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Two copies each of the PLANTERS' MONTHLY for February and April, 1884, are wanted by the editor to complete files. One dollar will be paid for each copy furnished.

It has been officially stated that the amount paid by the U. S. Government as bounty on domestic sugar for the year ending June 30, 1894, was \$12,099,899, of which Louisiana planters received \$10,868,896.

The month of August and the first half of September have been the driest known for many years in these islands. A few rain showers have fallen, but they have for the most part been at a higher altitude than the cane fields.

Some idea of the commerce in artificial fertilizers may be derived from the fact that the United States consume annually 1,600,000 tons, Germany 1,300,000, England and France each 1,000,000, to say nothing of other countries.

There was an advance in the price of sugar in New York during August to 3.75, which was the quotation September 1. It is not likely to be higher at present, as the stocks of raw and refined on hand in the United States are unusually heavy—fully four months supply.

The new Cora pattern nine-roller mill for the Ewa plantation on this island, referred to last month, has been ordered from the makers in St. Louis, Mo., and will be delivered here before the end of December. Each of these nine-rollers is 70x34 inches, and the entire plant is guaranteed to be the finest work of the kind ever done in the United States.

A correspondent of the Ceylon Tropical Agriculturist, writing from Fiji, says: "Some 200 to 300 Japanese are expected next month as laborers on sugar estates. It is to be hoped they will turn out well and not increase wages which are too high already in Fiji. With Japs, Indian coolies, Polynesians and Fijians we shall have a fine mixture; and a man to work them will have to be a linguist as well as a planter."

According to statistics compiled by U. S. commissioner of agriculture, the value of Florida products is estimated for 1893 as follows: Oranges, \$4,380,621.34; pineapples, \$470,581.25; bananas, \$21,350.75; sugar apples, \$307.75; lemons, \$81,635.20; pears, \$80,145; peaches, \$122,025; cocoanuts, \$2,529.75; strawberries, \$104,814.09; limes, \$6,508.50; grape fruit, \$27,170.60; pecans, \$1,484; mangoes, \$5,884; avocado pears, \$2,489; guavas, \$3,622.25.

Alfalfa is one of the richest and best grasses for horses and cattle grown in any country. It grows luxuriantly in California and other sections of the United States. It requires plenty of moisture to thrive well. Why may it not be grown in the Hilo districts and other parts of Hawaii where rains abound? If the Hilo grass can be eradicated, the alfalfa might thrive. It is well worth the trial.

Advices from Java state that there has been apparently no decrease in the cane disease which has prevailed for the last few years, and for which no effectual remedy has been found. A change of seed has been suggested, but unless the change is made in such a way as to prevent the disease from attacking the new plants, nothing can be accomplished by it. This would necessitate abandoning altogether the old fields for new fields located as far from the old as possible.

The plantations located in the Hilo district have had exceptionally good crops the past year, owing to fine weather, plenty of rain, excellent fertilizers, and what is most important, good management in the field and in the mill, each plantation striving to make the best record. As a result Onomea returns 9,400 tons of sugar, Hilo Plantation 8,700, Pepeekeo 6,600, Waiakea 6,000, Hakalau 5,300, and Honomu 3,500. The tonnage per acre has not been ascertained, but it is believed to have been about five tons.

Some persons complain that their fruit trees do not bear as they formerly did or should. This is especially the case with avocado pear, orange and lime trees. The following experience of a Florida fruit grower we find in the Florida Agriculturist:

"I have often heard it said that if you would drive old nails in a barren tree it would make it bear. I had no faith in the proverb, but early last spring having some old nails at hand and a Navel orange tree, and remembering the saying, I drove a lot in the tree, and now the tree is full of fruit. Had the nails anything to do with it, and if so why and how? And if the nails had anything to do with the tree fruiting will it have to be repeated yearly or will what is now in it suffice? If there be any incredulous Thomases, if they will come, I will show them the tree, nails and fruit."

Mr. Marsden, our local entomologist, is meeting with well deserved success in breeding colonies of lady bugs. At present his attention is devoted to the species which attack the coffee and orange tree blight, called *pulvinaria*. The lady bug which eats and thrives on this blight is known as the *cryptolaemus*, of which a number of colonies have been distributed over the group. It is necessary that those who take charge of these colonies make themselves familiar with their appearance and habits, so as to recognize them or their larvae wherever they are found. Once planted in any district, they will remain as long as they find the food which they feed on; but when this gives out they die.

A new coffee enterprise is soon to be started in Kona, Hawaii, under the name of "South Kona Coffee Company." Its site is located on the land called Papa, some four or five miles from the dividing line between the districts of Kona and Kau,

with Hoopuloa as its port or landing, which is only four miles from the government road, and easily accessible at all seasons of the year. The land is owned by Mr. J. M. Monsarrat of this city, and is believed to be among the best for coffee growing in Kona, as the soil consists of very rich *aa*, and is easily worked. The government road traverses this land at an elevation of about 1200 feet above the sea, affording the best climate for coffee to be found anywhere. It is proposed to organize a company with a capital of \$40,000, with privilege to increase it to \$100,000. Under proper management this enterprise promises to be one of the safest and best now open to capitalists here or abroad.

A paper read before the Hilo Coffee Planter's Association by Mr. A. Sunter, will be found on page 403. As giving the experience and views of a coffee planter, it will prove interesting to all engaged in this industry. Here is a man who has taken a claim in the wild forest of Olaa, and in two years has cleared it off sufficiently to plant 11,000 young coffee trees with his own hands, and with no hired help. This is just the information that is needed by most beginners. We wish other planters would send us their experiences with as full details as they choose to give. Whatever they are, they will doubtless prove instructive to others, even though they may already know something about coffee.

The attention of planters is called to the communication of Mr. James Scott, chief engineer in the Makaweli mill, describing (see page 409) a new device to remove scales from the tubes in boilers. The discovery was made by Mr. Morrison, manager of the Makaweli plantation, who has patented the simple but very effective device. Every planter knows how troublesome and vexatious these scales are, and what a loss they cause in labor, delay and extra fuel. By this simple—and perhaps some may say silly device until they see its very effective work—the labor and loss are reduced to a small fraction of what they formerly were, and those who use it will be surprised at the reduction in the cost of fuel. It is, however, by the use of such simple methods that great saving is frequently effected, and it will not be long before its merit will be tested by every sugarboiler, as its cost is trifling.

To the great surprise of European beet growers, says the Chino Champion, our California farmers have produced the richest and best beets of which any record has been made. In Germany and France an average of 12 per cent. of sugar in the beet is considered good, while in Chino an average of 15 to 17 per cent. is no unusual record. In the season of 1892 the first 1,000 tons of beets harvested averaged 17 per cent., and last season the entire crop averaged over 15 per cent. In the cost of production is also another marked advantage in favor of the California farmer. While European farmers count on perhaps \$40 per acre as the cost of producing beets, the Chino growers have reduced this to the neighborhood of \$25 per acre.

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HOW SUGAR WILL BE AFFECTED BY THE NEW TARIFF BILL.

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Of course the passage of the tariff bill causes no end of comment, pro and con, and a vast amount of speculation which is as variable as is individual opinion. The provisions of the bill as regards sugar are as follows:—Raw sugar, which now comes in free, is subject to a duty of 40 per cent. ad valorem. On refined sugar there is levied a duty, first of 40 per cent. ad valorem, second, of one-eighth of a cent per pound, and third, of one-tenth of a cent per pound on sugar imported from countries which pay a bounty.

With a 40 per cent. ad valorem duty added, there must of course be a corresponding advance in refined sugar of from one-half of this advance has been anticipated, so that the additional advance above present prices, for which this duty could be held directly responsible, would be from 9-16 to $\frac{5}{8}$ of a cent per pound. Of course in the event of a short crop, which always has the effect of causing the price of sugar to advance, or of any natural causes which make higher prices, such advances would add just that much that would be added to the cost per pound were it not for the duty. It would seem that sugar at its lowest point would be from $1\frac{1}{2}$ to $1\frac{1}{4}$ of a cent per pound higher on account of the duty; but, with that duty added, it will be no higher than it has ruled at times since sugar was placed on the free list.—*New England Grocer.*

ERRORS CORRECTED.

A writer in the Louisiana Planter has the following paragraph relative to the production of sugar in these islands:

"With free sugar from the Sandwich Islands, where those who are connected with the refining interest own all the sugar lands and control the raw sugar interest, it seems to us that the sugar industry of the United States is threatened with extinction, for with two or three years' profits in the refining and cane sugar production in Hawaii they can develop the industry in the Sandwich Islands to such extent as to supply the United States with all the sugar consumed at less cost than is possible where labor costs more and but one crop of cane sugar is available."

Like some other writers on the possibilities of sugar making in these islands, the correspondent quoted above shows very little knowledge of the facts. The land suitable for cane growing here is all appropriated and being worked to its utmost capacity. Last year's crop was about 150,000 long tons, and by no possibility can the yield under the most favorable circumstances ever exceed 200,000 tons, or about one-tenth of the present consumption of the United States. Another error of the writer is regarding the cost. It costs more to raise cane and manufacture sugar in Hawaii than it does in Louisiana or Texas, and this will probably always be the case, as most of our skilled and field labor has to be obtained abroad.

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THE NEW AMERICAN SUGAR TARIFF.

After one of the most prolonged and bitter debates in both houses of congress, the new tariff was passed early in August, and went into operation on the 28th of that month without receiving the President's approval. It imposed a duty of forty per cent. on the ad valorem cost, which will probably be fixed by the Secretary of the Treasury at a uniform rate of about $2\frac{1}{3}$ cents. This with the additional duty per pound of one-eighth cent on all sugars over 16 Dutch Standard, will make the duty about one cent per pound, or \$20 per ton. The following is the text of the law:

"All sugars of No. 16 Dutch Standard in color or under to pay a duty of 40 per cent. ad valorem, and all sugars above No. 16 Dutch Standard in color shall pay in addition one-

eighth of a cent per pound. Also one-tenth of a cent per pound additional on sugars which are imported from or are the product of any country which at the time the same are exported therefrom, pays directly or indirectly a bounty on the export thereof. It is also further provided that nothing contained in this schedule shall be so construed as to abrogate, or in any manner impair or affect the provisions of the treaty of Commercial Reciprocity, concluded between the United States and the King of the Hawaiian Islands on the thirteenth day of January, 1875, or the provisions of any Act of Congress heretofore passed for the execution of the same."—*William Dimond & Co.'s Circular.*

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LAHAINA CANE.

