## *ADIEU 1893—WELCOME 1894.*

This issue closes the twelfth volume of this periodical. It was commenced in 1882 to serve as the organ of the Planters' Labor and Supply Company, and to furnish a medium through which those interested in cane planting and in the manufacture of cane sugar or other products might express their views on all topics bearing on this as well as other industries, in which planters are directly or indirectly interested. How well it has served the purpose, we leave others to say; but if it has failed in any respect to meet the purposes for which it was established, it has not been from lack of efforts on the part of its editors or publishers.

In closing this volume, while thanking those who have kindly aided us in the past, we ask our friends who are interested in advancing the agricultural prosperity of Hawaii to endeavor to assist us by contributing the results of their varied experience in whatever branch of industry they may be engaged. A single original thought often leads to a train of thoughts, resulting in valuable suggestions, improvements or inventions which otherwise might never have been conceived. Most of our planters, managers and mill men are men of intelligence, education and brains, who have reached their present position through untiring industry and struggles with adversity, which they have conquered only by indomitable perseverance. The varied experiences through which they have passed fit them to impart instruction to those who are seeking information here or abroad.

Cane planting and sugar boiling are the same in every part of the world, and experiences in either branch—whether successful or not—are such as every beginner must pass through in learning how to plant or boil successfully. An employee entering for service into such a mill, for instance, as that of Ewa or Makaweli or others in these islands, or the Calumet in Louisiana, witnesses the perfection of the modern sugar house, and if qualified by experience, or natural ability, or by close study and application to grasp the improvements which science has perfected, he has an advantage over one who is employed among inferior surroundings. The former stands

as it were, on a higher plane, where the view is more extended, and larger results are obtained from the same labor as is performed in an inferior mill with corresponding machinery and appliances.

So it is with a manager, engineer or sugar-boiler. Each may be striving to obtain better results in his department by securing larger returns from less labor and cost, and may be doing what has been tried by others before him, some of whom have found what they sought and published their success, while others have failed and become discouraged. Now if each had published the results of his experiences, it is clear that every one situated in similar circumstances would at once discover the causes of his own failure and of his rival's success. And more than this, a comparison of the details in the processes by which success was obtained in the one case, and failure resulted in the other, will always be instructive to both, as indicating the lines on which each won or failed in his search for improvement. This will illustrate the value of publishing personal experiences in an industry in which so many in every part of the world are engaged. And it moreover shows the necessity of every person who is engaged in producing sugar, taking one or more of the best periodicals devoted to this branch of industry.

A few weeks ago an old subscriber called at our office to express his gratification in finding in a recent number of this periodical what he had been searching for years in books and other publications without success. And to give a practical turn to his appreciation of its usefulness, he has increased his subscription from one to five copies for the coming year. We can hardly expect this of all, but we trust that every one interested in Hawaii's industrial prosperity will at least take one copy of the PLANTERS' MONTHLY.

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PRESERVING TAMARINDS.—There is no fruit that grows here more luxuriantly or bears more abundantly than the tamarind. And there is no good reason why its fruit may not be profitably put up for export, if done properly. In the *Queensland Sugar Journal* we notice a recipe for curing and preserving it, which may be of use to those who have the trees in

bearing. It is the method adopted in the West Indies: "This fruit should be picked while the pod is yet green and before it is fully ripe. The proper condition is indicated by the color of the pod, which should be of a rusty greenish brown, but juicy and succulent. At this time the pods will snap, break off like French beans. Place the fruit in layers in a jar or other tight vessel. After placing a layer of fruit at the bottom of the vessel, sprinkle over this a small quantity of clean, brown sugar. Follow this with another layer of fruit, and this again with a sprinkling of sugar as before until the fourth or fifth layer has been placed in position. Upon the fifth layer sprinkle very carefully, in addition to the sugar, and lightly, with tartaric acid. Go on in this way until the jar is full. Then cover it and place weights upon the fruit to hold them down beneath the syrup. The fruit thus prepared should be kept until the pods and all are dissolved, say two months, after which it is ready for the market. Tamarinds thus prepared are worth at wholesale, 9d. per lb."

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## *SUGAR AND LABOR IN FIJI.*

We are indebted to the editor of the *Fiji Times* for a pamphlet entitled Hand-Book of Fiji, which gives information regarding sugar and the laborers employed on the plantations of that group, which will be read with interest. The sugar exported from Fiji during 1891, amounted to £327,526, say $1,636,630, mostly to Australia, where it is refined and finds its market for consumption.

Next to sugar, the principal exports are copra, £63,039 and dried fruits £61,501 and the total exports of the group amount to £420,783.

The cultivation of sugar is being rapidly extended. The exportation of green fruit has almost doubled itself in four years. The export of maize has decreased, but large quantities are now being consumed in the Colony. The export of tea is affected by the increasing consumption in the Colony itself.

The following extracts from the Hand Book, show the kind of labor employed in Fiji, with cost, etc.

The laborers available for plantation work in Fiji belong to three classes, Indian coolies, Polynesians introduced from the neighboring groups and Fijians.

INDIANS.—The first importation of coolies was in 1879. The number required by the large sugar companies has rapidly increased until there are now about 10,000 in the Colony.

The average cost for each adult has proved to be between £16 15s. and £23 6s. He is recruited in India, through the usual emigration agency system, and comes to Fiji for ten years, five of which he spends in the service of the original requisitioner, and the second five working as a free man where and how he pleases. At the end of ten years he becomes entitled with his wife and family to a free passage to India at the expense of the General Revenue of the Colony.

POLYNESIANS.—There are at present about 2,400 Polynesians in the Colony. They are recruited, under strict Government supervision and control, from the islands of the New Hebrides and Solomon groups. Each immigrant is engaged for three years, for which he is paid wages from £3 to £6 per annum besides rations, clothing, quarters, and medical attendance. He may then return home, or re-engage for terms of one year. It has been found that Polynesians who have returned home after working any length of time in Fiji often wish to re-engage.

The cost of introduction is about £16 a head, which sum is payable by the employer, together with his return-passage fee of from £5 to £7. The Government places no limit of time upon the right of a Polynesian immigrant to a free return-passage to his home after he has served his indenture period of three years.

After the fourth year the wages are from £10 to £12 a year, the employer, as before, providing rations, clothing, and house accommodation according to the scale provided by the Legislature.

The Polynesian is not really cheaper than the Indian coolie, but being more tractable and pleasant to work with he is generally preferred by small planters on cocoanut or fruit plantations.

FIJIANS.—For clearing a plantation or lading punts and vessels the Fijian is better suited than either the Indian or

Polynesian. A large number are at work on the plantations for periods varying from one month to one year. They are employed either at time or task work, and the usual wages are 8d. a task, besides rations and quarters. Excepting in the case of natives working by the month, all engagements must be ratified by the magistrate of the district to which the laborer belongs, and in which, as a rule, he engages. The employment of Fijian agricultural laborers is regulated by law, and the following classes of persons are not allowed to contract for periods of labor beyond their "home district."

(1)—Married men, except under such conditions as may be prescribed by any Native Regulations passed for the purpose.

(2)—Men whose absence from their "home district" is inconsistent with engagements into which they have previously entered, or with obligations imposed by law, or whose presence in their districts shall be required by the District Council for works of actual necessity.

(3)—Women.

(4)—Children under the age of fourteen years.

For periods of one month at a time Fijians may go to labor within their home district or its adjacencies without any formal engagement.

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## *CANADIAN SUGAR TRADE.*

[CORRESPONDENCE QUEENSLAND SUGAR JOURNAL.]

Your favor of the 22nd June addressed to the Honorable the Minister of Trade and Commerce is this day at hand, and in answer to your enquiries I have the honor to append a statement showing the quantity and value of sugar imported into Canada in each fiscal year ending June 30th from 1889.

Such importations are almost entirely raw sugars and are procured from almost all producing countries in the world; in other words, wherever the best value can be had for the least money.

A statement herewith will show the countries from which the importations for 1892 came; figures for 1893 not yet tabulated. As an instance of the erratic course of the trade there

were in 1892 no importations from Brazil, while in the previous year about 22,000,000 lbs. came from there.

Sugars imported into Canada are at present free of duty with the exception of "All sugars above No. 14 Dutch Standard in color, and refined sugars of all kinds, grades, or standards, and all sugar syrups derived from refined sugars, a specific duty of eight-tenths of a cent. per lb."; consequently very little refined sugars are imported. Of the 247,350,324 lbs. imported during the past fiscal year only 1,610,147 lbs. were dutiable, and the presumption is that the bulk of that small quantity was not refined, but raw sugar over 14 Dutch Standard, probably bright grocery sugars from the West Indies.

I could not undertake to quote average prices obtainable as such prices follow closely the market values of like grades throughout Europe and the United States. I have noticed that as a general thing Canadian refiners sell at or a trifle less than current New York quotations, being so near to New York, which is one of the largest sugar markets of the world, our refiners must follow New York prices and meet all fluctuations of that market.

Sugars are seldom consigned to this country. Our refiners seek them wherever to be found at prices that appear favorable, and wholesalers buy almost exclusively from our own refineries, in fact the eight-tenth cent per lb. duty in refined prevents foreign competition.

SUGARS IMPORTED INTO CANADA.

| | Pounds. | Value. |
|---|---|---|
| 1889 | 202,937,618 | $5,570,466 |
| 1890 | 189,282,237 | $5,580,574 |
| 1891 | 212,937,089 | $5,128,325 |
| 1892 | 292,361,259 | $7,806,737 |
| 1893 | 247,350,324 | $6,509,440 |
| Average | 228,973,700 | $6,119,200 |

Approximate average cost $2\frac{2}{3}$ cents per lb.

W. F. BARMELEE, Deputy Minister.

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Whenever a farmer discovers that his team is one of the heaviest items in his expenses, and must be kept at work every day when work is possible, he has a fair chance of success.

## *VALUABLE TABLE FOR SUGAR BOILERS AND CHEMISTS.*

We have received from Mr. Hubert Dyer, Superintendent and Chemist of the Ewa Mill, a convenient table for the rapid determination of the quotient of purity of sugar solutions. The table as calculated and arranged by Mr. Dyer is an invaluable aid, almost a necessity after being once used, in every sugar house where the slightest chemical work is done. It suppresses entirely the tedious division of sucrose by Brix and enables the chemist to read off directly the correct figure. It has been so widely extended that it covers nearly all possible cases with our tropical juices, high and low; and is besides capable of wide application for mill juices, diffusion juices, filtered juices, molasses, etc. This table can be seen at the office of the PLANTERS' MONTHLY.

