THE

PLANTERS' MONTHLY

PUBLISHED FOR THE

PLANTERS' LABOR AND SUPPLY COMPANY,

OF THE HAWAIIAN ISLANDS.

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A very fine sample of coffee is acknowledged from Mr. C. Hooper, of South Kona, Hawaii, who has commenced a coffee plantation near Hookena. The trees look healthy and bear well, and the prospect is now fair for good crops. We wish him every success.

The latest New York quotation, February 7, for Cuban centrifugals of 96 degrees test is 5¾ cents. The present indications are that the price of sugars in the United States will not decline very much till the new European beet crop begins to be harvested, which will be about August or September.

A most remarkable change in the current of the sugar trade is the fact that though sugar is free in England, yet the sugar refiners there have had to contend with imports from Germany, France, Holland, and the United States, the total importations for 1890 amounting to 500,000 tons. The latter source of supply of the English market is the most unaccountable, and still remains unexplained.

The Cuban sugar crop, now being harvested, it is thought will be the largest ever taken off, or in the neighborhood of 800,000 tons. A large portion of this will undoubtedly find a market in the United States, particularly if Spain enters into

a reciprocity treaty with it, as Brazil has done. The advantage of such a treaty is so largely on the side of the sugar producing country, that such treaties will very soon be made.

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WITH OUR READERS.

The article on National health and cleanliness, (page 57), contains information which every householder should know, and nowhere is a knowledge regarding the rules of health more necessary than on plantations and around sugar mills, where fevers and other diseases are at times found, which could never exist with proper sanitary care. The writer says: "when men learn how much easier it is to prevent than to cure—that none of these diseases are spontaneously generated—we shall have gone a long way towards their total abolition, and they will be banished from our country."

Now that the price of sugar is about to be reduced to our planters, it will be wise for them to study and make note of any improvements which the experience of cane growers in other countries has tested. Some facts respecting the value of certain manures in Demerara are given on pages 63 to 66, which may be of use here, or at least serve as a guide. Some of our plantations have an inexhaustible supply of new sugar land, but most of them possess a limited area, which has to be cropped year after year. Only those who study the results obtained in this and other countries will be able to maintain the generous yields of former years.

An article on the preservation and analysis of sugar solutions will attract the attention of sugar boilers.

The very full history of attempts made in the United States to establish the beet sugar industry, commencing as far back as 1830, shows how persistent have been these efforts. (see pages 70 to 77.) Yet the result has generally proved a failure, until the more recent efforts in California and Nebraska. These latter have been undertaken by men who were thoroughly versed with the best mode of cultivating beets as well as manufacturing beet sugar, and they are likely to prove eminently successful.

On page 77 will be found the prospectus of the Kona Tea and Coffee Company, which it was intended to publish in the

January number. The company is now fully organized, and will immediately commence operations. Its prospects are very flattering, when the present high price of coffee is taken into account.

The report of the Paauhau Mill on Hawaii, printed on page 88, should have been signed by Andrew Moore, manager of that estate. The grinding, it will be seen, was carried on throughout the year, with the handsome output of 5,766 tons, which promises to be increased in 1891 to about 7,000 tons. And this the product of a three roller mill, 26x54 inches in size.

A very interesting article to horticulturists is that on tropical fruits in California, on page 89, in which reference is made to a new fruit, the pepino, that has not been brought here, so far as we know. From what is said there of the algaroba tree, it would appear as though it may soon be seen growing almost everywhere in Southern California, and wherever it is introduced, it will be found valuable for animal food as well as for fuel.

The value of McDonald's hydraulic regulator, as applied to sugar mills is set forth in an article taken from the *Louisiana Planter*. A few of our mills have this attachment, and all of them should possess it.

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THE LABOR QUESTION.