In reply to an inquiry received from Queensland regarding the "Lahaina Cane" and its history, we furnish the following facts obtained in part from a letter written by Mr. D. D. Baldwin of Maui, and published some twenty years ago in the Hawaiian Gazette, and also republished in the first volume of the PLANTERS' MONTHLY.

In 1854 or 5, Captain Edwards of the American whaleship George Washington brought a bundle of choice sugar cane from Marquesas for Mr. Charles Titcomb of Hanalei, Kauai. As the ship put into Lahaina first, and the facilities for sending the cane to Kauai were few and far between, he gave it to Consul Chase who planted some in his garden. Mr. F. A. Oudinot, a resident of Lahaina known as "Marshal Oudinot," also planted some of this cane on his premises. From these few plants sprang what is now known as Lahaina Cane. It proved to be a remarkably rapid grower, very sweet, and as the leaves dropped off readily, an easy cane to handle and take care of, and in appearance very handsome and attractive.

In his letter above referred to, Mr. Baldwin says: "The Lahaina variety can readily be distinguished by its long straight leaves of light color, heavily aculeated or covered with prickles at the base, and its small, round, prominent buds; while the variety known here as 'Cuban Cane' has leaves of darker green, bending down in graceful curves with no prickles, and large triangular buds located in little cavities on the sides of the cane stalk. * * * The Lahaina cane has taken the preference [over the Cuba], its advantages being: 1. Rapid growth, thus quickly covering the ground and

requiring less labor for cultivating and irrigating. 2. Deep rooting, it drawing nourishment from the subsoil, or from soil the surface of which has already been exhausted by other varieties of cane. 3. It having, when mature, a hard rind which prevents the ravages of rats. 4. The superior richness of its juice, it generally weighing one-third more than the juice of other varieties of cane cultivated under like circumstances. 5. It possesses a compact, firm fiber, which renders the trash easy to handle and enhances its value as fuel. With these advantages may be mentioned the peculiar whiteness of its juice when mature, which exceeds that of any other island variety, and with its superior density would naturally insure white grades of sugar."

About the years 1870-2, the Lahaina cane began to take the place generally throughout these islands of other canes, increasing the average yield from two or three tons per acre to four, five, and even six tons, under similar conditions of cultivation and manufacture in various localities of the group.

This increase of yield from Lahaina cane has continued from year to year under more favorable mill work, until now, it is not uncommon to hear planters report eight, nine and ten tons of sugar obtained from favored portions of the plantation. Where this cane is well cultivated and cared for, there appears to be no appreciable deterioration in any of its leading characteristics, of easy cultivation, easy stripping and handling, the juice maintaining its high excellent qualities as the purest, richest, and most productive of any variety known, at least so far as our soil and climate are concerned. It has been exclusively grown on some of our plantations for over twenty years, and remains as thrifty and productive as when first planted. At the same time it should be stated that it is very sensitive to cold, and thrives best on lowlands and in warm sheltered localities.

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If you live in a new home, plant fruit or shade trees.

If you live in an old home, plant ornamental trees.

If you live on a shadeless street, plant shade trees.

If you are young, for your own future plant trees.

If you are old, for your children's future plant trees.

In whatever town you live, may there be plenty of parks, and may the streets have plenty of trees.

CORRESPONDENCE AND SELECTIONS.

NOTES ON THE SUGAR MILLS AND PLANTATIONS OF HAWAII.

EDITOR PLANTERS' MONTHLY:—The Hamakua mill, situated at Paauilo, is one of the most compact to be found in the district. Indeed, there is no other mill on this island where so much machinery is crowded into so small a place, or where more work is done considering the size of the plant. If this mill is noted for one thing more than another, it is for the efficiency of its superheaters, and for the large amount of water used in maceration, which sometimes exceeds thirty per cent., and floods the trash to complete saturation or until it can take up no more water. Still never is there difficulty in evaporating the juice, nor any delay anywhere. The great efficiency of the superheaters is, I presume, mainly due to the fact that the steam boilers in use here are of the multi-tubular type, which generally allow the gases to escape at a rather higher temperature than do those of the compound or where two boilers are set tandem fashion. However, this may be, one thing seems certain, that where multi-tubular boilers are in use the superheater gives the greatest satisfaction and shows the best results. There are in this mill four multi-tubular boilers, each fired separately, and they give an abundance of steam. There is also a five-roller mill made by the Honolulu Iron Works, and the boiling-house is well supplied with every apparatus necessary for the defecation and evaporation of the juice, as well as for the drying of the sugar.

A number of improvements have been made in this mill during the last few years, and among other things are an artesian well, an electric light, a new style of juice heater, four new iron mud presses, an ice machine, and now they are to put in place either a cane shredder or a cane crusher, but probably it will be a shredder. This will be a great improvement to the mill, as they are compelled to do a large amount of work here. Considering the advantage gained by these shredders, it is a wonder that there are so few of them in use on the islands.

I should like to say a word about the electric light in use here, as it surpasses anything I have seen on this island. There are two powerful dynamos in use, one for the arc light and one for the incandescent, driven by a thirty-five horse-power Westinghouse engine. One of the dynamos is of the Edison make and is a perfect beauty, and all the appointments are most perfect and of the very latest designs, and far superior to any of the older machines in use.

PAAUHAU MILL.—This mill has been so much improved and so thoroughly reconstructed that it may, without the least exaggeration, be called a new mill, although the old parts are still standing in striking contrast to the new. This mill has not only been improved but greatly enlarged, so that instead of making sixteen clarifiers a day as was formerly done, they can now make sixty with ease. The engines, gearing, rollers, etc., are all of improved design and most substantially and strongly made. The three mills are of the two-roller type, and are said to do splendid work. This style of mill is now fast coming into use, and they will eventually, it is thought, quite supercede the old three-roller mill which has too many objectionable features to stand any show alongside of the new type. There are three sets of compound boilers here, but they are set somewhat different from the usual way. For instance, it is usual when the boilers are fired under the bottom to set the multi-tubular boiler next to the chimney, but here the flue boiler is next to the smokestack and is said to work well this way.

This mill has a large number of centrifugals which is evidently a good idea, as too many mills are only too often short of them, and in consequence have to run until far in the night. It is also well supplied with most of the modern improvements, excepting the cane shredder. This mill is now one of the best on the island.

OOKALA PLANTATION.—This is one of the oldest estates in the district, and has had more than its share of ill luck, arising chiefly from the too frequent droughts. Still the owners are pushing the work, and over 800 acres of new cane have been planted, with some four hundred acres of old cane. Last year's plant looks rather poor, but this is not surprising when we consider the shallowness of the soil and the hills that this plantation is mainly composed of, and the excessive

dryness of the climate of the last few years. Deep soils seem to resist this drought much better than the shallow soils, and to a surprising extent, for it is found that while some of the poorer and shallow soils barely yielded one ton per acre, the deep soils have in some instances turned out five tons per acre.

This property however has been quietly enlarged and wonderfully improved within the last few years. Land has been taken in from all sides; and an extensive system of fertilizing has been adopted; and thirteen thousand dollars was spent for fertilizers last year alone, which on account of the extreme dryness seems to have done but little good. Nothing can compensate for the want of rain, although, perhaps, some kinds of fertilizers may be suited for dry climate better than others. But when the fields lie upon hill sides they are quickly drained of all moisture, and at the same time are more exposed to the winds and sun, and it is doubtful if under these circumstances any kinds of fertilizers are of much use.

They have also made improvements in the system of transportation, and a new railroad has been laid down, new locomotives and improved cars put in use, new flumes laid, and in fact every thing apparently has been done that is possible to do to give despatch to the work and to reduce expenses.

A few words here in relation to the amount of rain needed for the successful growth of cane. This of course varies with the locality and the conditions of the soil; but it is generally conceded that the minimum quantity is not less than six inches per month. It is however evident that poor soils situated on hill sides must need more. The rose-bamboo cane has been generally planted this year, specially on the higher lands, and it is doing well, is growing in favor in this district, and will soon be the only cane grow here, as it stands the dry weather better than the Lahaina, and yields fully as well in most places.

THE KUKAIAU PLANTATION has suffered from the drought, apparently, to a greater extent than any of the other plantations, and some idea of the loss may be gathered from the fact that the nine hundred acres harvested last season only yielded thirteen hundred tons of sugar, and the year before was still more discouraging. However, they are not in the least discouraged, but are pushing the work ahead just as usual and have planted already 400 acres and will probably plant

more. The cane planted last season is looking much more promising, and with a fair supply of rain from this time on, there is every indication that there will be a good crop here next season. Considering the dry season some of the large fields of this plantation are looking exceptionally fine, thick and strong, and will probably yield five tons per acre. Quite a large tract of rich and valuable land has been added to this plantation, from which good returns may be expected. Fertilizers are used here but not so extensively as on some of the other plantations, as the soil is comparatively new, at least much of it, and therefore may not need it.

Besides the plantation, Mr. Horner has a large cattle ranch above, and the largest and finest coffee grove in the district. This grove comprises about sixty-five acres, part of it is bearing and the trees are loaded down with berries, presenting a most beautiful sight. This grove is situated in the midst of trees, and is well sheltered from the wind, a precaution which seems very necessary, as there is nothing, so far as my experience goes, so delicately sensitive to the wind as the coffee plant. For it is noticed that while the coffee trees growing in the valleys and hollow places are most luxuriant, those on the hill sides have scarcely started to grow, although they were all planted at the same time. Mr. J. M. Horner and Miss Annie Horner have also started new coffee groves above the plantation. Mr. C. R. Blacow also has here one of the finest orchards on the Islands. It is mostly planted to coffee, but there are also almost every variety of fine trees, all looking well, while the orange trees compare favorably with the best orange trees of California. The prospect for the coffee industry certainly looks most promising, for nowhere have I seen trees bear such quantities as these young trees are now loaded with. I should also say Mr. J. M. Horner has several nurseries for raising the coffee trees, and they contain 50,000 to 60,000 choice young plants, which present a very pretty sight and are growing most vigorously and in great luxuriance.

There is also a pigeon post established here for carrying messages from the plantation to the ranch, and it is bound to be a great convenience. These carrier pigeons are evidently capable of improving their most wonderful gifts for whereas the young pigeons take nearly an hour to make the passage (6 miles), the older ones can do it in six minutes.