NOTE FROM MR. DYER.

EDITOR PLANTERS' MONTHLY:—Having recently calculated and arranged a table (after Kottman) for the rapid determination and of the co-efficient of purity, I would call your attention to it. It would be unnecessary to remind you of the vast saving of labor thus effected; suppressing as it does all division of sucrose by Brix, and enabling one to read directly the desired purity, were it not that Kottman's original table is so narrow in scope as to be of little practical use. This table is so greatly enlarged that it includes practically all the ordinary cases. A range in sucrose from seven to twenty per cent. and of solid contents from eight to twenty-seven speaks for itself.

Its use is by no means limited to raw juice, as every sugar chemist will find it invaluable in his laboratory. The great range in purities, from 50 minimum to 95.2 maximum, renders it widely inclusive; by the ordinary dilution method it becomes a valuable assistant in handling machine syrups, molasses, etc.

The table presents an almost solid mass of figures 16"x20", but it is so arranged in squares and different styles of figures that reference is precise and rapid. By placing in an ordinary frame with a window glass cover and hanging it beside the desk, reference is most easy.

Postpaid on receipt of price $2.50.

Truly yours,

HUBERT DYER.

Ewa Plantation, Oahu, H. I.

# CORRESPONDENCE AND SELECTIONS.

## *COFFEE PLANTING IN TRINIDAD.*

[The following article, prepared by Superintendent Hart of the Royal Botanical Gardens, Trinidad, contains the experience of the best coffee growers on that island. It should be read in connection with Mr. Millers comments, published on pages 486-7 in our November issue.—ED.]

The Central Agricultural Board having decided at its meeting in June, 1891, that it would be advantageous to the colony, if the government were to offer premiums for the cultivation of certain areas in coffee, it was decided *nem con* that prizes should be awarded as follows:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| £100 | for | beat | 10 | quarees | =32 | acres. | |
| £ 50 | " | " | 5 | " | =16 | " | |
| (3) £ 25 | " | " | 3 | " | = 9 | " | 6 r. |
| (3) £ 10 | " | " | 1 | " | = 3 | " | 2 r. |

### COFFEE CULTIVATION.

The coffee tree in its native state will grow to fifteen or twenty feet in height; the leaves are a dark glossy green like laurel; the blossom is similar to jasmine with a strong odor, the fruit is somewhat like a cherry of an oval shape, each cherry contains two cells, and each cell one bean or seed, unless by a freak of nature it happens to be a pea berry, containing only one.

### SELECTION OF LAND, SOIL, ELEVATION, CLIMATE, ETC.

Judging from an experience of eleven years in Jamaica, I should declare that the higher suitable land could be obtained for its cultivation in Trinidad the better. By suitable land is meant lying well sheltered from strong winds, of a friable nature, and a character that would generally obtain for it the name of good mountain land. The best aspect for coffee, according to Mr. Sabonadiere "is an eastern one facing the rising sun," and "the best land of undulating or moderate slope strewn with boulders"—he is here speaking with special reference to Jamaica, but the sense of his writing

may be appropriately applied to Trinidad also. Many, however, prefer a southern exposure. Suitable soil at any elevation from sea level to 2,000 feet, and almost any exposure will grow good coffee, but it is doubtless correct that an eastern or south-eastern exposure is the best. Advantage should always be taken to leave all woodland intact with stands on the poorer ridges adjoining, so as to obtain shelter for your coffee, to maintain or assist in maintaining the necessary humidity, and to prevent the drying up of streams in the locality of the plantations.

Land should always be selected near a stream if possible, *i. e.*, if a large area is to be planted, so as to make provision for the water power necessary for the manipulation of the crop previous to its being placed in the market. Water in any case is essentially necessary for the preparation of coffee of superior quality, even if the power for machinery is supplied by other means, but in this case a small and steady supply is sufficient. It should be remembered in making a selection of land that the higher the elevation the better will be the quality of the coffee produced, for it would not be possible, in Trinidad as in Jamaica, to get above the limit, as we have no land higher than 3,022 feet, while the coffee limit in Jamaica is drawn at 2,500 to 5,000. It is, however, a curious fact well known to botanists that although the temperature is higher in the islands lying in latitudes several degrees south of Jamaica, yet there are many plants which only grow say at 3,000 feet and there only in Jamaica, which will be found at much lower elevations in the other islands, and possibly coffee which flourishes well at 3,000 feet in Jamaica may therefore flourish in the same manner at a considerably lower elevation in this colony. To what this circumstance is due, cannot readily be determined, but it is attributed to the fact that the humidity of the islands lying nearer the equator is greater at less elevations than in Jamaica.

### CLEARING LAND.

The work of clearing land is so well understood, and its cost so well known in Trinidad, that no especial instructions need be given on this point. For comparison, however, I may state that the average cost of clearing hillside land in

Jamaica ranges from £2.10 to £4 per acre, according to the nature of the timber on the land and the supply of labor in the particular district where the cultivation is being carried out.

### NURSERIES.

With the Jamaica planter as a rule, nurseries are "very few and far between." Not but that it would be better to have them but that indifference is generally exhibited as to the method by which their supply of seedling plants are obtained: "Suckers," *i. e.*, self-grown seedlings from under old standard trees are generally what the planter relies upon in Jamaica, but nursery plants must nevertheless be much superior to any supply obtained in this manner, from the greater surety with which they can be transplanted in ordinary seasons, from the more vigorous constitution they primarily possess and from their greater likelihood to develope into well formed trees.

To make a nursery, beds should be prepared under the shade of palm leaves having good soil a foot in depth. Undried parchment coffee should then be sown in drills two or three inches apart. In one or two months the plants will appear above the ground, when they should be carefully removed and transplanted again under shade in beds in rows eight to ten inches apart and six inches from plant to plant.

The question whether the tap root should be cut or not may be left entirely to the judgment or preference of the cultivator as it is not considered to be at all material in the process of cultivation. By some, injury to the tap root is strongly deprecated, while others consider it quite immaterial, both planters being able to produce coffee equal in quality. From the nurseries the plants should be taken to the open field when they have reached a height of 12 or 14 inches. Many, however, allow them to attain much larger dimensions and consider these better able to withstand the vicissitudes of the weather.

### PLANTING.

In making a coffee plantation the distance apart will depend in a great measure upon what kind of cultivation has been determind on—whether mixed or exclusive. If exclusive

cultivation is determined on then the coffee plants should be planted six feet by six feet apart, but on rich lands this distance must be increased to seven, eight or nine feet, allowing the necessary intervals between for the shade trees. It is also well not to plant the permanent shade at first until it is seen where the coffee takes well and where it does not. In some of the holes coffee will refuse to thrive, but a shade tree would probably do well in the same spot, although were another plant of coffee put in it would probably share the fate of its predecessor. The usual shade used for cocoa in its juvenile stages may also be used for coffee, such as plantains, bananas, cassava, corn, etc. The primary crops thus produced often going a long way to recoup the expense of clearing the grounds as evidenced by the contract system so much in vogue in Trinidad among the cocoa planters.

Holes should be made with the ordinary dibber in use on cocoa estates—with this the soil should be well loosened to the depth of a foot or more, all stones and roots removed and the plants placed firmly in the centre, care being exercised to see that it is not planted too deep or below the "collar," *i.e.*, the part where the union exists between roots and stem. Planting should always be done, if possible, in showery weather, but if a stream is near where water can be easily obtained, it will render the planter somewhat independent of the seasons, as coffee will always thrive where it can be watered once in a while so as to keep it from becoming burnt at first planting, which generally has the effect of producing a stunted and unhealthy growth.

### ROADS AND DRAINS.

Narrow paths or bridle roads are easily made and are essential to the economical gathering in of the crop on an estate of ordinary dimensions. They should be made of sufficient width to allow the mule and hampers passing freely without injury to the trees, for the purpose of weeding, manuring or collecting the crop.

The land on which coffee is planted should be well drained, and on the ordinary land which would probably be brought under cultivation, it would be necessary to have the trenches at least as frequent as the ordinary drainage of a cocoa or

sugar estate. Planters must, however, be their judges of how much is required and the methods by which it should be effected as it is impossible to lay down any hard and fast rule which will apply to all districts alike. Suffice it therefore to repeat that the land should be well drained, and to say that in no instance should the system employed be so inefficient as to allow the land to become water-logged at any period of the year.

### WEEDING.

This operation should be regularly performed. The best seasons for weeding in Trinidad, so far as I have been able to judge from my short experience, would be just before and after the dry season. Land should not be weeded during the dry season, as we should try and retain as much moisture as possible around the roots of our trees during that period. Billing down any tall weeds and laying them as mulching around the roots of the trees would certainly be an advantage, however, during seasons of drought. Of course the plantation should be kept as clean and as free from weeds as possible, having due regard to the effect of the particular season which may prevail at the time upon the trees and the state of the crop. Weeding should not be performed at all when the crop is approaching ripeness as it could hardly be done without injuring it.

### PRUNING.

The system of pruning to be adopted is one which demands the careful attention of the cultivator. No tree should be so high but that the topmost branch can readily be reached by a laborer of five feet six inches in height. The tree should therefore be "topped," *i. e.*, its centre leading branch should be taken out when about five feet in height. This will cause the laterals to spread so that instead of having a thin rambling tree some ten to twelve feet high with a head like a small palm and no undergrowth, we should try to produce a compact bush of the height before mentioned with a diameter of some six to eight feet. It cannot be expected, however, to grow trees on Trinidad plains and keep them to these dimensions under shade, but still the point should be aimed at. The lateral branches should not be allowed to become

too thick, all "gormandizers," or branches which appear to be taking more than their due share of the nourishment afforded by the roots should be regularly removed. It is better to do this before they become too large, as when allowed to fully develope, the wound caused by their removal is apt to have an injurious effect. In winter pruning, that is to say, after the crop is gathered, all small and useless branches, all dead or dying wood, and all branches which cause a confused and matted appearance should be carefully removed with a sharp knife. The tree should also be well balanced; by this is meant that branches on one side should not be allowed to grow longer than those on the other, giving the tree the one-sided appearance always to be avoided. After a little practice the cultivator will see which are the branches which will give him the largest number of flowers, and these he should in all his pruning operations strive to maintain in as regular proportion as possible all round the tree. Freshly planted coffee trees should always be staked where winds are experienced of such strength as to do them injury by loosening them in the ground. The operation of pruning during the growing season should be strictly confined to the removal of all the young and then succulent shoots which appear and sometimes almost surround the stem of the tree. These may be carefully removed from time to time as may appear necessary with hand alone, but a knife may be used, if it is preferred; for my own part, I should prefer to use the knife, on the ground that the wound caused would be much smaller and cause less damage to the tree, but I am aware that many old and experienced planters for whom I have great respect prefer the use of "finger and thumb" only.