EDITOR PLANTERS' MONTHLY:

From present indications, there will be a scarcity of laborers and consequently a strong likelihood of trouble in the near future unless something is quickly done. There is at the present time far more cane under cultivation than there are laborers to take care of it, and as might be surmised the cane on some estates is choked up with weeds, and suffering for want of stripping and care generally. And still while it must be evident to all that the laborers are growing fewer, the planters are straining every nerve to plant more than ever before. How this is going to end is a question which I think might enlist the attention and earnest consideration of the Government and of all interested in the general prosperity.

The planters have ever shown an enterprising and courageous spirit, and it is hoped that they will not be left to suffer for these very commendable qualities unless they themselves are to blame for this state of things. Still it might be worth while to investigate this matter and see where the trouble lies. The men are no doubt leaving for some cause, and in most instances they have some grievance, whether real or imaginary it would be hard to say; but as there can be no effect without some cause, it is natural to suppose that there is some trouble at the bottom, which might be better understood and perhaps remedied.

We must not forget that though these laboring people are poor and ignorant creatures, they still belong to that great human family, which recognizes those eternal laws of justice which have existed ever since the world began; so that we must remember that these laws can not be infringed upon with impunity even to such as they are.

There is no doubt that there have been many instances of harshness and overbearing practiced towards them, but it is pleasant to notice that there is a growing spirit of kindliness and encouragement shown towards them which appears to have a good effect, as many now seem more satisfied with their lot in life, and with their general surroundings.

If we are to keep the men we have, we must do what is right by them, and if as much were done to keep them as there is to get them, there would perhaps be fewer leaving the country. SUGAR CANE.

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CANE VERSUS BEET.

While there can be no doubt as to the superiority of the cane as a sugar-producing plant, it is equally certain that its saccharine properties can be very much developed by having recourse to the improved methods and processes in use among the beet growers. "*Fas est et ab hoste doceri.*" We may learn something even from an enemy—learn it, too, in a sense better than was intended by the Latin poet. The meaning he intended to convey was that he who notices the mistakes of a foe gains thereby a lesson of advantage. The lesson that we ought to learn from our beet-growing rival is

the instruction that is to be derived, not from his mistakes and failures, but from his merits and triumphs. That the cane is intrinsically superior to the beet is further established by the fact that the contest between the two is even now, in spite of the enormous bounties pocketed by the beet producer, a drawn battle. For many years the scientific experts of the continent have been engaged in developing to the utmost the saccharine properties of the beet, and in devising machinery for the production of the largest possible quantity of sugar in the manufacture. If the colonial producer were in a position to employ the same improved methods of cultivation and manufacture in respect of the cane that his continental rival has employed in the case of the beet, he would be undisputed master of the situation. He would be able to place his sugar in the market at a price which would defy the competition of the most insane bounty-giving country in the world. In other words, improved methods of cultivation, supplemented by new processes and appliances of manufacture, would enable the colonial producer to make the natural cost of production so small as not to be capable of being reached by his continental rival save by the help of bounties too enormous to be bestowed by any sane government.—*Jamaica Standard.*

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BEET SUGAR CONTRACTS.

EDITOR PLANTERS' MONTHLY:

A Beet Sugar Factory is about to be erected on the Chino Ranch, San Bernadino County, California, and a Beet Sugar Plantation established. The Chino Ranch belongs to Mr. Richard Gird, and as it may be of interest to your readers to know the terms offered to beet growers, I send you herewith a form of contracts proposed, as published in *The Pomona Progress* of January 15, 1891. The Factory people seem to have protected themselves pretty thoroughly.

Yours truly,

WILLIAM O. SMITH.

BEET SUGAR CONTRACT.

THIS AGREEMENT, between Richard Gird, of Chino, in the county of San Bernardino and State of California, party of

the first part, and ..... party of the second part, WITNESSETH, That for and in consideration of the covenents hereinafter contained, it is mutually understood and agreed between the parties hereto, that the said party of the second part shall and will during the current planting and harvesting seasons of 189.. plant or cause to be planted .....