THE HAMAKUA PLANTATION, PAAUILO.—Considering the lengthened drought, this plantation has achieved some remarkable results and has surpassed others in this district. Notwithstanding the two dry seasons, some of the fields yield over five tons of sugar per acre; and the entire crop amounts to 3,600 tons. The estimated crop was 5,000 tons, but this loss was not nearly so great as some of the other places had to suffer. It may also be stated that the soil here is both deep and rich, and is kept in fine condition by constant fertilizing manuring. Besides the fertilizers great pains are taken with the manure of the stables, both to secure it all and to keep it in good condition. Sheep are also kept for their manuring properties, and are said to be the best investment that was ever made here for that purpose. There is also a system of green soiling adopted here, which surpasses anything of the kind that has come under my notice.

The plant used for this purpose is called the Lupin, and grows most luxuriantly every where that it has so far been planted. It is also stated that the benefit derived from the use of this plant is most surprising, so that now it is being planted extensively about the plantation, and three tons of the beans are to be planted this year. The work is being pushed ahead more extensively than ever, and I believe 900 acres will be planted to cane this year, most of it being rose-bamboo. The indications for a good crop for next season are very good.

PAAUHAU PLANTATION.—This is the largest if not the finest estate in the district, and is said to be in a good condition. This property has been placed in a condition so as to turn out 8,000 tons sugar each year, that is, providing the weather is favorable. The plantation presents a fine appearance. There are good substantial roads and bridges, two gravity railroads, and a locomotive railroad. Avenues of fine trees surround the plantation, and every thing about the place shows evidences of skill, care, and good management.

This plantation has, however, like others in this district, been a sufferer from the drought, or it would have made a name for itself long before this. But with all the drawbacks it has had to contend with, it turned out nearly 5,000 tons last year. This place seems to be more than triple its former size, and is evidently the largest plantation in the district. There seems to be an immense amount of cane under cultivation.

and most of it looks in a fine condition. A considerable amount will also be planted this year.

Fertilizers are used here quite extensively and very systematically, and are said to give good results, but nothing in comparison to what might have been expected, with more rain. Indeed all that this place lacks is rain to make it one of the finest properties on the Hawaiian Islands.

G. O.

Hamakua, Hawaii, August, 1894.

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*INCENTIVES TO INCREASE THE ACREAGE OUTPUT
OF SUGAR.*

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(Louisiana Planter.)

The prevalent and seemingly inevitable tendency in the varied industries of any magnitude is to decrease the cost of raw material and finished products, and in consequence the cane sugar producers are experiencing its effects in the immense quantities of beet sugars annually manufactured in Europe, which amounts to about six-tenths of the commercial sugars of the world. The inexorable logic of events is that the acreage output of cane sugars must be increased—to render the industry lucrative—to accomplish which it is absolutely necessary to first *convince* those who are vitally interested that it must be done with every known available means consistent with true economy. Those who have done most to advance the industry in recent years are untiring in their endeavors to secure still better results in both field and factory; because they are fully aware that therein lies their greatest hope of future success.

The proof is becoming more and more convincing that the elements of plant life which are rapidly removed from the soil by the growth of luxuriant crops of cane must be restored in great measure by the use of artificial manures, and the skill of the scientist is being invoked to discover compound fertilizers which will give the best results under varying soils and climatic conditions in the different cane-growing countries.

It is most fortunate that the chemists of the factories are beginning to investigate the subject, and also the variations

in the sucrose content of the canes—each of such financial importance, not only to the producers of the canes but to the purchasers at the factories, where their saccharine richness must in the near future govern the price. Their investigations, if carried farther, may demonstrate conclusively that quantities of land are planted in cane, fertilized and cultivated at a decided loss to the producer, because the annual acreage output in tons of cane and sugar per ton is not adequate to pay the heavy expenses, aggregating as much for twelve as for thirty tons per acre to harvest time.

Although contrary to what is generally conceded as correct practice, it might prove more profitable to plant cane after cane in soils well adapted to their growth and culture than to plant low-lying fields, the physical qualities of which are such that large yields can not be had one year in five. Last year, although the season was neither a very dry or wet one in most localities, yet the observer could stand at the scales of some large factories as the canes arrived from the various fields and note the difference in appearance.

The eye could detect at once those coming from lands well suited to the requirements of the plant, and those from stiff, partially-drained soils. In the one instance they were of good length and diameter, with long joints, denoting a heavy tonnage, and in the other they were deficient in length and diameter, with short joints, and evidently woody, conclusive evidence of scant tonnage and poor if any profit to the producer, as the cost to harvest time had been as large if not larger than if the tonnage had been double or triple. Excellent cane soils have yielded from twenty-seven to thirty tons per acre, with remunerative quantities of sucrose where replanted for a term of years (consequently notably exhausted of nitrogenous compounds), where the application of manure has been as high as 100 pounds of ammonia per acre.

To insure increased yields, attention is being more and more attracted not only to the solubility of the fertilizers in water, but the minuteness of their particles, both prime factors in the availability of the applied plant food for the growing crops, to more certainly insure the rapid stalk growth in summer and early autumn. Heretofore fashion has had much to do with the fertilizer used; but when it is known that in Guadaloupe Demerara, the Sandwich Islands, etc., cheap sugars are produced with ingredients of high

quality, the question is being asked may it not prove profitable to use them here to a greater extent, if properly applied as to place, time and manner? If sulphate of ammonia can be used in Demerara where there is an annual rainfall of 100 inches, why not here where it is frequently less than 60 inches?

That effective drainage and intelligent fertilizing are necessary here to approximate maximum yields of sugar can not longer be disputed, yet it is frequently noted that a heavy tonnage is had at the cost of sucrose per ton, with, at times, marked instances where the tonnage yield and sucrose per ton are both large, results which all planters should strive to attain. There are recorded instances where fertilized fields have yielded forty tons of cane per acre, which gave an output of 200 pounds of commercial sugar per ton; but we have yet to learn of a single instance in the State where such results have been had from newly cleared virgin soil. That there is something in the physical quality of such soils, or the composition or excess of their plant food, which precludes the possibility of such yields, *va sans dire*.

To discover and profit by what manurial conditions existed in the soil when the large acreage output was had must be the aim of the planter and chemist; but it is extremely doubtful if soil analysis will solve the intricate problem. That the previously applied manures and possibly pea vines ploughed under had undergone chemical changes such that their ingredients had been placed in just the forms best suited to the canes in the former instance may be surmised, and that in the latter there was an excess in the different forms of nitrogen in the rich soil there are cogent reasons for believing.

When canes have to be harvested frequently only ten months after planting, there are two factors in climatic conditions very essential to the development of sucrose where the tonnage is heavy—abundant sunlight, and at least cool nights. The season of 1877 was a memorable example of their absence, with a continued murky atmosphere which followed the two storms of September. In many instances where there was a semblance of heavy tonnage the canes were so deficient in sucrose content that they scarcely paid the cost of cutting, delivery and manufacture.

If proprietors can succeed in securing an average of twen-

ty-five tons per acre (which at times will necessitate a yield of from thirty to forty tons in some fields, to counter-balance that from defective ratoons, etc.,) cost of production of the raw material will be decreased as compared with what is had on most places throughout the sugar belt.

To average twenty-five tons per acre necessitates more than the generality of planters possess at present, viz., a fine quality of soil, well drained, whether by natural fall, artificial means, or what is best, the two combined, abundant capital, labor, mules and the improved implements, coupled with the *savoir-faire* to so manipulate as to from year to year counteract as far as possible adverse climatic extremes.

Admitting that progress has been made, and that the field for improvement is large in cheapening production in growing an abundance of canes per acre, relatively rich in sucrose, yet on the other hand delivery (in all weathers) and manufacture have not been practiced extensively on grounds of true economy; as plants having done first-class work are numerically small in comparison with what might have been put in operation had a different regime been followed. Although germane to the subject, it may be superfluous to note some of the factors which have had their influence; yet it may be stated in all candor as an admonition, not a criticism, that weak mills are the bane of their possessors, and dear as a gift, yet many have been placed in position as double crushers, and as such failed to secure an average of 70 per cent. extraction.

Compound crushing, giving a high juice extraction, is no longer speculative or experimental, as owners of iron works are ready to contract for plants to be constructed of superior material in all the essential parts, such as Rousselot headstocks or housings, rocker trash turners, or turn-plates, shaftings of the best scrap iron, mill pinions or crown wheels having the combined qualities of steel and iron, compound spur gearing on cast iron beds, spur pinions of steel, the spur wheels made with centres in bodies in halves, and the segments cast separately; the machinery to be driven by horizontal Corliss steam engines 30 by 48 inches, the segmental fly wheels fourteen tons weight, for mills 6 feet by 32 inches

diameter, with 16 inch journals, with which 84 per cent. extraction can be had with heavy saturation, as is the case in Queensland, Australia, with the double mills of the noted works of the Mirrless, Watson, Yaryan Company of Glasgow, Scotland.

Even since double crushing has come into vogue the loss in juice extraction has been large, and it is only a question of time how long such can continue, for there is no valid reason why it does not cost the producer who only obtains 60 or 70 per cent. extraction as much to grow a ton of cane as he who secures 82 per cent. or over. Rivalry, and local competition for labor, etc., if nothing else, will necessitate the heroic abandonment of old and weak crushing plants and small multiple effects, where heavy saturation between mills can not be practiced, and where in the latter case alone a probable loss of ten or more pounds of sugar per ton of cane is incurred, to say nothing of the increased cost of manufacture, where three or more factories with all the numerous employees are engaged, when one, with a powerful milling plant, could, with its railroads, etc., perform the work more effectively, with immense saving in sugar, wages, etc.

Central factories can be erected and successfully operated by possessors of large estates and capital, who not only grind their own canes, but purchase from the numerous small proprietors, tenants, etc.; again by capitalists who may own but little if any land, but who purchase from the growers of the cane in the surrounding country, and, lastly, by the land owners in a given area who can select the most available site and by combining and becoming stockholders conjointly own the factory and operate it for their mutual benefit.

When Louisiana becomes dotted with factories having high-typed machinery, with which all the paying quantities of juice can be extracted, and cheaply converted into sugar, and the combined efforts of the agriculturist and chemist have solved the problem of producing from thirty to forty tons of cane per acre, with a sucrose content such that 200 pounds of commercial sugar can be had per ton, then the

State will continue to maintain high rank as a tropical cane sugar producing country.

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COFFEE CULTIVATION IN HAWAII.