### MANURING.

Where a supply of suitable manure can be obtained nothing pays better than a liberal application once or twice during the year. The seasons selected should be those when the plant is in full growth and just when the berries are commencing to form. It required, however, great discretion to manure land on a hillside as the chances are that should heavy "seasons" occur immediately, nearly all the labor will be in vain, as the rain will remove the greater part of the

nutriment. On the level, however, manure is more easily applied. In steep land the best method of application is to bury it slightly under the surface on the upper side of the tree, so that should any wash occur the manure would not be lost. On even ground, well rotted manure may be applied to the surface and forked or hoed in, the best time for the operation being when moderate showers occur at intervals. The best kind of manure for application is certainly well decomposed cattle pen manure. Whenever applied, manure should never be heaped and left around the stem of the plant. All cultivators should remember that it is far more profitable to cultivate a small area well so as to produce healthy trees, giving good crops than to plant a large area which can only receive indifferent attention, and on which the crops are not 50 per cent. of what they would be in a well cultivated field.

### HARVESTING AND CURING.

This is generally the pleasantest as well as the most important part of any cultivation, as we are then in a position to see nearly to the end what our previous efforts have produced. In Jamaica "picking coffee" is performed principally by women and children at rates ranging from one shilling to one shilling and sixpence per bushel or "tub." The coffee then called "cherry" is brought in to the works every evening and on some estates the pulpers are kept going all night when the crop is coming in fast. Jamaica estates are as a rule furnished with an elaborate set of works; but as they are somewhat cumbersome and antiquated, the plan upon which they are built not having been materially altered for the last century, I could not recommend the Trinidad cultivation to copy them, but would suggest the use of more modern machinery such as is now found in work on the Ceylon and Indian estates, a description of which I append later on. Two kinds of coffee are now being sent into the market, parchment coffee, and clean or prepared coffee. The former now seems to find some favor, as its preparation requires much less labor, time and skill in the country where it is grown; it costs two shillings and sixpence per cwt. only to make clean coffee from the parchment coffee in England, while in Jamaica the cost is probably more than four times

that amount. Cherry coffee simply requires to be run throuh a pulping machine to remove the cherry skin, then soaked in water for a few hours, and afterwards the mucilaginous covering removed by a short fermentation and by washing in clean water. The berries have then to be thoroughly dried on a "Barbacue" in the full sun until it is sufficiently cured. "Barbacues" or terraces having a smooth cement surface are essentially ncessary for the production of good coffee, as with this aid it is capable of being dried much more quickly than in any other manner. Their extent and size will of course depend upon the quantity of coffee to be cured. They are cheaply made, and should have small sheds attached to them in which the partially dried coffee can be secured during rainy weather. Clean or prepared coffee on the other hand demands much more attention. After arriving at the stage at which it is called parchment coffee it is kept for some little time in large heaps to allow it to "ripen," though this practice is not universal. It is then peeled in what is called a peeling mill. This removes the "parchment skin," and also the "silver skin" which immediately covers the bean. The perfect removal of this inner skin is considered a test of good curing. Should the beans during the process of harvesting have been allowed to ferment too much especially in the "cherry skin" there would be great difficulty in removing it, and this fact will greatly depreciate the coffee in price when it comes on the market. When the coffee is removed from the peeler it is placed in the winnowing machine to remove the husks from the berry and is then ready for the "sizer." In passing the "sizer" the coffee is sorted into first, second and third class qualities, and the "tryage" or refuse makes a fourth class which is never exported. After the sizing machine has done its work the superior classes of Blue Mountain coffee in Jamaica, are again sorted by hand to pick out broken "beans," stones, discolored berries, or any other matter that would spoil the sample. The work is done by women seated upon a stool in front of a bench placed near the windows of the coffee stores, where a good light can be obtained. When the coffee has been sorted in this manner it is ready for the market and is placed in barrels for exportation.

Mr. Sabonadiere, an experienced and much respected Ceylon planter, now resident in Jamaica, writes as follows as to yield:

"In Ceylon we used to calculate that the cherry of five imperial bushels should yield 112 lbs. of clean coffee. That would be 22 lbs. for each bushel. Sometimes coffee turned out L. 75 to L. 80 bushels to the cwt. much depended upon the quality and weight of the bean.

It is difficult to give the yield per tree or per acre. Six feet by six feet gives 1,200 trees to the acre. Allowing 200 trees for roads, vacancies, etc., leaves 1,000 trees per acre. Fine Ceylon properties used to give 10 cwt. to the acre, sometimes more, but I believe the average was about 5 cwt. or 560 lbs, to the acre or over ½ lb. clean coffee to each tree. I know an estate in Ceylon that gave in 1856, 1,200 cwt. shipped coffee and only 60 acres in extent." This was previous to the attack of leaf disease."

Great care, however, must be exercised that coffee is shipped in what is called a *clean ship*, as contact with any matter such as sugar, molasses, kerosene oil, cocoa, etc., will have a bad effect upon and probably spoil the sale of any consignment that may be sent. Shippers should therefore be particular to see it consigned to a part of the hold where it may meet with nothing likely to have a prejudicial effect.

### MACHINERY.

Messrs. John Gordon & Co. of London are the makers of first-class machinery for the preparation of coffee. In 1889, His Excellency the Governor sanctioned the importation of a small pulping machine which was erected in the Botanic Gardens to show the method of working and the mode of preparation that should be pursued to put first-class coffee upon the market.

This machine only makes what is called "parchment coffee." To make clean coffee further machinery is required. This includes, 1st, a "peeler," 2nd, a "separator," or "sizer," and 3rd, a "winnowing machine," or "fan," but the first only is a necessity. A small-sized peeler is at work in the Royal Botanic Gardens, and at Coblentz a much larger machine of the same class is to be seen.

If later on the progress of the industry warrants it. I would suggest that a set of this machinery be procured and placed in the centre of some district where a considerable quantity is grown, for the purpose of showing that not alone can good coffee be grown in Trinidad, but that it can obtain a remunerative price in the London or American market.

It is not to be expected that coffee equal in quality to the Blue Mountain coffee in Jamaica can ever be produced, but I am satisfied that a coffee of excellent quality and that would obtain good prices can be grown in Trinidad, judging from the samples I have had prepared from the trees growing in the Botanic Gardens.

These results are conclusive that what I have previously written on the value of Trinidad coffee is quite correct, viz.: That the coffee only requires better preparation to make it equal to, if not better than, that of other countries possessing the same elevation, and that it can be prepared to return remunerative prices.

It is probable that the central factory system would be the most economical, and that small growers would be much more encouraged were they able to obtain a fair price for coffee in the cherry.

Many of the Jamaica estates have almost unconsciously resolved themselves into central factories for some time past, and the peasantry are glad to take advantage of the opportunity thus offered to them. On some estates more than half the quantities exported are the production of the small land holder prepared by the machinery of the large estate.

The kinds of coffee cultivated in the Trinidad Botanic Gardens are as follows:

Coffee—*Coffea Arabica and Coffea Liberica.* Of the former there are several varieties, the first, and I consider the most important, being:

1. (*a*)—*Coffea Arabica-var.* "Creole" or the variety usually grown for export in the West Indian Islands.

   (*b*)—*C. Arabica-var* with narrow leaves is evidently a true Arabica with a large berry, but not so prolific as the ordinary "Creole."

(*c*)—*Coffea Arabica-var.* "Hybrid Mocha." This is apparently only a variety of the Creole with a smaller berry but easily distinguished by leaf characters. Mr. Prestoe considered it a Hybrid.

(*d*)—*Coffea Arabica-var.* "Mocha." Is the small-berried and true Mocha coffee.

(*e*)—*Coffea Arabica-var.* "Eden Mocha." Has a berry slightly larger than the last.

(*f*)—*Coffea Arabica-var.* "Bengal." I have not seen the berry of this.

(*g*)—*Coffea Arabica-var.* "Maragogipe." A Brazilian variety sent out by Messrs. Christy & Co.

2. *Coffee Liberica.*—This is the original Liberian coffee. Trees of it planted some years ago have reached a height of nearly 30 feet and bear a profusion of berries. To maintain this tree at a height that the crop can be easily gathered will evidently be a difficult matter. It is not a shrub like the *Coffea Arabica*, but a small tree, and evidently grows to too large a size to render the collection of the crop an easy matter. To cure it, other machines than those adapted to the curing of Arabian coffee, or a modification of them are necessary.

Plants of all the foregoing are available for distribution at low rates, but wanting further experience I do not for the present recommend any but the "Creole," which has in the past and in the present served so well for cultivation in the West Indies and Tropical America. It is to be pointed out, however, that the valuation of samples by the brokers shows a high return for the variety known as "Hybrid Mocha," and this variety therefore, if it maintains its quality, may take precedence of the well-known Creole coffee.