.....

.....

prepare the soil, sow the seed furnished by the party of the first part at cost, in quantities designated by the party of the first part, say between fifteen and twenty pounds to the acre, to cultivate, thin out, harvest, preserve from the sun and rain, and deliver said beets free from dirt as circumstances will admit, clean and in good condition, with tops closely and squarely cut off at the base of the last or bottom row of leaves, according to instructions received from time to time through the party of the first part; and for all beets delivered at factory according to conditions named above, the party of the first part agrees to pay as follows: Three and one-half dollars ($3.50) per ton for beets containing an average of at least twelve per cent of sugar to the weight of the beet, with a purity co-efficient of eighty; an additional twenty-five cents ($.25) per ton for each and every per cent of sugar contained above twelve per cent, as determined by daily tests made in a laboratory of the party of the first part. In determining the percentage of sugar, any fraction of one per cent under one-half of one per cent shall not be counted, but any fraction of one per cent not less than one-half of one per cent shall be counted as one per cent. The party of the first part reserves the right to reject very large beets, diseased beets or those parts of beets grown above ground not fit to be manufactured into sugar, or beets whose average is below twelve per cent, or whose co-efficient of purity is less than eighty.

Beets not properly cut and trimmed, or with dirt clinging to them, will be cleaned and cut, and the tare deducted from the weight of the beets, subject to mutual adjustment between the parties hereto as to expenses incurred and amounts to be deducted therefor.

Very large beets or those mostly grown above ground and diseased beets unfit to be manufactured into sugar, will be refused.

In case the building is damaged by fire or otherwise, in such a way that it is impossible to use or replace it in time to work off the crop, this contract becomes null and void, and the party of the first part agrees to pay the party of the second part fifteen dollars per acre for every acre contracted for and actually planted with beet seed at the time of the disaster, allowing the said party of the second part to retain the crop.

In case damage occurs before seeds are planted then this contract becomes void, and the party of the second part has no claim whatever against the party of the first part.

Credit will be given for seeds to responsible parties, if desired, to be deducted from payments on first delivery of beets.

The party of the second part agrees to plant all the seed furnished by the party of the first part, on the acreage contracted for.....and dispose of it in no other way.

Payments will be made on the 5th of every month for beets delivered during the previous month.

Notice shall be given to the party of the first part at once if anything detrimental occurs to the crop after the seeds are in the ground.

Signed at Chino, this ..... day of ..... 189..

Witness .....

[SEAL.]

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WHY DO WE STIR THE SOIL?

If compacting the soil make it retain moisture, why do we advise frequent stirring of the soil in times of drought? The question is a legitimate one, and we will answer. It is necessary to plant seed near the surface, especially in the spring, for the soil is warmer there and the conditions of germination more readily supplied. But after the seeds have germinated, the roots strike downward and the moisture is supplied largely by the soil water rising from below by capillary attraction. If the surface is left hard, then the

water will ascend to the surface and be rapidly evaporated. But if a steel rake or hoe is frequently used to stir an inch or two of the surface, it breaks the capillary tubes and the moisture ascends to the roots of the plants and there stops until absorbed by the roots and reaches the air by passing through the cells of the roots and plants and leaves, depositing the disolved plant food by the way.—*Queensland Planter.*

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DOES THE SUGAR CANE CONTAIN TWO JUICES?

In the recent experiments made upon a horse mill at Calhoun, La., there were found exuding from the end of each cane pressed by the mill copious drops of a fluid, which, by tasting, gave no indication of sugar. Twice this juice was caught in a bucket and submitted to careful analysis in the laboratory. It was found to be almost *devoid of sugar.*

The question arises, whence this fluid that exuded in rather considerable quantities? Long ago *Dutrone* announced that the cane contained two juices—one *cellular* and rich in sugar, the other *intercellular* and almost devoid of sugar. Subsequently the above phenomenon has been noticed by several observers. This, however, has been the first opportunity the writer has had to directly observe and analyze this juice, and so striking have been the results that special investigations will be made at an early date to satisfactorily solve this interesting question.—*Louisiana Planter.*

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SUMMARY OF METEOROLOGICAL RECORD FOR 1890.