[A Paper Read Before the Hawaiian Coffee Planters' Association of Hilo.]

GENTLEMEN:—We are met together, a little band of men from the four quarters of the world, to engage in the cultivation of coffee. Some of you have had great experience, in the coffee fields of Ceylon, and understand thoroughly all the conditions necessary to success in that country; and you have adopted the best possible ways probably for that climate, you have had peculiar conditions to meet, poor soil, and the constant use of fertilizers, and, with the aid of cheap labor, you were successful. Others here are from Mexico, and the countries of Central America, where the conditions are somewhat different. There the soil is fertile, but the methods of cultivation are altogether different from the ways in vogue in Ceylon, and the yield of coffee per acre, if statistics are worth anything, much larger than in Ceylon, and the countries thereabouts. Each and all of you, no doubt have your own ideas as to the proper system to pursue to attain success, and you will no doubt follow your own ideas. But have you considered that the one from the far East, and the other from the fertile forests of Central America and Mexico, in a new country, where the soil, climate, and surroundings are altogether different from the places from which you have come, and that perhaps to attain success, the peculiar conditions with which you are surrounded, should be made the subject of special study. There are scarcely two districts in this country which are exactly alike, all have different soil, climate, &c., each must be studied by itself.

I shall only speak now of Oloa. Where in all the wide world can you find so favored a place as Oloa? You are in an Anglo-Saxon country, so to speak. There is no place on earth where there is so much intelligence and general culture, in proportion to numbers, as in these Islands at large.

There is better respect for law, and life and property are more secure than in the United States, or in European countries. There is an entire absence of all those insect and animal pests, which are the bane of other tropical countries, and the country is healthy neither is it hot or cold, while the temperature is pleasant the entire year. We are living on a good road, which has cost us only taxes. In other countries road building has to be done generally at the planters' and farmers' expense. We are close to a good port, where vessels will take our coffee cheaply to the United States, our best market. There are no export or import duties to pay. Our estates are exempt from taxation for ten years. These in my opinion are advantages enough to attract many persons of intelligence and means to our shores.

The soil of Olaa, as you all know is a deep, chocolate-colored loam, which, according to the best authorities, is the ideal soil for coffee. That it is rich goes without question. How could poor soil support such a growth of trees, ferns, and vines? The rainfall is somewhat excessive, but it is neutralized in great measure by the unequaled drainage of the soil, making ditching and draining unnecessary. As you all know, no matter how hard it rains, the water never runs on the surface, but sinks immediately, except in places which have been packed by the feet of men or animals.

The disadvantages are: there is no regular wet or dry season, and the coffee trees blossom irregularly, and the climate (whether that is a disadvantage or not) is some twenty or more degrees cooler than other tropical countries. But with these drawbacks, I believe this can be made to be the most productive coffee country in the known world, as it is at present the most productive sugar country. Why it is not so at present is due to the fact that sugar has paid so well, that people would not turn their attention to anything else. Now that people are turning their attention to coffee, I believe that it will be only a question of time, until our district of Olaa, becomes famous for both productiveness, and the superior quality of its coffee. Gentlemen, while I have never seen a large coffee plantation, I have been familiar with coffee trees during my twenty-five years residence

in these Islands. I have studied the subject a good deal, and have conversed with many people from Ceylon and other coffee countries. I have also made myself familiar with Labonadiere, the great authority on coffee culture, and have had the benefit of the experience of the late Mr. O'Dowda, whom many of you knew and who was an authority on coffee. He often visited my place in the lower woods, and would go out with me, knife in hand, and explain all the different processes. Still I must admit that I practically know very little, and it is with great diffidence, and it seems to me, presumptuous on my part, to get up before you, who have had more experience, and ventilate my views on the subject. And if my views and methods are radically different from yours, or of any views held by any authority on the subject, I hope you will pardon me and lay it to the score of ignorance. When I first came on this district there was nothing but a trail. This new road had not been surveyed as yet, and sometimes I did not see a soul for two weeks at a time. How it has changed since then! I planted in the lower woods over 13,000 trees, and cared for them three and a half years. The conditions there are altogether different from those prevailing here. I shall not speak of them except to say that I learned a great deal, and that this experience is helping me here.

I have been now in Olaa nearly two years, and have 11,000 trees planted on seventeen acres, and have hired no labor, but have done all the work entirely myself. The trees which are from eight to sixteen months old, are looking remarkably well, are thrifty and healthy, and entirely free from insect pests. Now if you were to ask me how I would begin and carry on a coffee plantation, I would say—I would first put my labor house in an isolated spot, and have it entirely surrounded by jungle, and have access to the coffee only by a narrow path. Then, before I begin clearing the ground for coffee, I would clear all the weeds away from the road in front of my holding, and keep them cleared away. I should impress upon the laborers the necessity of not walking among the weeds, and to be very careful that there were no seeds of weeds on their shoes or clothing before beginning their work. Then I would deny people free access to the coffee field, and

stipulate that if they wish to see it, they must first get permission. One person can carry enough seeds of bad weeds on his clothing to seed a whole plantation. There are very few bad weeds in the jungle, and if you can keep them out of your fields by going to all this trouble, it will be a simple and comparatively inexpensive operation to care for your land. On the other hand, if you allow the weeds to spread through the land, it will be an expensive operation to get rid of them, and they might ruin your coffee trees.

CLEARING.

In clearing I would cut all the young trees and underbrush away, and would cut down half of the Ohia trees, leaving the logs on the ground, and burning only the small limbs and brush. I would not move a fern except it was in a place where I wanted to plant a coffee tree, and would not disturb any of the vines or trash, but let it lay on the ground and rot. There is nothing better in my opinion than a mulch of rotten ferns and vines for coffee. So far as my observation goes, a slight shade for coffee for two or three years is a great benefit. Leaving half of the Ohia trees for that length of time helps to shade them. After two or three years I would kill by girdling or burning half of the remaining trees, which would let in all the sunlight that I should think would be necessary, and the remaining trees, about one-quarter of the original number, I should leave permanently. As I said before, I believe light shade is necessary in the beginning, and it will help to attain that result by not trying to kill all the small ferns which are so numerous, under the larger ones. For two years I should simply cut off the tops and put the material around the young coffee trees, to act as a mulch, and to keep the ground cool and prevent weeds from growing. After two years, when the coffee trees are large enough to make shade of their own, I should then kill those ferns and uproot them, and at the same time carefully bring together all the rotted stuff which now covers the ground around the young plants, and leave it there. I would not level a hillock or disturb the soil in any way, but leave it in a state of nature with the surface mould undisturbed.

Do not be alarmed if you see moss growing and covering the ground, let it grow, do not disturb it. It is nature's way for keeping the ground cool and moist, and that is what coffee trees delight in. And it also prevents in a measure bad weeds from springing up.

PLANTING.

I would get the best possible trees for planting. If I could not find good ones I should defer planting. I would nip off some of the tap root, and the long straggling laterals, and taking a damp time for planting, stir up and loosen the soil to the depth of six inches or more, without displacing the surface mould, and plant the young tree entirely in the surface mould, taking great care to not get any of the red subsoil mixed up with it, and I would plant at the rate of 600 trees a day. Our soil here, as you all know, is not hard, and does not need a spade or mattock to break it up. I believe digging holes to the depth of twelve or eighteen inches to be entirely unnecessary here. And furthermore I believe it to be injurious, especially if you get too much of the red soil on to the surface. If you fill the hole which you have dug full of mould, carefully scraped from the surrounding surface, you will have a good bed for your tree; but it will be a costly and expensive operation, and no better than the other less costly way. Planting in surface would give the young trees the benefit of being in contact with the richest of soil, and they show the benefit by a strong vigorous growth, and the trees will have without exception a healthy color. On the contrary, if you plant in the red subsoil, or have too much of it mixed up with the mould from the surface, the trees will have a stunted appearance, yellow leaves, sickly looking, and slow of growth. They may recover in two or three years time, but I doubt it.

Some of you no doubt will say that it is a foolish idea to kill by girdling some of the Ohia trees, and to leave them standing as they will fall down later and destroy your bearing coffee trees. Well I would say, let the trees fall, in falling they will crush a few trees, but the way those crushed trees will recover will astonish you; and they will be more vigorous

than ever. Crushing the coffee trees only seems to put new life into them. In regard to the proper height for topping the trees and the system of pruning, there are gentlemen here who are more competent to speak on that subject than I am, but with all due deference to them, I should think that the low system of topping and cutting off the secondaries or tertiaries each year, after they have borne one or two crops of coffee, to be costly and almost impracticable here in this country where we have no trained labor. It seems to me that as fast as you could train one man, he would be taken from you by an offer of higher wages elsewhere, and you would have to train another man, and so on.

I have heard it said and read often that coffee trees will not bear replanting on the same ground, that they exhaust the soil, and that you must find new ground for your second planting. I received some months since a Ceylon newspaper with a marked article, describing the processes used in India. I think the place is Saigon. There they plant three times in succession on the same ground, and then turn it out to jungle. On the lowlands they allow twelve years for one planting, or thirty-six years for the three plantings. On the upland twenty-four years for one planting, or seventy-two years for the three. The land, however, must be rich. I believe we can do the same here, as I know of old trees in this country, so old in fact that the old men and women have no recollection of the time when they were planted, bearing immense crops every year without any cultivation whatever. If with all our cultivation we can induce our coffee trees to produce half as much as these wild trees yield, we shall be fortunate indeed.

There are many little points I have not touched on in this paper. It is not within the scope of this article to speak of gathering and curing the coffee. This is a matter that I do not understand, and there are gentlemen here who have made a life-long study of the subject. We are fortunate indeed in having them here in our little community. When the proper time comes, I hope they will speak, and I for one will be glad to learn from them.

In closing, I will say that it is our duty to learn all the best

methods for conducting our business, and to try and formulate an absolutely perfect system, that is, if it is possible for us to do so. And in order to attain this, we must discuss all the different methods with each other in a friendly way, and try to avoid disputes. If we all work together as one man, we shall have in time a perfect system, and meet with the success we well deserve and ought to have.

A. SUNTER.

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*A NEW METHOD OF REDUCING THE FORMATION OF
SCALE ON TUBES IN ANY MULTIPLE EVAPORAT-
ING EFFECT.*

EDITOR PLANTERS' MONTHLY.

DEAR SIR:—It will probably interest your readers to hear something about the experiments I have been making with our Film Evaporator (Yaryan) in the way of introducing "scale catchers" into the tubes.