"Trinidad," says Mr. Pasteur, the expert who reported in the Colonial section of the Exhibition of 1886, "is well fitted for the growth of coffee, the shape and size of the beans showing that soil and climate are favorable, and that only labor, care and skill are required to give the coffee its proper value." He also strongly advised the shipment of coffee in parchment, to be peeled and sized in London, stating his belief that the parchment not only preserves the color and quality of the berry against damage but allows it to mature

more completely. The present prices for coffee in the London market are as follows :

| | | |
|---|---|---|
| Jamaica | 85 to 120 | Public Ledger, June 6th, 1891. |
| East Indies | 96 " 130 | |
| La Guayra | 99 " 101 | |
| Costa Rica | 88 " 105 | |
| Ceylon | 99 " 125 | |

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## *HILO PLANTATIONS.—THEIR REMARKABLE PROSPERITY IN RECENT YEARS.*

It seems a little strange, not to say discouraging, to see the once famous Hamakua district in a state of collapse and the cane dying for want of rain. But it is more strange to see the once despised Hilo district now blooming like a rose, indeed a very wilderness of saccharine abundance. Passing out of the par-baked district of Hamakua into that of Hilo, blossoming and fragrant, and made refreshing by the soft breeze and the mellow and beautiful wreath, is like passing out of the wilderness into the promised land, flowing with milk and honey. But it is doubtful if even the promised land ever yielded so rich a harvest as the planters of Hilo district are now reaping. It is stated on good authority that the yield per acre for the entire district last year was not less than five tons of sugar, and from present appearances the yield this year will exceed the previous one. One may learn something of the improvement when it is stated that the plantations in the Hilo district cleared on an average 25 per cent.,

Some idea of the crops may be learned from the following figures: Papaikou and Wainaku each turned out seven thousand tons, Waiakea and Pepeekeo five thousand, and the yield for the district was thirty-five thousand tons. This is a good showing for an old, worn-out soil. If anyone had predicted such a yield ten years ago he would have been considered a fit subject for a lunatic asylum.

Now, as many have condemned the planters in the past for their parsimoniousness in leaving nature alone to fight their battles, so they deserve praise for the great efforts in assisting her, and for the wonderful transformation which they have accomplished in this once barren, God-forsaken soil of

the Hilo district, which has been done solely by judicious use of the fertilizers. I should like to give a full description of this marvelous change effected, but neither time nor space will permit. I will therefore merely say that from Ookala to Hilo is now one vast cane field, and not such scrubby cane as I remember seeing years ago, but only such cane as can be produced with the finest climate, the best of soil, and the most judicious care in every department. And one is astonished beyond measure to see the old worn out lands of Pepekeo, Papaikou, Wainaku and Onomea, yielding such crops as could scarcely be formerly expected to grow on new lands. And doubtless many persons will be astonished to learn that the Ookala plantation which is at the tail end of the district, with the worst soil, and the least rain, and which for ages has been sunk in the slough of despond and covered with debt is now among the rest coming to the front, but it is a fact nevertheless. All are so glad to see the Laupahoehoe plantation starting up again. There is undoubtedly good soil upon this place, and the new order of things will reach here also. There is as bright a future, and as splendid a success awaiting this as has been achieved by any of its more fortunate neighbors. It is scarely necessray to say that these remarkable changes are due to a thorough and systematic course of fertilizing, to better methods, of cultivation, and to more careful management in every branch of the business.

The amount of money now spent for fertilizers would astonish some people, and it is generally considered that nothing pays so well. Some of these plantations, it is stated, pay out as much as thirty-five thousand dollars a year, and what may seem most strange is that those which spend the most for this article declare the largest dividends. It is also stated that most of the land that has been under cultivation for thirty years and which was considered worn out years ago is so far reclaimed by fertilizing, as to be the finest soil on the place, and actually improving from year to year.

But these Hilo planters now do not wait to see the soil worn out, before they begin to fertilize it. Mr. C. C. Kennedy and some others start to manure the soil as soon as they start to use it, which is evidently a good plan.

Besides these improvements one constantly finds evidence

of progress, and evidences of energy and enterprise, which speak more forcibly than any amount of words can do of the interest taken in this industry, and which must be a subject of gratification, not only to the planters themselves but to all those interested as owners. I must not forget to say a word for the weather, which is doubtless doing as much for this district as the planters themselves. The climate here now is said to be just perfect for sugar cane growing. Warm rains at night and scorching sunshine for the day is what is needed for the perfect growth of this plant, and it is just what they are getting here now.

I cannot close this letter without referring to the rare and beautiful sight one may behold passing over the Hilo road at this season of the year. For now nature is prodigal beyond description and beautiful beyond comparison. The cane fields are tasseling and blooming and making one vast flower garden thirty miles in length. The gulches are covered with the most varied and most gorgeous display of tropical vegetation, and the hillsides are clothed in rich verdue, and the mountains crowned with a mantle of snow.

### SUGAR MILLS OF THE HILO DISTRICTS.

The foregoing statement is a description of the plantations of the Hilo district; in the following I propose to speak of its sugar mills. These are in no respect behind in the march of progress and improvement. Indeed it is very apparent that a more careful supervision is noticeable in the mills. Nor is it at all strange when we consider that all of this work is constantly under the eyes of men who are as earnest and as determined to secure the best results that the mill can give as the managers themselves. It is not possible to get the best results without this mutual co-operation. But to secure the highest possible extraction, polarization, etc., it is important to have good and powerful machinery, good steam apparatus, etc., good methods, a good system, and as I said before, great vigilance kept over everything, at all times and everywhere.

As regards the machinery, it must be admitted that the Hilo mills take a foremost place among the best on the islands; and when a district can boast of such mills as Waia-

kea, Wainaku and Papaikou, they are not far behind the times. Indeed, I believe the success of these corporations is largely due to the exceptional good work done in the mills. It was the Waiakea and the Wainaku mills which first showed the planters of this district what could be done in the way of superior grinding and more careful methods of manufacture, and I am glad to find they have kept up their early promise, and are still standing at the front. Waiakea, however, has generally taken the lead in adopting the newest inventions and the best methods, so that one finds there about all the best improvements and appliances that are known, and sometimes even improvements that are not generally known; and they are constantly making improvements for the purpose of saving labor or saving steam, and in higher extraction, higher polarization and a larger quantity of sugar from the cane, and in all these aims Mr. Kennedy has been exceptionally successful. Wainaku, however, is now about to take the lead in a new and a very important and interesting direction. This new departure is undoubtedly a move in the right direction, and there is no doubt, whatever but that it will give the greatest satisfaction to them, and at the same time yield a rich return for the trouble and outlay. The new machine is called a Cane Shredder, and although new to many of us here it is not by any means a new invention. Indeed in the United States it has acquired a most enviable reputation, and it comes among us with the highest and best of recommedations; so that there is every assurance that it will prove another genuine success, and be a credit to the Hilo district. It is said that this machine not only puts the cane in a perfect condition, for grinding, but in its effect it is equal to adding another set of rollers to the three-roller mill, and thus securing an increase in the extraction of ten to twelve per cent. It is stated by the aid of this valuable machine some of the five-roller mills of America have secured an extraction of 97 per cent., an achievement before unknown in the history of this industry.

Besides this machine one notices quite a number of minor improvements. There is a small eighteen-inch water wheel that drives the six centrifugal machines, a hydraulic lift for shipping the sugar, a hydraulic pump for pumping the mo-

lasses, and a juice cleaner and lift, this last is a novel device and improvement, and is now being adopted in all of the best mills of the Hilo and Hamakua districts. They have also a most solid and the best constructed wharf that I know of on this island. This mill is substantial and compact, and I may say a very neat little mill, but it is large enough to grind seven thousand tons of sugar a year.

Papaikou, is one of the few places that can boast of two five-roller mills, two double effects, a ten-ton pan and a vast amount of other first-class machinery. The last of these five-roller mills is set nearly down at the sea level so that all of the land of this immense plantation can be brought into use, and the cane flumed to the mill without hauling.

They have in the past generally run both of these mills, but I understand they will run but one this year and work day and night. If this be so, there seems to be an excellent opportunity for doing some highly interesting work, and some record-breaking which will astonish our planters. As one of these mills stands above the other, the trash can be brought from the first to the second five-roller mill with but a little trouble, and scarcely any expense, which will undoubtedly give the highest extraction ever obtained by roller pressure, and at a very small cost.

GEO. OSBORNE.

Hamakua, Hawaii, December, 1893.

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## *IRRIGATION IN EGYPT.*

[BY THE HONORABLE ALFRED DEAKIN, M.P., VICTORIA.]

Egypt has been appropriately entitled "the gift of the Nile," and the gift appears the more generous because it is made to the desert. The attractiveness of its ancient records, linked as they are with the earliest dawn of both Hebraic and Hellenic history, and of its colossal monuments of a remoter and yet more shadowy era, is still subordinate to the charm of that mighty and mysterious river, by which alone history and monuments became possible; which has been the object of worship, wonder, and speculation for untold ages; and

whose beneficial influence remains as richly potential to-day as it was in primeval and pre-historic periods of cosmic change. The revelations of modern geology enabled us to solve it mystery, but do not make its marvels less. The rich soil of the Abyssinian plateau, washed into its turbid torrents by fierce tropical storms, is conveyed thence in thick solution to create a garden in the midst of an arid region of barren rock and shifting sand 2000 miles away. The whole cultivated area in Egypt is comprised within its valley and its Delta, which, as Aristotle knew, are the entire creation of the river, built up by its deposits, "film upon film, and layer upon layer," during many cycles of time.* Outside the valley stretches the veritable Sahara, with but here and there, amidst its endless desolation, the relief of a cluster of palms and perhaps a little pasture. Even those oases are fed by subterranean channels supplied from the same source, and their extent altogether insignificant. The Egypt of the past was five times as large as the Egypt of the present, maintaining mightier cities and prouder peoples, but both have been virtually defined by the limits of the river's overflow, which has greatly contracted since a natural dam, whose site is now marked by the First Cataract, was swept away. The territory outlined upon our maps is but nominally controlled. Political Egypt is two-thirds as large as Russia, the largest territory in Europe, but peopled and productive Egypt is only the size of its smallest territory, Belgium, and, so defined, is the narrowest country in the world. It consists of the valley of the Nile, 550 miles long, and varying in width from 14 to 32 miles, but with an arable breadth nowhere exceeding nine miles, until it reaches the Delta at Cairo, from whence it expands in fan-shape to a width of 160 miles at the Mediterranean. The depth of the soil of the Delta, which has all been deposited by the river, commencing sometimes below the level of the sea, averages 33 to 38ft., with a maximum of 50ft. near Kalyub. The present rate of deposit has been recently

* "Aristotle plainly affirmeth, the region of Egypt (which we esteem the ancientest nation of the world) was a mere gained ground, and that by the settling of mud and limous matter brought down by the river Nilus, that which was at first a continued sea, was raised at last into a firm and habitable country.' —*Psevdoloxia Epidemica.* SIR THOMAS BROWNE.

estimated to average 4in. to 5in. in the century, and Sir J. Wilkinson considers that the area is increasing in width also.