MONTH.	Mean Temperature	Average daily range of temperature	Rainfall, inches	Number days rain exceeding .02 in.	Cloudiness, per cent	Number days sky overcast, (more than 50 per cent.)	Number days trade wind	Relative mid-day humidity	Relative night humidity	Mean Barometer.	Extreme range of Barometer
January	71.37	8.64	4.16	12	57	16	18	76.8	81.5	30.00	0.30
February	71.76	7.86	10.65	14	49	8	13	68.6	82.5	29.99	0.35
March	70.92	6.66	10.89	16	54	9	13	66.6	77.2	29.98	0.45
April	73.42	7.89	5.21	13	57	12	17	68.3	81.5	30.03	0.36
May	74.44	9.29	2.24	9	44	4	19	66.2	79.8	30.05	0.21
June	76.69	5.62	2.20	15	37	3	30	71.3	73.8	30.08	0.16
July	77.30	6.77	2.94	17	39	5	29	64.7	78.6	30.05	0.21
August	77.32	9.10	2.17	17	34	2	31	54.6	80.4	30.00	0.20
September	77.55	7.66	1.38	13	35	1	27	63.7	79.0	30.01	0.15
October	76.12	6.95	2.65	12	36	3	20	68 8	80.0	29.97	0.25
November	74.18	6.50	2.80	12	42	5	17	69.2	79.5	29.99	0.40
December	72.17	6.64	2.48	13	42	7	23	65.9	78.8	30.03	0.39
Annual Average	74.48	7.47	49.77	162	438	74	257	67.1	79.4	30.02	0.52

CORRESPONDENCE AND SELECTIONS.

NATIONAL HEALTH—NATIONAL CLEANLINESS.

"Man is the most precious capital of the State and of Society in general. Every individual life represents a certain value." These memorable words, spoken by the late Prince Rudolph on the opening of the International Hygienic Congress at Vienna, deserve the special attention of all men. There are some, we are aware, who argue that there ought to be checks to the increase of population, who look upon war, pestilence, and famine as necessary barriers to its too redundant flow; these arguments are only from the lips outwards, and only do harm by fostering that feeling of passivity among men which leads them to endure patiently manifold ills of life because they believe them to be in accordance with the will of God. This habit of mind has been handed down from generation to generation, and it is easy to understand how man, overwhelmed by the mysterious pestilence, and conscious of his inability to check its terrible progress, should, in despair of obtaining any earthly succour, turn with helpless hands his tearful eyes to Heaven. These things we can understand; although even *then* ignorance ascribed to the wrath of God, events which had actually been taught to be contrary to His will: observation alone might have proved to the men of former times that, under certain conditions, the plague ravaged their populations while they were comparatively exempt under opposite conditions; for even in ante-Microscopic days, it was written, "Thou shalt have a place also without the camp, whither thou shalt go forth abroad: and thou shalt have a paddle among thy weapons; and it shall be, when thou sittest down abroad, thou shalt dig therewith, and shalt turn back and cover that which cometh from thee: for the Lord thy God walketh in the midst of thy camp to deliver thee, and to give up thine enemies before thee." Deut. XXIII: 12–14.

For over three thousand years this simple Sanitary Law, easy to be understood, easy of application, sublime in its final

reason,—that the great God of Nature see not the nakedness of anything, and turn away in disgust—has been appealing to the common-sense and judgement of mankind. The great Sanitarian, Law-giver, and inspired Prophet taught mankind what common-sense endorsed, and with what result? Fæcal accumulations in holes and pits dug for the purpose—accumulations on the surface of the soil—and, worse yet, the baneful but fashionable water-closet and *mixture with water* (which has intensified the evil tenfold)—on every hand accumulation, or solution, whence poisonous mephitic vapors arise, and in which hostile and prolific microbes breed their deadly swarms; who knows not their potency? The plague and the pestilence, the black death, the cholera, the yellow fever, the typhoid—this last every day—these terrible fæcal diseases have ravaged the ranks of mankind and fattened on their best and bravest like ravening wolves among placid sheep.