During the existence of the mill, now two seasons passed, we have experienced much trouble from scale collecting and coating on the tubes and thereby retarding the work of the evaporation and costing much more for fuel than the low sugar prices would warrant.

In the first place I may mention that we have tried various ways and means of getting rid of, or relieving, our evaporator of this great trouble, even at times resorting to the circulation of Caustic Soda at a density of 16 deg. Baume for at least one hour, then allowing it to remain in the tubes of each vessel for at least three hours, after which we used scrapers. We also tried circulation of the Caustic through the tubes for a considerable time, then putting steam on to the outside of the tubes hoping to pulverize the scale which could afterwards be removed with ordinary tube brushes.

Both of these methods were good in their own way but did not relieve us of our trouble for more than the first three days of the week. The use of strong Caustic Soda we also found very detrimental to the joints of the apparatus.

After planning and scheming the best methods of cleaning our scaly tubes and while in conversation with our manager Mr. Morrison, he suggested to me the idea of putting something into the tubes to which scale would adhere and which

could easily be removed and cleaned. His idea I thought good and so got some one-inch ordinary wrought iron pipes cut in lengths equal to the length of the tubes and provided at ends and in middle with small iron guards to keep them in a central position, one pipe in each tube. This we found an improvement taking on quite a coat of scale, but the trouble we experienced by the removal, cleaning and replacing these pipes caused us to think out some other and easier way of overcoming the scale difficulty, this we did most successfully by experiment.

Instead of the iron pipes we introduced a wood rod 16 feet long, the length of the tube, and 1" square into each tube allowing it to float in the juice while concentration was going on, this we found a most successful effort and proved quite a valuable addition to our apparatus, not only as a scale catcher but also by increasing the temperature of the juice and thus effecting a more rapid evaporation. The reason of this latter and most important advantage is that the juice space in the tubes will be reduced from a full open tube without the rods to about one-half the volume when the rods are in their central position, and as the steam, or vapor, outside of the tubes thereby will get a smaller and more divided body of juice to act upon, the circulation will be greatly increased and the evaporation more rapid. The following figures are taken from my actual work here at Makaweli and will conclusively prove the great advantage derived from the application of these rods, not only to a "Yaryan?" but I believe to any existing horizontal and vertical multiple evaporating apparatus.

Our evaporator is of the double, quadruple type, taking steam into top vessel, each vessel containing 120 tubes of 3" outside diameter and 16 feet long. In one of these vessels we placed 90 rods made of wood and one inch square, and from these 90 rods we got *43 lbs. of scale* after a run of three days. In addition to this great amount of scale and in comparing the work done in the same time and under the same conditions by the other top vessel without the rods, we had an increased temperature of from 4 deg. to 6 deg. and an increased density of the juice of 1.8 deg. Brix.

I feel confident from the results obtained by the experi-

ments I made here that these rods, or scale catchers, will prove a valuable addition to all multiple evaporators, and especially to the ordinary type of Triple or Quadruple effects in which the tubes are placed vertical, as in them the rods can be placed in the tubes and around the drums from the vapor space with either a spring or a metallic weight attached to the lower ends to prevent them from floating to the top while the juice is being evaporated. They may also be kept central in the tubes by screwing a few little half round brass headed nails into them, the thickness of the head to be equal to the juice space around the rods. For instance, take an effect with tubes say 2" inside diameter, I would suggest having the rods made 1 $\frac{1}{4}$ " diameter leaving a clear space for circulation of the juice $\frac{3}{8}$ " around the rod. It might also be an additional improvement to have the scale catchers in the tubes of the vessels where scale is most formed, fluted, thereby exposing a larger surface to the juice for the retainment of the scale, in that case the rods should be of a little larger diameter. The removing and cleaning of these rods is a very simple and easy matter in comparison to tube scraping, to say nothing of the harm done to the tubes by repeated scraping. One man can remove say a hundred of these rods in the same number of minutes, and when they are dry, by battering on the ends with a mallet almost all the scale will drop off leaving the rod clean and ready for replacing in the tubes.

I feel sure that the planters of these Islands will find this a valuable addition to their evaporators, if adopted, the cost being so small and the benefit so great.

Respectfully yours,

JAMES SCOTT,

Makaweli, Sept., 1894.

Engineer Makaweli Mill.

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SUGAR CANE DISEASE IN AUSTRALIA.

(Correspondence of the Queenslander.)

SIR:—Many of your readers will remember that in the year 1882 I visited the Clarence and Richmond rivers at the request of the M'Ilwraith Government to prepare a complete report on the condition and prospects of the sugar industry, and to deliver two or three lectures on the advantages of the soil

and climate of North Queensland. One result was the visit to Queensland of nine New South Wales men, who took up 8,820 acres on the Russell and Mulgrace, and paid £8,820 to the Lands Office, besides introducing a large amount of capital. Of these nine, three had their money returned, on their own request, by the Minister for Lands, as, being non-residents of the colony, they were not qualified to select. Six remained, and besides paying our land revenue £5,820 expended at least £8,000 on their selections. I could have introduced scores of valuable selectors at that time had non-resident men been able to select. Every possible encouragement was given by Mr. Perkins, then Minister for Lands, but the people were afraid of incurring risk from a change of Ministry before issue of titles, and four who did select and were unable to come and reside here had their money returned. However, there was a clear sum of £15,820 left as a set off to the £100 paid to me for the report. In that report I predicted a slow but sure decline in the sugar industry of the Clarence and Richmond, and foretold the failure of the small mills. For this prophecy I was ferociously assailed by the Sydney Press. I clearly foresaw disaster to the cane from frosts, droughts, and an uncongenial climate calculated to ultimately create disease. There were then forty-three small mills on the Clarence, and the two large mills belonging to the Colonial Company. On the Richmond there were thirty small mills and one Company's mill. Today on the Clarence the Company have one very large mill, and the forty-three small ones are reduced to five. On the Richmond there is still only one company's, and the thirty small ones are represented by four, exclusive of one in the "Big Scrub."

The following letter by last mail from my brother, who has the largest private mill on the two rivers, contains some specially interesting information concerning the very serious character of the new disease. He writes from Woodburn, on the Richmond, and says:—"The largest single field of cane contains about fifty acres. The company pays 12s. per ton in the field, cuts the cane and loads the carts, allowing the grower 1s. extra for carting to the punts, or a total of 13s. The yield varies from half-a-ton to five tons of sugar per acre.

The cane has been very bad this year, and the disease is doing sad destruction. On cutting the cane, a yellow gum oozes from the cut. In the pan the juice bubbles up like boiling fat, and refuses to grain. You can only boil up and empty into coolers to granulate, the same as with the old Wetzel pan sugars.

"My son took twenty-two hours to grain a charge in the vacuum pan, and in the last hour a pressure of 70 lbs. of steam barely moved the surface, and after emptying the pan he had to boil a charge of caustic soda to clean the inside and free the coils from a gummy substance that defied the heat to move it off. There is deplorable news from the Clarence, where the cane is almost a total failure, and the Company may not have more than six weeks' crushing next year. All the mills have shut for the season, and on the Richmond only the Company and myself are at work. I have still five weeks' crushing. The disease is not nearly so bad here as on the Clarence, but I dread next season as we are always a year behind the Clarence in diseases. The last twelve months have been specially calamitous. The floods destroyed nearly all the crops on the upper river, and the salt-water tides rose abnormally high, overflowed the banks, and killed the cane on the lower river. The destruction was deplorable, and now the disease threatens the remainder. I am doing my best to introduce new varieties of cane. Only two sorts are affected by the disease—the 'Gray Fiji' and 'Mauritius Ribbon'—but unfortunately these are our staple canes, and time is required to obtain another variety."

SISAL AND OTHER FIBER-BEARING PLANTS.

(F. Alber Smith, in the Manufacturers' Record.)

For many years there has been a steady encroachment of fibres prepared from green plants direct upon the various fields in which the old-process fibres, flax and hemp, have been used. This movement has been watched with the greatest interest. It is within the memory of men still in the cordage business that Russian and Italian Hemp were the only material from which good cordage could be made, and it was with great reluctance that the English accepted ma-

nilla (plantain) fibre in lieu of Russian and Italian hemp. With even greater tenacity did our own manufacturers reject the offers of fibre from the agave plant, "sisal," but now the agave plant furnishes the chief material for the manufacturers of binding twine in this country and elsewhere, and also for certain kinds of cordage and bags.

During 1893, Mexico exported 120,000,000 pounds of sisal, and the Philippine Islands considerably more. This change has not been effected by reason of superior intrinsic worth of the new fibres, for in fact a well prepared Russian, Italian or American hemp still has a claim to superiority. The fibres are annuals, and from their nature and the customary methods of preparing them for the trade, the product is unreliable in quantity and quality. All annual crops are more or less hazardous by reason of excessive drougths and moisture during the growing season, and for the same reason the commercial value of the product fluctuates. Flax and hemp have an additional element of uncertainty as a result of the prevailing methods of spreading the stem upon the fields after harvest for the purpose of receiving rains and dew, in order to effect a partial separation of the fibrous bark from the interior woody portion, so that subsequent mechanical treatment will give a commercial product. The time usually required in growing flax or hemp is about three months, and the time that usually elapses from seeding to the completion of the prepared fibre and sale is about twelve months. A recent estimate in Ireland places the cost of producing one acre of flax, including the preparation of the fibre, at \$50.00 and the yield of fibre at 600 pounds, making the cost of fibre $8\frac{1}{3}$ cents per pound.

The varying conditions under which the fibre of flax and hemp are obtained make it exceedingly difficult to estimate an average cost or yield of these old and once popular fibres. Jute of India is also an annual and subject to the same misfortunes while growing as flax and hemp, and its commercial value is likewise subject to similar fluctuations. Jute fibre has at no time had anything to recommend it but its cheapness. India Jute is apparently losing its prestige for cheapness.

Improved machinery now available and generally adopted in producing fibres from the agaves and allied species of leaf fibre-bearing plants is quietly revolutionizing the fibre industry. The agave plants of Yucatan and other parts of Mexico, South and Central America are beginning to furnish a large portion of the demands of commerce for fibres. Fibre is now produced from the agave leaf as cheaply as the Hindoo produces the jute fibre. The fibre is superior in strength and cleanliness. The life of the agave plants covers a long term of years without replanting. The fibre is extracted every month in the year. The commercial fibre is obtained direct from the leaves by mechanical methods; hence the fibre is uniform in quality. The fibre may be baled and shipped the same day the leaves from which it was extracted were cut from the plant; hence the income may be as regular as the production. The supply is uniform from year to year. The great variety of fibre-bearing leaf plants permits the producer to furnish many grades of fibre—qualities to supply a demand from the finest linen to the heavy hawser.