The agencies which established and sustained Egypt in the past are as indispensible for the maintenance of its fertility to-day. There is no rain, and hence, without the inundation, there would be famine, while with it there is plenty in all the region round. The Nile is both Brahma and Vishnu, both Creator and Preserver, to the people upon its banks, whose ancestors in deifying it only expressed, in the most vivid manner, their sense of the absoluteness of their dependence, and the profoundness of their obligations. It is no longer regarded as a Divine Being, but its increase is as eagerly anticipated, as gratefully welcomed, and, perhaps, awakens the religious emotions of awe, reverence, and dependence, as much as when it was ushered in with priestly procession, solemn rite, and costly sacrifice. Each season's harvests are still the gift of the same stream, and year by year the prosperity of the nation is governed by the height of its rising. The most frequent disasters occur from its rising too high. There is then an upward filtration of "calcareous and magnesian salts and alkaline chlorides" which require to be washed away by a succeeding inundation before the land again becomes fit for cultivation. Hence the supreme importance of the overflow each year, and the anxiety with which it is watched and measured. The people of the Nile have been slow to learn its lesson; but at last efforts are being made by the stranger to utilize its bounty to a fuller extent. The inundation is being gradually controlled by a network of canals, so as to become irrigative all the year round, yielding three harvests instead of one. The wealth of Egypt is wholly agricultural, and its agriculture is only possible to the extent of the watering. Fortunately, though subject to variations, this is far more certain than a rainfall. There was corn in Egypt in the days of Jacob when it had failed in Canaan, and the many vicissitudes of many centuries have found and left this strip of fertile soil a coveted source of perennial productiveness. From a time prior to the first inroad of the Shepherd Kings, who laid the foundation of the Hyksos dynasty 200 years before Christ, down to the present day, when British bugles are sounding in the citadel of Cairo, and

scarlet uniforms dot the narrow byways of the bazaars which lead to the shattered forts of Alexandria, the history of Egypt has been a history of invasions. What attracted the invader even more than its stragetic position was the agricultural wealth of the country, which its peaceful people have gained by means of that inundation which has been the source at once of its existence, its prosperity, and its tribulations.

There are too many differences between the political and economic conditions of Egypt and Australia, in addition to the differences in their climates and physical conditions, for the close comparison to be drawn between them in connection with the water question. There are, however, some general facts worthy of notice, and a few special lessons which may be derived from their experience. Egypt, as a whole, is the most remarkable evidence of the potencies of irrigation; but the general impression that nature still accomplishes all that is necessary to its productiveness beyond mere sowing and reaping, is quite erroneous. It is only in return for a life of ceaseless toil on the part of the cultivator that the rich soil yields its rich harvests and fat revenues. The value of irrigation is taught, it is true, but so is the greatness of its demand for labor and for a scientific study of the conditions under which it should be practised. The task of the Fellahin, the Egyptian peasantry, of to-day has been as severe as that of the Children of Israel when under the yoke of Pharaoh of the Exodus. But a few years ago taxation amounted to £3 10s. per acre, while borrowed money to meet it or tide over a failure of the inundation cost from 40 to 60 per cent. Though the crushing exactions of the last reign have ceased, the condition of the greater number of them is pitiable to-day. The burden of taxation is heavy, and the burden of misdirected labor is almost as heavy again. But the burden of their private debts to the usurers is heaviest of all. These have been estimated at £10,000,000, and appear more likely to augment than to decrease. The main outlines of the Egyptian position may be given in a few sentences. In Egypt all the canals have been constructed, and are owned and controlled by the State. The water is distributed by its officers to communes or local associations, which apportion it more minutely, and play a very important part in its practi-

cal administration. For undertaking to keep the canals running the State formerly levied taxes, not according to the supply given, but according to what the taxpayers could afford to pay, and according to what might happen to be the needs of the Government. Owning the water it has practically owned the land, and as sole landlords the Viceroys of the past have proved heavy taskmasters.

Although there are some springs of considerable flow, and a few lakes still used for storage, the visible stream of the Nile is practically the sole source of the water supply. According to the estimate of M. Linant—which is probably too high—the discharge at the mouth averages 3½ millions of cubic feet per minute at Low Nile, and 17½ millions of cubic feet at High Nile; the smaller of these quantities being almost identical with the discharge of the Murray at Echuca in the flood of 1870, as estimated by the Chief Engineer of Water Supply. The current at Low Nile averages two miles, and at High Mile three miles an hour. A further approximate estimate is that one-third of the river overflows at High Nile. This is utilized in two ways. In Upper Egypt, except under the Ibrahimieh Canal, the primitive system is still pursued. The country is divided by embankments into a succession of great basins, 8,000 to 40,000 acres in extent. "As the Nile rises in August, these basins fill to a depth of several feet. The water lies in them till October, depositing its fertilizing mud. It is then drawn off, the land is ploughed and sown, and a crop of wheat or beans obtained the following March or April. This system allows of only one crop a year, and valuable sub-tropical plants like sugar cane and cotton cannot be grown;"‡ but in Lower Egypt, and in the lands under the Ibrahimieh Canal in Upper Egypt, although the old system remains, it has been supplemented by the modern system of weirs, reservoirs, and permanently-flowing canals in addition to the simple flood offtakes formerly employed. The new canals "flow throughout the year, to permit of the cultivation of rice, sugar cane, and cotton. The lands of Lower Egypt are, therefore, perpetually under cultivation, and there is no time to flood the fallow fields in the manner

‡ "Notes on the Irrigation Works of Egypt," Colonel (now Sir Colin) Scott Moncrieff, C.S.I., etc., etc., 1884.

practised in Upper Egypt." In the Delta there are three seasons of four months each: summer, from April to July, when the estimated discharge of the river ranges from 720,000 to 1,500,000 cubic feet per minute; the flood season, from August to November, with a discharge of from 11,220,000 to 23.160,000 cubic feet per minute; and winter, with a discharge of 1,500,000 to 3,300,000 cubic feet per minute. Each of these seasons has its crops and appropriate methods of cultivation. Bountiful as the Nile is, it is somewhat capricious in its gifts, and does not bestow them with that scientific precision required to permit of permanent irrigation in all seasons of all years. In Lower Egypt, it is for three months too high and for nine months too low. A project has been broached by which the Wadi Raian, suspected of being the site of the Lake Moeris, which according to Herodotus, Strabo, Diodorus, added so immensely to the prosperity of ancient Egypt, should be converted into a reservoir half as large again as the Lake of Geneva, covering nearly 400 square miles, and containing more than 1,000,000,000,000 cubic feet. Until this stupendous work be undertaken, Egypt must continue to depend upon an unregulated Nile, and cannot hope to materially enlarge its irrigated area.§

There are altogether about 6,000,000 acres under cultivation, that is under irrigation, for in Egypt the words are synonymous. "It is just as necessary to water the land as to water the cattle. Where there is no irrigation there is desert."‖ The Delta contains 5,000,000 acres commanded, of which about 2,625,000 are actually irrigated, and 840,000 acres more are fit for irrigation, while the balance consists of morass and desert which could only be watered advantageously after considerable expenditure. As during the inundation the water is above the level of the cultivated land, irrigation is rendered easy. The perennial canals, which are employed at the Low Nile as well, are of varying size and depth, the larger carrying 3ft. deep of water in summer and 20ft. in flood season. They leave the river at from 3 to 5 feet below mean low-water level, and, in the upper valley, at about 28ft. below ground level, gradually decreasing in depth until they run

§ Cope Whitehouse, "Contemporary Review," September, 1887.
‖ Sir Colin Moncrieff. Private letter.

out on the surface. In 1873, there were 1,917 miles of navigable, and 6,583 miles of unnavigable canals. Some of the former are of considerable size, the Ibrahimieh, for instance, being 93 miles in length, with a width at ground level of 230ft. for the first 38 miles, and 161 miles afterwards, giving a net discharge of about 16,380 cubic feet per minute in summer, and of 70,140 cubic feet per minute for 100 days in time of flood. The Nahran Canal is 167 miles, and the Yusufi overflow channel 166 miles in length. Most of the works are built under Mehemet Ali by the forced labor of the Fellahin, and consequently their true cost cannot be determined. The annual State outlay upon their maintenance amounts to about 2s. an acre commanded. There is, in addition to this, the *corvee* or compulsory labor, required from the villagers, which was equivalent in 1884 to an army of 165,000 men working for 100 days, and in 1885 to an army of 117,700 men working for an equal period. Under English rule, this unjust practice is being gradually abolished.

The water is divided from perennial canals by permanent or temporary dams through simple cuts in the bank. The former are composed of masonry piers 8ft. thick, with openings 15ft. wide, closed by timber beams set vertically, supported by the masonry in the bed of the canal, and above by a cross beam placed from pier to pier. They are often surmounted by arches, thus forming a bridge on the same structure. When the watering is over the beams are lifted, and the stream passes on to the next dam. The temporary work is of earth, occasionally a little strengthened with piles. There is a little furrow irrigation in orchards and gardens, such as those of the Khedive, at Gezireh, where, by simply fitting a flower-pot laid upon its side with its mouth upstream into little channels, the flow was delayed so as to permit of sufficient soakage into the small aperture at the bottom until stopped by another flower-pot. But, as a rule, all watering is managed by submersion, the fields being readily divided into plots, by ridges made of Nile mud. The duty of water is estimated in the roughest way. Rice requires a constant stream and much manure; cotton and sugar are watered every two or three weeks; the first needing a small, but the second a liberal allowance in each watering. The quantity

of water said to be employed for such crops from perennial canals in the Delta is uncertain, but appears to supply from 1½ acres to 2½ acres per cubic foot per minute. With beans, lentils, and maize a considerably higher duty is obtained. Under the inundation system the one watering given appears to show a minimum of six cubic feet per minute to the acre; but this varies greatly in different districts. Cereals are grown chiefly in Upper Egypt, under the primitive system, being sown in the ground after its inundation, without ploughing, and not needed to be irrigated. A considerable area is under pasture, each group of cultivators having its small patch, upon which their sheep, or usually tethered camels, asses, and buffaloes, are fed; but much green stuff is cut, always by hand, either for transport to the cities or for feeding cattle. The canals are greatly used for carrying produce to market or to the railway. But even the great advantages they offer for this purpose have been hitherto but imperfectly enjoyed, owing to the numerous illegal obstructions placed upon them and unjust exactions in the shape of toils.—*Queensland Sugar Journal.*

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## *INSECT PESTS ON COFFEE TREES.*

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NORTH KONA, HAWAII.

THE EDITOR PLANTERS' MONTHLY:

SIR:—As requested I beg to submit to you the following notes on some insect pests affecting coffee in this district, and their enemies.

THE MEALY SCALE—*(Dactylopius destructor)*, has world-wide distribution. Locally known as the "White Aphis" it constitutes the destructive "White Blight" of the coffee and other trees. During the past three or four months this pest has gradually been disappearing, and at the present time very little of it is to be found. This disappearance is most probably due to the unusual climatic conditions of the past season, and is therefore only a respite. The dead scale is to be found showing the development of a fungus, but whether this is parasitic or post-mortem is yet to be determined.

ENEMIES.—The wonderful success of *Vedalia Cardinalis* against the cotton cushion scale raised a hope that it would also serve for allied pests, and particularly the mealy bug. Vedalia, however, cannot feed on this scale, although it will attempt to do so, because the cottony fluff clings to its legs and jaws and disables it. (Insect Life Vol. V., p. 142). In reply to a request from the Consul-General for Mexico in New York city last year, for specimens of Vedalia to be used against *Dactylopius destructor*, which was damaging the coffee crop in that country, Pof. Riley assured him that Vedalia was of practical benefit against *Icerya* only, and advised the use of kerosene emulsion spray as the most effective remedy for this important pest. (Insect Life Vol. V., p. 60.) In fact no predaceous insect is known, the introduction of which is likely to prove of any service. *Noxius koebele*, a lady bird nearly allied to Vedalia, has been proposed and an attempt was made by Mr. C. D. Miller some time ago to import it, but unfortunately no specimens were received alive. Our grey spotted lady bird *(Coccinella abdominalis)*, probably introduced from the west coast of America, where it was described by Say 60 years ago (Howard) seems incapable of reproducing itself in sufficient numbers, here or elsewhere. Though, both in its larval and mature stages, this Coccinellid feeds freely on Dactyopius, it is just as partial to Aphids, and perhaps does more actual good in that direction. Not long ago, I discovered a smaller but very much more active lady bird in Kona which also feeds on the mealy scale, but it is comparatively rare. From specimens sent to Washington it has been identified as a *Scymnus* (sp. ?).

Some time ago Mr. Craw of San Francisco discovered a small Chalcid fly of a new genus parasitic in *Dactylopius*, and it was named *Rileyia splendens*. I believe that Mr. Craw claims that this parasite wiped out the mealy scale in the Los Angeles district. Dr. Coquillet, of Los Angeles, while acknowledging the existence of the parasite, informs me that the pest is rare in his district, as he thinks, on account of dryness of the climate. Our experience in Hawaii seems to be that the drier the weather the better the pest thrives.

Prof. L. O. Howard writes: "Since the original sending we have received no more specimens, and I imagine the

species must be comparatively rare. From its bizarre form I take it that this species is not a native American form, and that it has been introduced into California from the west, possibly from Hawaii."

THE GREEN SCALE—*(Pulvinaria camellicolla)*, first made its appearance in this district about June of last year. It is a native of Japan. (Insect Life Vol. V., p. 282). It appeared first on the pride of India trees, and this tree seems most easily to succumb to its attacks. The pest, however, is now to be found on vegetation of the most varied types. On coffee the egg masses are to be found on the leaf. After hatching, the young insects nigrate to the tender ends of the branches where they attach themselves, crowding together and frequently overlapping, semi-transparent and of a bright emerald green. Having, in this fixed stage, developed itself to maturity on the juices of the plant, it again acquires the power of locomotion, crawls back to a leaf, there to attach itself once more and excrete a snowy mass of compact cottony fluff containing innumerable eggs. So far the coffee tree does not seem to be much injured by this scale; I expect, however, that in the dry season the injury will be more apparent. A few months ago, I found in it a parasitic fly to which I will refer later.

All scale insects, more or less, exude a sweetish, sticky "honey dew," which, covering the surfaces of stems and leaves, affords pabulum for a smut fungus. That accompanying the development of the white blight here is *Cepnodium lanosum* (Cooke) and constitutes the so-called "Black blight." The newer *Pulvinaria* is if anything more successful in producing it. Its growth is entirely superficial, but it no doubt, to some extent, injuries the trees by practically shutting out the light from the chlorophyl cells of the leaf. A species of *Pso-cus*, a curious little insect which lives in families beneath a tent of gauze it weaves for itself on the under surface of the leaf, feeds on this fungus.

THE HARD SCALE is an undetermined species of *Lacanium*. A couple of years ago, it was quite plentiful on both coffee and fruit trees. Upon seeking for the cause of its suppression, I found it to be the host of two different kinds of parasites, specimens of which, with that found in *Pulvinaria* I forward-

ed to the Entomological Department at Washington. Prof. Howard, who was so kind as to examine them, says in reply: "The parasites are (a) *Dilophogaster californica*. Howard, which occurs abundantly in California, and is there a parasite of the Black Scale or Olive Scale (Lacanium oleae). (b) The other parasite is a new species of *Coccophagus* which may be called by the manuscript name of C. hawaiiensis. (c) The parasite which you bred from *Pulvinaria camellicola* is, as you suppose, identical with the larger reared from the *Lacanium*. The rearing of this Dilophogaster from the two scales is extremely interesting, since in California it has been found to prey only upon the Black Scale. For the past few years I have been inclined to believe that this parasite came originally from the Hawaiian Islands, and your rearing helps to confirm this opinion."

The presence of the parasite in the *Pulvinaria* seems unfortunately to be accidental rather than by selection. It is only to be found in about two or three per cent. of the specimens examined, and always much smaller than that bred in the *Lacanium*, almost every specimen of which is found to be infected. By this little fly, what would otherwise be a very serious pest is effectually controlled.

Yours, etc., W. G. W.

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## *CITRIC ACID IN THE CANE JUICE.*

EDITOR PLANTERS' MONTHLY:—Owing to the long continued drought in Hamakua and Kohala, the planters in these districts have been forced to grind about two months earlier than usual in order to save their cane.

In working the juice from this green and sometimes half dead cane, there has been more or less trouble in keeping the tubes of the double or triple effect clean, also in working of second sugars. A few notes on the cause of trouble in both cases may be of interest.

In evaporating the juice of mature cane in a triple effect the deposits which form in the different cells are in each case

distinct and characteristic. That in the first is soft and muddy, and easily removed; that in the second is somewhat harder, while that in the third is generally quite hard and flinty and adheres quite firmly to the tubes.

Below are analyses published by H. Pellet of deposits formed in a triple effect in working cane juice:

| | CELL I. | CELL II. | CELL III. |
|---|---|---|---|
| Moisture and Organic | 29.80 | 26.70 | 18.60. |
| Silica | 0.40 | 23.40 | 69.80. |
| Iron and Alumina | 3.80 | 9.98 | 2.80. |
| Lime | 46.30 | 25.80 | 0.80. |
| Magnesia | 1.36 | 0.81 | 1.08. |
| Phosphoric Acid | 17.10 | 11.70 | Traces. |
| Undetermined | 1.24 | 1.61 | 0.92. |

These represent very nearly the composition of tripple effect deposits which have come under my observation here in former years.

The deposit or scale with which I have had to do during the last two months has been altogether different in character. It has been lighter in color, not so hard in the third cell, still harder to remove, and has been more nearly alike in the second and third cells.

An average sample from the third cell shows on the analysis the following composition:

| | |
|---|---|
| Moisture | 18.54. |
| Silica | 2.94. |
| Iron, Alumina and Phosphoric Acid | 5.10. |
| Lime | 15.96. |
| Magnesia | 4.24. |
| Carbon Deoxide | .99. |
| Organic | 51.96. |
| Undetermined | .27. |

An examination of the organic matter showed that the chief constituent was citric acid, and this combined with lime as calcium citrate formed the body of the scale. I have by decomposing the scale with sulphuric acid forming sulphate of lime and setting free the citric acid, filtering and evaporating, obtained quite large crystals of citric acid. There are several other organic acids present the nature of which I have not yet determined, but the citric acid predomnates and

is the one that gives most trouble owing to the property of calcium citrate of being more soluble in cold than in hot water, and consequently of being precipitated from a boiling solution, unless most of the calcium citrate is precipitated in the triple effect, it will be in the vacuum pan, and going into the first molasses make trouble with the second sugar. Here it shows itself as a fine grain or cloud much like "false grain" in appearance, and having the same effect in centrifugaling, preventing the purging of molasses. A strike of No. 2 which cannot be dried owing to the presence of calcium citrate will generally dry when cold: enough of the calcium citrate having entered into solution to allow the molasses to go free. I have seen this citrate of lime present in No. 2 sugar to the extent of three or four per cent., and of course lowering the polarization that much. Its presence can be determined by dissolving a quantity of the sugar in water and allowing the solution to stand a few hours when the citrate of lime will settle to the bottom as a fine white powder.

I have found that in working juice containing citric acid the best results are obtained by liming to slight alkalimity so that the clarified juice gives a faint rose color with *phenolphthaleine* solution. The citrate of lime is then nearly all precipitated in the multiple effect, and the second and third sugars dry much more freely and are of higher polarization.

As to removing the scale from the tubes, a pretty strong solution of caustic soda or potash softens it so that it can be removed with a certain amount of manual labor.

As the scale is soluble in 10 per cent. muriatic acid to the extent of 95 per cent., the theoretically perfect method of removing it would be treatment with 10 per cent. acid followed by caustic soda or potash which would dissolve silica, etc., not soluble in the acid.

Mr. Oma Carr of United States Department of Agriculture has recently examined a scale or deposit from the sorghum sugar house at Medicine Lodge.

An analysis of an ordinary sample showed.

* Moisture ..... 14.21.

* Journal Am. Chem. Sec. Vol. XV., No. 3.

| | |
|---|---|
| Magnesia | 17.70. |
| Lime | 9.80. |
| Iron Alumina<br>Phosphoric Acid | 4.10. |
| Carbon Deoxide | 2.76. |
| Silica | 1.75. |
| Organic | 49.31. |
| Undetermined | .37. |

Except in the propositions of lime and magnesia, this is not unlike the scale I have been considering, and the similarity extends to the organic matter. Mr. Carr having found that in this case citric acid was the predominant organic acid.