All these grades can be grown in Florida, Texas, and tropical countries. Sisal grows luxuriantly in Florida. I have received fine specimens grown as far north as Sanford. The growth and preparation of this fibre should be as cheap in Florida as anywhere in the world. Florida reported for 1890, 2,189 acres devoted to pineapple culture; now there are more than 4,000 acres in cultivation, and it is said that more than 865,000 acres of Florida lands are suitable for pineapple culture.

The fibre of the pineapple leaf is suitable as a substitute for the finest linen. The choicest fabrics known to commerce have been made of the fibre of pineapple leaves. This fibre can now be produced cheaper than is possible to produce flax fibre. An immense quantity of pineapple leaves are now in Florida, and the demand only awaits the offer of the fibre in sufficient and regular quantities. The "*Bromelia Sylvestus*" is a plant growing in considerable quantities in Mexico, Central and South America. There is very little doubt but that it would grow in Florida as luxuriantly as pineapple or sisal. The leaves are six to twelve feet long and contain an exceedingly fine and strong fibre.

P. L. Simonds, F. R. C. J., an English author on British industries, says: "Ropes and cordage made of it are much stronger and more durable than those made from hemp; they are also lighter and more pliable; do not require tarring, by which hempen ropes lose much of their strength, and bear the alterations of dryness and moisture with little injury, while the difference in hygrometric action is considerable.

"Cables made of this material—pita fiber—are acknowledged by the admiralty board to be much superior to those made from hemp.

"The weight of pita is one-sixth less than hemp, thirty feet of one-inch rope made of the best hemp from the Royal Dock Yards weighing twelve ounces, and the same made of pita only ten ounces.

"In a vessel of 120 guns the weight of standing and running rigging, which in hemp is fifty-four tons seven hundredweight and two grs., in pita would be only fifty tons six hundredweight and nineteen pounds, making a sensible reduction in top weight and increasing thereby the stability of the hull, not to mention the saving in first cost.

"In a five months' trial, carried on in H. M. S. Portland, the hygrometric action of the pita ceased after the third day, while in hemp it continued the whole time, a log line 300 feet long in pita contracting only nineteen and two-tenths feet, while a hempen one contracted twenty-four and six-tenths, being five and four-tenths feet in favor of pita.

"The superiority of the pita over hempen ropes is undoubted, and I annex an extract from a report by a Belgian engineer who has closely studied the question: 'Ropes made from the pita,' says Mons. Chevremont, 'possesses a greater average strength by four times than those made from hemp of the same diameter and manufactured by the same process.'

"By the operation of tarring, ropes of hemp lose nearly a quarter of their strength, while ropes made from the pita, from their nature, are exempt from this operation (their natural gum acting in lieu of tar), and their smooth surface protects them from wear by friction.

"The specific gravity of ropes of pita compared with ropes of hemp is as nine to fifteen; it is, therefore, clear that a rope

of the vegetable silk weighs six-fifteenths lighter than a rope of hemp of the same diameter and length.

"Squier, in his 'Tropical Fibres,' states that the fibre of this plant is probably more valuable in every sense than those of any other tropical plant."

This plant has never been brought into a state of cultivation like the sisal plant, owing to the difficulties of adaptation of machinery for extracting the fibre. That having been overcome, the opportunity is offered to Florida for utilizing another fibre plant. Florida has already acclimated the fibre plant "Sanseveria," which produces fibre equal to flax or hemp. Florida has untold wealth in the future production of fibre. Besides the 120,000,000 pounds of sisal fibre annually imported into the United States, about the same amount of manilla fibre is imported yearly. More than 150,000,000 pounds of manufactured jute are received at our ports from abroad each year. Sixty million pounds of raw jute are annually imported at a cost during the past fourteen years of three and a quarter to five cents per pound, and sisal can be produced in Florida as cheaply as jute is produced 2,000 miles inland from Calcutta.

And in addition to the above, 140,000,000 pounds of jute butts are annually imported at a less cost.

The annual increase in the consumption of long fibres in the United States is larger than that of any other nation.

The United States is a larger consumer of long fibre for handling the cotton crop and its products than all the world besides.

The United States is a larger consumer of long fibre (in twine) for harvesting grain than all the other countries of the globe.

Neither Yucutan or the Philippine Islands possess a factory for the manufacture of their fibre, and for practical reasons they could not; but there is no good reason why Florida could not spin its own fibre.

It has been demonstrated that it pays to spin cotton in the South near to the cotton fields. Why, then, should it not pay a much greater profit to spin fibre having one-third the value of cotton per pound near to where it is grown? For more detailed information concerning pineapple and other leaf fibres the reader is referred to report No. 5 by Mr. Charles R. Dodge, Department of Agriculture, Washington, D. C.

IMPROVEMENT IN THE QUALITY OF CANE.

There is little question that the above subject deserves very much more serious consideration than it has received of late years. We do not refer so much to the discovery of a new method of selecting plants, but to the application to its fullest extent of such knowledge as we already possess. The common canes cultivated in Queensland are known as the Meera and the Rose Bamboo or Rappoe. These have been grown and bred from over and over again, and, as it was expressed by a leading grower at the Mackay Agricultural Conference two years ago, the body has been worked out of them. Today the industry is being rushed by large numbers of men who, however, competent they may be to grow cane, have no experience to warn them against the danger of exhausting the stock from which they are planting. The Queensland rust of the seventies, and the denudation of the fields on the Clarence River in New South Wales today are both due in a greater or less degree to the same cause—exhaustion of the cane stock. The day has arrived when, if we would avoid worse evils, we must make a determined effort to thoroughly renew the body of the cane from which we plant. We do not pretend that there is no one trying to do this already, but the majority are not endeavoring to do so, and it is upon the action of the majority that the healthiness or otherwise of our fields will depend. The streets and squares of our city may be clean, but if the slums and alleys are unhealthy, disease will spread from the latter and attack and devastate the former. Efforts are being made to import canes from the Sandwich Islands and to improve our stock by other means, but these will have to be assisted by a far more general effort if any real good is to be done. Not only must absolutely new canes be, if possible, procured, but the stock at present used must be strengthened. The importations of new sorts from abroad, and their careful nursing, may give us new seed cane, and it would be well worth the while of some of our more energetic growers to combine and offer a reward for the production of, say, two-year old cane grown from seedlings. But while this is being done the stock now used should not be neglected. Every individual grower can do something towards improving his cane. The mill-owner can assist by

taking canes that, even if they appear somewhat low in saccharine matter, are by reason of their strong growth and consequently disease resisting qualities, likely to prove a more reliable cane than that at present used. Even the Rose Bamboo could probably, by nursing on rich scrub lands and by judicious manuring, be brought to give strong and healthy stock for seed. The mill-owners have yet to consider whether it will not pay better in the long run to take a cane slightly lower in saccharine contents than to run the risk of failure through a disease in the superannuated canes now generally used. It is a duty with the organized bodies of farmers to endeavor to persuade their members to do all in their power to check the deterioration of cane, which to all thoughtful men is daily becoming more evident. These remarks apply with greater or less force to all the sugar districts of Queensland, and we trust they will not pass unheeded. We do not pose as Cassandras, nor do we desire to convey the impression that the danger of disease is very imminent, but we do contend that, unless those with experience come to the front to check the tendency to perpetuate the inbreeding of the cane, they, with those now entering upon the industry, will in a few years rue the day when they neglected the warnings of the last few years and the experience of half a century. Nor do we consider that the Government of the country will be able to hold itself entirely blameless if it fails to utilize to their full extent the State nurseries now established. If the rust in wheat, or the phylloxera in the vine, can constitute calamities of national importance and justify State interference, then equally in Queensland is the protection of the great sugar industry against the enemy of decay a matter which the State cannot afford to refuse.—*Queensland Sugar Journal*.

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THE USEFUL VARIETIES OF NUTMEG.

The oldest works making mention of the nutmeg speak of several kinds which have attracted the attention of the earliest Dutch travellers. In 1596, before the conquest of Banda, Linschoten mentioned two kinds of nutmeg—round and long—and in 1605 Clusius gave drawings of a fruit branch of *Nux myristicamus*, as well as the ordinary nutmeg.

As the intercourse between the Moluccas and New Guinea

increased, an entirely new kind of nutmeg came into the hands of Europeans—the *Myristica argentea* Warb. This was probably first noticed in 1666. Since the middle of the eighteenth century it became an article of commerce in Eastern Asia. Towards the end of that century it was brought to Europe and at the present time it is the most important article of export from New Guinea. Nevertheless, this nutmeg remained undescribed and unknown as well as the plant by which it is produced.

Warburg succeeded in obtaining information on this point through the assistance of a native who was persuaded to show him some of the trees in Dutch New Guinea. They were characterized by large leaves having a silvery appearance at the under side and hence the name.

Next to *Myristica fragrans*, *M. argentea* is certainly the most important variety and that which has the greatest future. The odor is not so delicate as that of the true nutmeg, but that may be due to the circumstance that it is not prepared and packed with as much care as the true kind. The export from the province of Onin is estimated by Beccari to have amounted to about 125 pounds at the middle of the 18th century and it exceeded in importance that of all other produce.

Since then the regular service of steamers has led to a great increase in this trade. Formerly the nutmegs were sent in small parcels by ships to Banda, there treated in the same way as true nutmegs and sometimes mixed with them. Now they are all taken direct to Macassar where they are all shelled and dusted with lime. The price of them in Macassar is about one-third that of the best quality of true nutmegs.

While formerly these nutmegs were used only in the Malay Archipelago, in the Philippine Islands, etc., by the natives, probably on account of their cheapness, as *Para papua* in the Malay country, as *Anizmoscada* in the Philippines, and came only occasionally to Holland and England, they are now regularly imported by way of Amsterdam into England as long nutmegs.

Apart from the fact that the aroma is not so delicate, the nutmegs are also very friable, but the broken fragments can

be used for the production of essential oil. They are also very liable to be attacked by maggots even when they have been limed. The aroma is very permanent even when the nutmegs have been kept for a number of years. Samples dating from the previous century have still a strong smell when crushed.

Hitherto the mace has not been brought into commerce. Samples of it brought to Europe have a dirty-gray to brown-red color, but this is probably due to defective drying, since some of the nutmegs brought over by the author have a fine dark-red arillus that is very oily and has a powerful odor. It is uncertain whether in drying the mace would acquire the yellow-red color of that from *M. fragrans*, but it is certainly capable of being made useful, provided it can be properly prepared.

These nutmegs would come into actual competition with true nutmegs only in the event of their being carefully cultivated and gathered, as the produce of *M. fragrans* is in Hainan, and it is not improbable that their lower price would be compensated by a large yield.

The nutmegs of *M. argenta* differ from true nutmegs in their narrow, long shape and the relatively less marked arillus furrows. The arillus generally consists of four broad stripes, which are united above and below. The same, with the hard shell, is from $3\frac{1}{2}$ to $4\frac{1}{2}$ Cm. long and from 2 to $2\frac{1}{2}$ broad. It is broadest at the base and becomes gradually narrower toward the end, externally of a bright red-brown color when fresh, but as met with in commerce it is generally rubbed and of a yellow brown color.

The fruit is embedded in a very thick pericarp, and when fresh it is from $4\frac{1}{2}$ to $6\frac{1}{2}$ Cm. long and $4\frac{1}{2}$ to $5\frac{1}{2}$ Cm. broad. The testa is nearly 1 Mm. thick. The endosperm contains much starch, and the brown runcination streaks, which alone contain the aroma, are more scattered and coarser than in the true nutmegs. The cotyledons are joined in a disc swelled at its edges to 5 Mm. diameter.

Among the available kinds of nutmegs the author mentioned *M. succedanea* Reinw., discovered by Reinwardt in the island of Tidore, one of the Moluccas, in 1821. The nutmegs can scarcely be distinguished from those of *M. fragrans*, and they

are very aromatic. The leaves and flowers of this variety are, however, quite different from those of *M. fragrans*.

In New Guinea there is a great number of varieties of nutmeg plants, the produce of which possesses some aroma, but, though permanent, it is generally too feeble to admit of these kinds being used to any extent as substitutes of true nutmegs.

As an adulteration of true mace the arillus of *M. malabarica* Lam., known under the name of Bombay mace, has been used during the last two centuries. It is much larger and more cylindrical than the arillus of true nutmeg, and the several flaps are united at the apex, forming a conical structure. The anatomical structure is also different, as may be seen by the aid of a microscope. When moistened with hydrochloric acid, the Bombay mace presents the marked peculiarity of assuming a greenish color.—*Dr. Warburg, before the Berlin Pharmaceutical Society.*

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THE WATERMELON SEASON AND TRADE IN AMERICA.

The sign "Melon today," displayed on a trio of the tempting glossy green fruit in the cafe windows notifies the public that the day of the famed Georgia watermelon is at hand. The small gamin of all shades flattens his nose against the pane, sighs regretfully and tries to console himself with the reflection, "Bime bye Unkle Rub'n sell um cent er slice," and with a whoop he rushes off with his neglected papers. If he could behold the pickaninnies on a southern melon farm burying their grinning faces in slice after slice of the juicy fruit his patience would be sorely tried. The busy man, as he eats his after-dinner melon and reads his *Star*, probably has no idea of the importance that this same melon has as a factor in the commerce of the south, rivaling even the peanut and the sweet potato.

When the railroads invaded the southern wilderness the managers saw at a glance the immense profit they would reap if ways and means could be devised to transport the melons which grew in such surprising abundance, to the northern states. The greatest difficulty lay in teaching the natives how to cultivate the melon. To them the idea was preposterous, gilding the lily, so to speak, but after many experi-

ments and losses a melon was developed, juicy, crisp, yet tender and with just the right thickness of rind to bear the many handlings before reaching its destination. Thus the Georgia melon, as we know it, appeared.

The managers of the railroads have done everything toward building up the now immense trade, visiting the homes on their roads and distributing seeds among the people who were too poor to buy them.

As soon as the watermelons are ripe for shipment begins a scene of bustle and activity, cutting, testing and piling the wagons and ox-carts to go to the stations, where the cars stand waiting for their freight. At the station the women, pickaninnies and men gather like bees around honey—melon being free to all comers—for besides the left overs there's many a slip 'twixt the hand and the car, and then how the pickaninnies revel. But the most picturesque scene is the great Boston or New York steamer loading up. Early in the morning, when the sun is just getting across the water, a small carload is scudding along before the breeze, setting well down in the water, the melons piled high. Another follows in her wake, and then another and another, and they drop down across from the steamer. In a few minutes a line of rowboats stretches between, and the men toss the melons from one to the other until they are safe in the vessel. As their lithe, blue-clad figures sway to and fro they keep time to a song with sweet rhymic swing. Occasionally there is a splash and a melon bobs up on the waves. Yah! yah! rings across the water and the shout of derision; "'Pears like your fingers is all funbms." Other splashes follow and the eager little wharf rats tow the melon ashore.

Some idea of the enormity of the watermelon crop may be formed when the number raised annually in the United States is put down at 150,000,000. When the crop in South and Central America, the various islands, China, Africa, etc., are added, it will be seen how the watermelon ranks as one of the world's food supplies.

A great wave of pity not unmingled with contempt sweeps over the southerner when he learns that the delights of the watermelon are unknown in England—that what is there

called a melon is only a musk-melon, and raised under glass at that.

Millions of dollars count up after the melon season, but this year, owing to the strikes, the receipts will be lessened and the melon farmers lose heavily. Upon the melons thousands depend for a living. The trainmen who run the fast fruit specials, 2,000 cars passing over one line alone to Chicago; the laborers on the farms, the gatherers and shippers. Then the commission merchant comes in for his share of the profits ere the melon gladdens the public palate through hotels, cafes, hucksters and curbstone venders. The housewife carefully saves the rind for pickles and preserves, while an excellent sweetmeat of the rind spiced is sold in the shops.

While the Georgia watermelon plays an important part, no true Washingtonian would award it the palm of superiority over the branch melon, for the melon raised around here is hard to beat. Cornfield Harbor, famed for the ice-cream melon, a variety with pale green rind and white meat and seed, must not be passed by without mention. In a few weeks the streets will echo with the cry of "Watermillyns, sweet watermillyns—plug 'em at your door." The little shops will bear the magic sign in straggling letters: Watermelon on ice, 2 and 5 cents a slice. The clam man's cart will be deserted for the more attractive pennyworth at his rival's, the melon vender's. And Saturday nights one side of the market, amid flaring lights from the spouts of battered coffee pots and the babel of voices, there will be a mighty thumping and plugging of melons, and all Washington will feast. With the small boy at the window we say speed the day.—*Washington Star*.

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CUBA AND ITS SUGAR INDUSTRY.

(Translated for the Sugar Journal from Die Deutsche Zuckerindustrie.)

Cuba has rightly been called the pearl of the Antilles. Even 400 years of Spanish taxation and oppression has been unable to go through the riches of the island, a trial hardly any other country in the world would have been able to pass through. It is more than probable that if Cuba were gov-

erned by another nation whose object would be not to politically gag the country and drag its finances downwards, but to assist it in promoting the influx of capital and immigrants, then we are convinced that the wealth of the island would develop itself in a way that would astound the world.

The soil is very fertile, with an underlay of chalk, but only a small part of the land is under cultivation. The hilly country in the East of the island gives a rich harvest of sugar cane, and if there was a sufficient number of workers the cultivation of coffee and cocoa could profitably be recommended. In 1891, 815,000 tons of sugar were produced; in 1892, 965,000; in 1893, 819,000; and the estimate for 1894 is about 1,000,000 tons. With sufficient capital and workers the production could inside 10 or 15 years easily be increased up to a couple of million tons. Cuba has also any quantity of minerals. Gold, lead, copper, iron, asphalt, and petroleum are found on the island, though only iron and copper are of any avail. There are enormous deposits of the best iron quartz, which is specially well qualified for Bessemer steel, near St. Jago de Cuba, and in such a favorable position close to the sea that the loads from the mines can be taken straight on board the ships. These mines are worked by American capitalists, and the quartz is at an average of about 50,000 tons a month sent to Pennsylvania. On the hills, mostly yet uninhabited, grow large quantities of the best sort of wood used in the furniture trade.

The geographical position of the island and its climate are specially favorable, 700 miles long, and nowhere wider than 130 miles, Cuba has a shore of over 1,700 miles with a great number of excellent ports, particularly in the North. Though the climate is tropical, it is very healthy, and during the dry season not too hot; the nights are always cool, so that the heat of the day has no bad effect.

Cuba has got no industries save sugar, rum, and cigars; everything else is imported including food, with the exception of sugar, meat, and fish. A heavy duty is imposed on everything, making life here most expensive. The duty on flour was, until a few years ago, 100 per cent. *ad valorem*, and was always a matter of discontent amongst the inhabit-

ants. According to the latest treaty with the United States the flour duty has been put down to 25 per cent. Commercially, Cuba is far better off with the United States than with its mother country, Spain. Nearly all its sugar and tobacco, as also all minerals produced, go to America, from where are imported the machines for the sugar industry, engines, wagons, flour, beans, meat (smoked and tinned), kerosene, wood for building purposes, hardware, and soft goods. More and more American capital is invested in Cuba, particularly in the sugar plantations, which makes the island far more an appendix of the United States than of Spain. The people are aware that they can expect nothing from Spain but the most unprincipled treatment, and this is the reason of their frequent attempts to separate themselves from that country. Our readers may yet remember the last, long lasting revolution which was ruinous to Cuba, and cost Spain many thousands of soldiers. Shortly after the Government had put down the revolution, the emancipation of the slaves followed, which for some time considerably decreased the output, and the effects of which even yet have not been got over. Spain gets a considerable income from Cuba, the reason why she, of course, makes every effort to keep the island. Though the Cubans are not over fond of the Americans, they are fully aware that the best thing for them would be to enter the Union of the States, and if the geographical position and the natural riches of the island are considered, it would seem that hardly any amount could be too high for the States to pay for getting possession of Cuba.

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TEA CULTURE IN THE SOUTH.

A Fayetteville, N. C., correspondent of the New York Evening Post says:

"Some fine specimens of American tea have been sent from here this season to northern markets, and the result of the sales seems to indicate that the culture of this crop in parts of the South may yet lead to large fortunes. It is not generally known that attempts were made to establish tea gardens here before the war, and since the end of that outbreak systematic efforts have been made to revive the old gardens.