I do not consider citric acid a normal constituent of cane juice as ordinarily found in Hawaii, and whether in this case its presence is due to the extremely dry weather or to the fact that the cane is green I cannot tell. An examination of green cane juice during a wet season would throw some light on the question.

EDMUND C. SHOREY.

Kohala, December 11th, 1893.

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## *BEET SEED EXHIBITS AT THE WORLD'S FAIR.*

[THE SUGAR BEET.]

Several exhibitions of beet seed were in the French Agricultural Section; as usual the most important was that of M. Jules Legras, whose farm is at Besny (Aisne), France. In our articles relating to the Paris Exhibition of 1889, we described with some detail M. Legras' method of beet-seed production as shown at that World's Fair; and we propose now to enter into some details respecting the 750 acre farm at Besny, where the soil is argilo-calcarious, and where, not many years since, weeds grew in abudance: now, due to scientific farming, they have become almost a rarity.

In this case like all others, the composition of the soil varied very much from acre to acre, but by patient analysis special fertilizers were compounded for each kind of soil, and at present almost complete uniformity prevails. In special cases where phosphoric acid, for example, has been deficient,

4,000 to 6,000 lbs. phosphate have been used. M. Legras, says, that for argilo-calcarious soils the ferrilizer used consists mainly of nitrogen and potassa. In this as in all other cases of the same kind, the chemicals of which a fertilizer is to be composed are purchased separately, and the mixing is done on the farm. Besides what has been mentioned 1,900,000 to 2,500,000 lbs. of defecation scums from an adjoining sugar factory are also used.

The organic substances employed depend upon the market rates. We are pleased to inform our readers that fattening of cattle is an important annex to M. Legras' seed farm and beet-sugar factory. Last year, those animals consumed 2,500,000 lbs. beet pulp. It is well to estimate 220 lbs. of pulp per diem for working oxen and this gives an allowance for loss in silos.

Our readers will not forget that the success of the entire beet-sugar industry depends upon the production of superior beets. As previously frequently pointed out, the best beets are those giving at the same time yield and quality, which condition can be reached only through an annual and constant selection of Mothers. M. Legras says, that upon general principles, it is a mistake to select Mothers to produce seed that are subsequently used for the sole purpose of obtaining beets that are in their turn to be used as seed for the supply of the general market; in other words, the two year system for seed production is a mistake, as the Grandmothers transmit to their Grandchildren only part of their qualities.

It is also a mistake, he avers, to have upon same farm several varieties of seed, as the ultimate outcome will be inferior hybirds. Whatever be the care taken to prevent it the deterioration is sure to occur; while the inferior varieties of seed are ameliorated, the superior beets are thus ruined. Evidently the production of seed after individual selection according to the Legras method is not generally adopted, because the cost of production is so great and profits so small that the seed producer soon becomes discouraged. At first the results obtained were very discouraging, but now they promise most favorably. It has been noticed that the Mothers left in the ground after seed, whose stems have been separated, have about same composition as they have before the seeds were formed.

One fact is certain, that to obtain the best results in beet-seed production, as in every thing else, certain requirements are necessary; these are too numerous to discuss in full at present writing. In Legras' method of cultivation for Mothers he obtains about 4,000 roots per acre (as a maximum) the average being nearer 3,500. From careful analysis it may be admitted, that from one acre of soil planted with beets for Mothers, there are extracted certain plant foods which must be returned.

Upon general principles it may be allowed that per acre there should be used 130 to 180 lbs. sodic nitrate, 130 to 180 potassic chloride, 280 lbs. potassic sulphate, 75 lbs. organic substances (blood, oil, cake, etc.), and 530 to 560 lbs. phosphates. With a view of not retarding the maturity of the Mothers it is not desirable to use in the fertilizer more than about 90 lbs. nitrogen per acre, while apparently very much more is needed. By these and other precautions it is possible to obtain seed attaining their complete maturity during their normal period of vegetation.

The Legras is white and has a French origin, long tapering root with depression on each side. The system of cultivation consists in having rows in one direction about 3 feet apart, in the other 1½ feet, arranged so that the position of beets in the rows is alternate. The Mothers weigh at least one half-pound, and never more than two pounds; these roots should have been obtained under a normal method of cultivation, and attained their complete maturity before being replanted. Endless difficulties and poor results would be obtained if the beets were too small. Constant working of the soil during the second vegetation is essential.

M. Legras recommends that the central seed-stalk be eliminated, so as to allow a thorough development of lateral stems. To obtain this, the central part of the neck of the Mother is cut off before replanting. The selection of Mothers consists of two important operations, first that based upon exterior appearance, as regards shape, weight, etc. Second, according to chemical methods. After the beets have been analyzed they are siloed. The soil should be thoroughly prepared the Autumn before planting; after the beet seed crop there should follow sugar beets cultivated for sugar pro-

duction. In France the planting is done in March; and after eight to ten days there follows the first weeding by hand between roots, which are spaced 18 inches apart. After several days a second hoeing is necessary; this continues until the stalk development of the beets renders the passage of the cultivator impossible.

At the Columbia World's Fair M. Legras exhibited a large drawing showing the lateral roots thrown out by the Mothers during seed development; this hairy growth frequently attains a length of 3 feet on each side. The stems or stalks of each Mother, when flowering is completed, represent a much larger quantity than one would at first suppose. A special kind of knife is used to cut the stems, and the bundles of them are made by women who follow in regular order. These bundles are placed in upright position, where they remain until dry; they are subsequently kept in sheds, etc., for protection against rain.

By the Legras method of seed-production great economy is needed in the ultilization of each root; the yield of seed is about 2,500 lbs. per acre. The seed obtained in lateral stalks by this special system of cultivation is heavier and finer than possible to obtain by the average method adopted by most beet seed producers. No better idea could be given of the enormous detail of the Besny beet seed farm than the fact that 175,000 beets are analyzed per annum. During 1892 analysis by the Pellet method showed that 4,400 beets out of every 10,000 averaged 16 per cent. sugar.

For many years the Violette system of analysis was in vogue; the objection to it was, that the sugar percentage of the samples analyzed was much higher than the reality, due to the fact that beets frequently contain certain substances other than sugar, and having a reducing influence on the copper solution. Furthermore, when the analysis was made late in the season, part of the sugar in the siloed beets had changed to glucose; this also had an important influence upon the result. By the Pellet method, the entire operation of selection is reduced to a few weeks instead of months, as formerly. We take pleasure in calling attention to the fact, that M. Legras being at the same time farmer and sugar manufacturer, has advantages that few seed producers have.

Whatever be the care given, climatic influence is an important factor in the results obtained.

We are informed that beet seed on same Mother does not necessarily mature at same time. The nature of seed on the stem is also an important characteristic not to be overlooked; some seed detach themselves, others adhere with such tenacity that special appliance is used to separate them from the stalk: the latter kind represents 70 per cent. of the total. From practical experiments made on the Besny farm, it has been found that the best beets come from seed that adhere to the stalk.

In conclusion we would say, that M. Legras' beet seed laboratory is the most important in France, if not in the world; and there every effort is made to produce the best leading variety of beet seed known. If this has not already been done, with the facilities at the disposal of the chemists of Besny laboratories, a result certainly awaits these efforts that the sugar world does not at present thoroughly appreciate: *i. e.*, that M. Legras centers his efforts on the production of one rather than many varieties of beets. This is an important indication that the desired end may yet be reached.

In previous issues we have had constant occasion to call attention to the superiority of the Deprez beet seed. The farm is situated at Cappelle (Nord), France, and many varieties of seed are cultivated. The soil on this farm is generally flat; the crop the year previous to planting beets is in most cases wheat. About 8,000 lbs. lime are used, and subsoil ploughing is practiced. In March about 1,000 lbs. oil cake containing 5½ per cent. nitrogen, and 320 lbs. sodic nitrate containing 16 per cent. nitrogen, are ploughed under to a depth of five inches. By proper preparation of the soil the Mothers planted flourish under excellent conditions.

The Deprez exhibit consisted of plaster casts of beets of several kinds, among which may be mentioned the early and late maturing beets. Numerous experiments have been made on the Cappelle farm, to determine the exact advantage there is in cultivating the two kinds of beets. We could not at present writing pretend to give even a synopsis of these; one of the conclusions was, that while great progress has been made as to the advantages of many of the existing varieties

of beet seed, much remains yet to be determined, as to the influence certain soils have upon seed of a given quality.

M. Deprez says, that he does not hesitate to make the assertion, that no one variety of seed can possibly be produced that would be suited to all soils and to all climates, to all methods of cultivation, to all fertilizers, etc. For example: it is found desirable in deep, rich soils to cultivate a late-maturing beet having an elongated shape; on the other hand, short, early-maturing beets thrive in cold soils without any special depth, and not possessing any special fertility. Beets to be harvested in September should be of the early-maturing varieties, those for October of the late-maturing types. While the beet seed produced by Deprez have apparently these characteristics, the question is by no means settled. One fact is certain, the beet seed cultivator is at a disadvantage in more ways than one. The farmer neglects his soil, does not perhaps use the most desirable fertilizer, and then blames the seed, while a special seed requires special temperature, even special elevation, as well as soil, etc.

As there are so many conditions to be considered, Deprez gives with each variety of seed, special instructions with diagrams and data, showing probable shape and yield. For example: the plaster casts showing types of the long, white late-maturing beets, are cylindrical in shape, have average size of neck, numerous leaves, skin very hard; and they are capable of enduring excessive drought, etc. Those suitable to very fertile and deep soils require 180 days for maturity and complete development. Of these beets 44,000 should be obtained to the acre; their length is about ten inches, yield to the acre about 25 tons. It is claimed that they average 15 per cent. sugar.

The other important type of sugar beet exhibited matures in 150 days, is only seven inches in length, is easily harvested and should be planted in soils of an average fertility. From want of space we cannnot describe the variety of beets recommended for distillation, etc. Of the other exhibitors of beet seed may be mentioned Vilmorin, Lemaire, and Laurent Mouchon. The excellence of the Vilmorin and Lemaire beets have been frequently discussed in these pages.