Professor Massey of the State Agricultural College has been instrumental in trying to spread information among the farmers concerning the culture of tea, and a few have been induced to put out gardens. The tea sent from the old Smith farm this season brought eighty cents a pound, and some from the Summerville gardens in South Carolina brought as high as \$1.00 per pound.

As far back as 1847 Junius Smith of Greenville, S. C., started a tea garden on his place, where he showed considerable skill and knowledge in handling the plants. But the war broke up his venture, and left the gardens to take care of themselves. The tea plants had to struggle for years for a position among the pines, cherry laurels and green briars. But despite these unfavorable surroundings they have continued to thrive, and today they are tea trees rather than plants. They have demonstrated by this success their right to live on the soil.

Mrs. Junius Smith, widow of the old tea planter, still lives on the place and makes tea from the plants that her husband started in those antebellum days. Some of this tea has been sold and tested in New York, bringing invariably from 80 cents to \$1 per pound.

In South Carolina Dr. Charles U. Shepard, than whom no man has done more to introduce and popularize tea culture, has revived the old government gardens at Summerville. His pretty country place is called Pinehurst, and near his home are six tea gardens of recent planting, averaging an acre each, and others are in course of preparation for planting. The plants are now in excellent condition, and from some of the gardens several crops have already been sold in the North. Dr. Shepard is an enthusiastic experimenter, and understands the culture of tea to perfection. He says that the leaf grown in the South is better for black than for green tea, and that the cost of picking is about 25 cents per pound of cured tea. On a large scale and with the best apparatus for gathering and curing, this cost might be largely reduced. He feels confident, however, that cheap tea culture could never be made profitable here, on account of the lower wages that rule in Japan and India and China, but the higher grade teas can be

grown with considerable profit. Dr. Shepard is increasing his tea gardens every year, and when the plants are old enough to yield good crops, he proposes to put in good machinery and start into tea selling for money.

Professor Massey says that the finest tea he ever tasted was grown in the South, and he has no doubt but it will be a future profitable crop in the Carolinas. An expert tea grower from Assam, who had charge of the Summerville plantation under General Le Duc, says that with negro labor he can raise tea more cheaply than is done with coolie labor in India, because of its greater reliability.

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CONCERNING FERTILIZERS.

The following letter lately received by Mr. A. F. Cooke of this city, from E. O. Painter & Co., editors of the Florida Agriculturist, and a well known authority on fertilizers, will interest those who are endeavoring to find the best fertilizer for use in these islands. Florida Phosphates, which have become so well known abroad we are informed, will soon be offered for sale here.

Deland, Florida, July 31, '94.

Mr. A. F. COOKE, Honolulu, H. I.

Dear Sir:—Your favor of June 13th has just reached us. We can readily see why muriate of potash is more largely used in California, or your islands, than the sulphate, as it is considerably cheaper per unit of potash, but we believe the time will come when there will be very little muriate used in the fertilizers that are wanted for sugar cane, or in fact for anything from which sugar is to be made.

We note your inquiry regarding iron and potash. Our experience in that direction is very limited, in fact we have no iron soil to contend with at all.

The question of acid phosphates, however, is one that is receiving considerable attention. Most of the fertilizers on the market have more phosphoric acid than is needed and consequently the amount is increasing in the soil all the time, at least soil analyses here show this to be a fact. We would suggest the use of phosphoric acid, such as is found in our soft phosphate, on land where acid phosphate had been used. The excess of phosphoric acid will furnish the plants with all they require until the soft phosphate becomes soluble, and will not hurt the plants nor injure the land.

I should very much enjoy a trip to your Islands, to compare your farming methods, fruits, etc., with ours, and have no doubt but that it would prove beneficial in many ways. We might be able to "swap" items that would be mutually beneficial.

Yours very truly,

E. O. PAINTER & CO.

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PLUMAGE HUNTING IN THE TROPICS.

Not very long ago I accompanied a gold-mining expedition into the tropical forest of Guiana, and stumbled across an English traveller who was collecting birds for a London and Parisian firm of merchants. He was settled in a village of Acaouis Indians, far from any of the haunts of the white men, and I stayed a couple of days with him and watched his methods.

Every male Indian of the village was in his service, and at the conclusion of each week they received pay, according to results, in cheap knives, powder, hatchets, cooking utensils, &c., pay-day being usually celebrated by a feast, in which all the men got fearfully intoxicated on a filthy compound called Paiwarri.

We started out every morning immediately after breakfast. The Indians were armed with bows and arrows and blow-pipes. The collector divided them into sections and sent them off into the bush, himself accompanying one group, but without doing any shooting. In a very few minutes the men were all scattered, each creeping and crawling through the almost impenetrable undergrowth and working on his own account.

I fastened on to a man and a boy and kept close to their wake all day. The man went cautiously ahead, disturbing every piece of bushwood or foliage likely to contain a victim. The large birds he killed with the bow and arrow, the smaller ones with the blow-pipe, through which he shot a tiny dart. Some of the birds were so small that the use of a gun with the finest of shot would have blown them to pieces.

With the skill of a denizen of the woods my man did not walk a step without rousing a feathered creature of some sort. Sometimes a large bird—a toucan or macaw—would flap clumsily out of a bush, and the twang of the bow-string would announce its death. Small birds fluttered across our path constantly, and they were promptly brought down with the

pipe. Now and then a flight of a score or two would suddenly settle all over in the branches about our heads, and on these occasions the Indians managed to kill a dozen or so before they appeared to realize their danger.

It was kill, kill, kill, without a moment's pause. Nothing with feathers on it was allowed to pass; and the arrows and darts left nothing but the tiniest puncture in the little creatures. The slaughter continued with half an hour's interval in the middle of the day, until about three in the afternoon.

As the birds fell the boy secured the bodies and dropped them into a long wicker basket, which was strapped across his forehead and hung down his back.

On our return to the village the men were coming in and emptying their baskets on to a long table in the middle of the Englishman's hut. Many of the birds were of the most brilliant plumage. Several king humming-birds—a species only discovered a few years ago, and peculiar to Guiana—were brought in, and those would be reserved for some museum in Europe, I noticed also one or two specimens of the brilliant cock-of-the-rock. But there were hundreds of birds not boasting any brightness of color, that were of no use.

The slaughter, in fact, is much greater in regard to the birds that are not wanted than those which reach the English market. When all the baskets were empty there was a heap on the table fully three and a half feet high.

The collector, stripped to the shirt and with the sleeves rolled up, set to work at once, going through the game. He handled every bird, dropping those pretty enough for a bonnet, or valuable enough for a collection, into one heap, and the useless ones into another.

Not more than one bird in ten was retained; the rest had been slaughtered uselessly. When I reproached my friend with this wanton waste of feathered life, he replied that he could not attempt to kill the birds himself and it was impossible to get Indians to discriminate between valuable and worthless specimens.

The moment he had made his selection he began roughly skinning the birds and pickling temporarily, for in the tropics a skin would be loopholed by insects were this work neglected

for an hour. Then his day's labor was done, and he prepared to devote the rest of the evening to eating and smoking, with occasional visits to a curiously-shaped jar of Hollands gin.

In conversation he informed me that many beautiful birds, once plentiful in those regions, had become entirely extinct.

"But" he added, "women will have their feathers, and as they pay for them why should I care."—*From Cassell's Saturday Journal.*

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FLOWER-PRESSING FOR MONEY.

In Colorado a woman has built up a successful business in collecting and pressing wild flowers to be used in making souvenir books. Why could not the same kind of a business be worked up in Hawaii where wild flowers are so abundant and beautiful? We fancy the opportunity is only waiting for the right person. Of the Colorado woman's success an exchange says:

The sentimental young person who presses flowers as mementoes of various occasions, has probably never considered the financial possibilities of flower-pressing. But that there is money to be made from the business is proved by Mrs. A. G. Conrad, of Colorado.

Mrs. Conrad went West in search of health several years ago. Like most western tourists she was afflicted with the mania for sending pressed flowers home to friends in the East. By and by the thought occurred to her that she might make a business of flower-pressing and souvenir-book making. She opened a booth, gathered and pressed her flowers in the summer, and made souvenir books of them in the winter. At the end of the second year she had a contract that called for 80,000 pressed, unmounted wild flowers, at 50 cents a hundred for the next season. By this time Mrs. Conrad was beginning to be ambitious. She bought a ranch where wild flowers were particularly abundant. There she lives now, increasing her business all the time and gaining strength as well. The income from her flower business has paid for the ranch, and supports her comfortably. She employs a number of women, generally semi-invalids and tourists.

FRUIT FOR MEDICINE.

A London physician has a very interesting paper in the *London Lancet* on the uses of fruits in the relief of diseased conditions of the body. To us of this land of fruits the writer's article is worthy of perusal, coming as it does from one who has made the medical uses of fruits a study for nearly a generation. The physician says that he does not want it understood that edible fruits exert direct medicinal effects. They simply encourage the natural processes by which the several remedial processes which they aid are brought about.

Under the category of laxatives, oranges, figs, tamarinds, prunes, mulberries, dates, nectarines and plums may be included. Pomegranates, cranberries, blackberries, raspberries, barberries, quinces, pears, wild cherries and medlars are astringent; grapes, peaches, strawberries, whortleberries, prickly pears, black currants and melon seeds are diuretics; gooseberries, red and white currants, pumpkins and melons are refrigerants and stomachic sedatives.

Taken in the early morning an orange acts very decidedly as a laxative, sometimes amounting to a purgative and may generally be relied on.

Figs, slit open, form excellent poultices for boils and small abscesses. Strawberries and lemons, locally applied, are of some service in the removal of tartar from teeth. Apples are correctives, useful in nausea, and even seasickness and the vomiting of pregnancy. The oil of the cocoonut has been recommended as a substitute for cod liver oil, and is much used in Germany for phthisis. Grapes and raisins are very nutritive and demulcent, and very grateful in the sick chamber. A so-called grape has been lauded for the treatment of congestions of the liver and stomach, enlarged spleen, scrofula, tuberculosis, etc. Nothing is allowed but water and bread and several pounds of grapes per diem.

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Never allow your cows to be hurried to and from the pasture, and never allow a dog to worry them. In fact a dog is a useless thing around cows. He invariably barks or in other ways annoys them. Cows should be kept as quiet as possible, that the milk may be normally secreted.