## *THE CHINO BEET CROP FOR 1893.*

The last of the sugar beet crop of 1893 has disappeared. The crop was harvested so completely and satisfactorily, that a contented sigh of relief was noticed along the line as the last loads were dumped and the wagons weighed out for the last time this season. We are safe in saying that so successful a close was even beyond the expectations of the most sanguine. Practically every acre of beets was harvested and worked up. A few small patches of overgrown beets were purposely kept for stock feed, but not a single farmer has failed to get his beets in the factory. In fact, for the past week the harvest has been almost entirely on Mr. Gird's beets, he having given the other farmers the preference before the season was so far advanced that bad weather might be expected.

The total harvest of beets from the Chino fields was 44,008 tons and 980 pounds, gross. From Anaheim and vicinity 7302 tons and 251 pounds were received, so there were actually weighed into the factory 51,310 tons and 1131 pounds of beets. For the farmers, this has been a remarkably successful season. The percentages of sugar have not averaged as high as in previous years, but the tonnage has been large and the yield of sugar per acre, which is the true criterion, has been good. The individual farmers are well pleased with their returns.

At the sugar factory the last beets were ground on the 3rd November, and the factory is again quiet. The great pulsating heart of the Southern California sugar industry will be still until the campaign of 1894 starts it up again with a greater capacity and a longer run than ever.

The total output for the season as estimated by Mr. Hamilton will be about 15,100,000 pounds, or 7550 tons. This would make 755 standard carloads, which, standing in line, would make a train about five miles long. Since the beginning of the campaign a trainload of sugar has left Chino every morning regularly, going to fill the demand for sweets on the Pacific coast. What a wonderful transformation! Three years ago Chino had a population of less than a hundred. It was a mere hamlet with a few struggling farmers about it. To-day, among the industrial enterprises of California, none have

greater prominence, more interested watchers than that at Chino. And it is safe to say that no community in the State is more prosperous to-day than is this, under the influence of the beet sugar industry. The government policy of encouraging the sugar industry by the bounty system has made this a happy and prosperous community. And, moreover, our prosperity has not detracted from that of another community or individual in the land. On the contrary, thousands of citizens outside of Chino profit by it and bless it.

John H. Dawson, Federal Sugar Inspector for California, has forwarded his estimates to the Treasury Department of the yield of beet sugar in this State for the season beginning June 30, 1893, and ending June 30, 1894. These estimates are required in order that Congress may have a basis to go on in making appropriations to pay the bounty on domestic sugar provided for in the McKinley tariff act. His estimates, which include the acreage in beets and the probable yield per acre, indicate that there will be a heavy increase in the sugar output this year. Heretofore the actual yield has fallen from fifteen to twenty-five per cent. below the advance estimate, but this has been in a measure due to a lack of preparation for handling the beet crop at the proper time. This year the working will be closer to the estimate than in past years. Should the yield for the present year come up to the estimates, the bounty would amount to $840,000. But, if the yield is in the same ratio with the advance estimates as the yield of last year, the production will only be 33,600,000 pounds, on which the bounty will be $672,000. So, after making allowance for every possible contingency, California will produce 11,800,000 pounds of sugar more than last year and receive $236,000 more of Federal bounty on the same.

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## *UNITED STATES BANANA IMPORTATIONS.*

*Garden and Forest* (New York) says: "Thirty-six years ago the steamer *North Star* brought to this port 500 bunches of bananas. The New York market had never before received anything like that quantity at once. * * * As late as 1865 the market was glutted by as small a supply as twelve

bunches, which arrived here in June, when strawberries were abundant, and the fruit was left on the hands of the enterprising importers. * * * It was not until 1879 that the first steamers were chartered as fruit-carriers for the West Indian trade, but the business has developed so rapidly that for the twelve months ending with July 1 last not less than 133 steamers were engaged in carrying bananas between the West Indies, Central America, Aspinwall and the United States, and as many as twenty-eight have discharged here in a week. Sailing vessels are too slow for this traffic, and the trip by steam from Jamaica requires but seven and a half days, and from Aspinwall a day longer. Three lines of steamers, comprising twelve vessels, make regular trips every ten days between Colon, Puerto Limon, Jamaica and New York, 120 more being chartered by brokers or run on the owners' account. Norway provides a majority of the vessels, which range from 400 to 2,000 tons burden, and the flags of Great Britain, the United States, Spain and Denmark also appear in the service.

"The trade has already grown, until in 1892 the receipts of bananas in this port amounted to 3,715,625 bunches. In July the highest figures of the current year were reached, 567,067 bunches having come to New York during that month. The largest New York supplies are now drawn from Jamaica, 1,055,876 bunches having been received here from that island during the year. The Cuban ports, Banes, Sama, Gibra and Cabanico, where the trade has more recently been established, together sent about 600,000 bunches last year, the remainder of the supply coming from Aspinwall, Honduras, Nicaragua and Costa Rica. Besides these large importations by New York, nearly 2,000,000 bunches went to Philadelphia last year and almost as many more to Boston, while Baltimore, Savannah and Mobile are also large consumers. New Orleans is, however, the most important market in the country, the enormous quantity of 4,483,351 bunches having passed into that city from Central America during last year, three-quarters of a million bunches more than were disposed of in New York. The water transportation to that port is short, and the bananas are quickly and cheaply distributed by special trains throughout the entire Mississippi valley. So

well organized is this service that the fruit is often cheaper in Chicago than in New York. The total importations into all United States ports during last year were 12,695,386 bunches, weighing about 325,000 tons.

"The general business depression, and the abundant supply of peaches and other domestic fruits, have affected the fall banana trade, prices now being nearly 50 per cent. lower than during last spring, when first-grade fruit, which can now be bought at wholesale as low as 90c., commanded $1.75 a bunch, averaging 125 fruits. Only a few years ago bananas sold at the fruit stands for $1 a dozen. The same number can now be bought for 15c. to 25c., and very often for less than 1c. apiece. Since the nutritive value of the banana is almost equal to that of the potato, both in starchy and nitrogenous elements, this makes an exceedingly cheap diet.

"The cargoes range from 8,000 to 32,000 bunches. The fruit sold on deck to local buyers is rapidly carted away on trucks, while large quantities are loaded in cars resting on floats by the vessel's side for shipment to other cities. The experiment of sales by auction, begun in August, is said to be meeting with considerable success, although but a small proportion of the supply is disposed of in this way. In these sales the bunches are swiftly passed from the hold, being rated by a 'sorter' as number one, two or three as they are handed over the vessel's side and placed in trucks; 100 bunches, all of one grade, constitute a truck load. * * * The buyers, among whom Italians, Greeks and Hebrews outnumber the American dealers, are ranged along the taffrail of the steamer, overlooking the trucks as they are loaded. * * * Upon delivery to the buyer the bananas are stored in dry cellars, those intended for early use being suspended in an air-tight compartment, where they are ripend by heat from gas stoves."

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## *SISAL THE HOPE OF THE BAHAMAS.*

[BARBADOS AGRICULTURAL GAZETTE.]

Every one knows the wail of the West Indian—"Ware sugar! Ware sugar!" Every visitor to these islands is told of the "good old days" when they were sugar-giants in the

land, before the beet-root giant-killer arose to challenge the monopolist's supremacy. It is refreshing therefore to arrive at an island, where pessisimism is not the prevailing tone, where many are sanguine and not a few are confident of future fortune, where a new industry is born of the weeds of the waste land, where a fatherly Governor's foresight and enterprise bid fair to change poverty to brilliant prosperity. Such a prospect is to be met in the Bahamas. Here Sir Ambrose Shea, the Governor has developed to a high degree the hitherto almost unknown industry, the growing of sisal-hemp—an enterprise which it is expected will make the Bahamas independent of the fruit-trade with America, and improve the welfare of the people.

For many years the sharp, lancet-leafed wild aloe of the Bahamas *(agave regidia)* was literally a thorn in the side of the fruit planters. Ubiquitous, irrepressible, it showed a preference for pine-apple lands; the innumerable suckers which sprang up hydra-like around the parent-stem defied attempts at extermination. It revelled in droughts, it scorned the hurricane. But although a noxious weed, with a price upon its head, the sisal has long been of service to the local fishermen, who have for generations fashioned their lines and hawsers from the fibre extracted from its great five-foot leaves.

All this time no one suspected that the despised fibre was worth £26 ($130), per ton in London.

It has been only during the administration of Sir Ambrose Shea that the full value of the "weed" has been recognized. Experts in fibre pronounced emphatically in favor of the new hemp; a market could be obtained for all that might be produced. Thus encouraged, the systematic plantation of acres of this aloe was commenced, though many, especially the creoles, scorned and derided; for the plant, like the prophet, was without honor in its own country. On the other hand, outsiders, and amongst them Mr. Joseph Chamberlain, planted their thousands of acres.

The following are a few of the facts concerning sisal growing which any sisal enthusiast will vouch for. The plants will grow upon almost any soil in the Bahamas without any previous preparation of the ground beyond the actual clear-

ing. The plant prefers a lime-stone rocky soil—in fact flourishes best in desert places where nothing else will grow. Consequently thousands of acres of land, previously considered as waste land, are now under profitable cultivation. The initial cost of cultivation is estimated at about £5 per acre; this includes clearing, and purchasing of young plants or suckers. The expenses of the second and third year are almost nominal, being confined to the labor for keeping down the suckers, and labor is very cheap—two shillings per day for men and one shilling for women. At the end of the third year the crop commences, the horizontal leaves are cut and carried away to be crushed, and the fibre extracted. The crop is now continuous—as the leaves become horizontal they are cut, and since the life of a plant thus continually pruned is estimated variously at from ten to sixteen years, the harvest is a long one. The extraction of the fibre is at present rather a primitive process. The leaf is thrust half-way between corrugated rollers, withdrawn, reversed, and crushed again. The horse-tail mass of fibre, is then rinsed in the sea, and dried in the sun. A skein of glistening silk-like fibre four to six feet in length, is the result. There are many other fibre-producing aloes, but it is claimed that the Bahama's sisal is almost entirely free from resin or gum, the presence of which makes the preparation a more tedious and expensive process. The estimated yield of fibre per acre is half a ton per annum, and the estimated cost of placing it on the maket is £12 per ton; while the market price is £26 per ton, or £2 more than manilla hemp. Sisal therefore may be called, "The Hope of the Bahamas."

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Scientific farming means full employment of every available means whereby larger and more profitable returns may be secured for the labor employed.

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Well-drained and deeply tilled land stores warmth to such an extent as to prolong the season of growth and obviate risks of frosts that otherwise might reduce profits of cultivation materially.—*Pacific Farmer.*