Men would not listen to the voice of Nature's God, nor to the voice of his Prophet, nor to the dictates of their own common-sense: will they now to the revelations of science? *Seeing* they say *is believing*. The microscope has revealed a world in which life is as active and as potent—indeed infinitely more potent—than in the larger world of ordinary vision. In this wonder-land—may be seen slender rod-like Bacilli, oblong Bacteria, and Infusoria of various shapes; creatures resembling every well-known form—graceful and swan-like—bill-shaped or breasted like a pigeon—full of life, full of movement, eagerly feeding on monads or single cells; so frail, that a breath can destroy myriads, but indestructible by reason of their marvellous powers of increase, and the vitality of their spores, which are capable of resisting extremes of heat and cold, and are carried hither and thither by the wind, or cling to dust and debris biding their time. Spores of micro-organisms preserve their vitality from 300 degree F., down to minus 120 F., and may be *dried* and *laid aside* for *years*, and yet grow "under suitable conditions." Adults may be destroyed by boiling water and also by a temperature of 140 F.: but the practically indestructible spores, which we may liken to eggs, are produced *ad infinitum* owing to the fertility and quick maturity of these organisms;

maintain their vitality indefinitely; and are ready to start with life *on the advent of moisture.*

To this point we beg to draw particular attention. Moisture and heat are the agents which bring about fermentation in fæcal masses and quicken into terrible activity the organisms which are the specific causes of cholera, yellow fever, and typhoid. Every village in this island is studded thickly with open privies; these lethal structures offend the eye and the nose wherever we turn, their mephitic exhalations assail us as we pass along the public roads, and in Bridgetown the open pits behind stores and houses, situated in the busiest and most frequented streets, mingle their inodorous vapors with the more recent odours of goods wet and dry.

Is there any wonder then that epidemics of cholera and yellow fever visit us occasionally? Or need we be surprised when we hear that a case resembling cholera has occurred somewhere, or that several sporadic cases of yellow fever—some of them fatal—have been seen? The spores are here, and the habitat they love we voluntarily supply. Small cause to wonder then at the sporadic bursts which bring to mind the epidemic slaughter, just as an occasional flash of lightning may remind us of the storm: and—worse than any epidemic—the typhoid wolf annually singles out of the flock our choicest ones, while we, ignoring teaching, whether it come from mouth of Prophet, or man of science, carefully feed the filth-fiend with the noxious nutriment from which he derives his strength.

Sir Spencer Wells, Bart, has given us the benefit of his splendid address on National Health, delivered at the opening of the Session of the Medical Department of the Owen's College, Manchester.

It was specially applicable, for, as it happens, Manchester is terribly deficient in sanitary matters. Its death rate is 29 to 30 per 1000, as compared with Birmingham 18, London 17, and Nottingham 14. "If it be asked," he says, "Why the mortality of Nottingham and Birmingham has been reduced so much in the last twenty years, while that of Manchester remains so high, I can only repeat that the Sanitary laws neglected *here* have been obeyed *there.* In Nottingham the

disposal of fæcal refuse has been completely altered since 1868. It has been utilized as manure, and the other refuse has been burned at a distance from the town." The decline of the death-rate in Birmingham and Nottingham "since 1860 has coincided with successive sanitary improvements—from 27 in the thousand to 24, 20, 18 and 16—while the infantile mortality and the deaths from phthisis and from Zymotic diseases have been still more considerably reduced." And these words are of universal application: "*Abolish Zymotic disease* is the task I would set before you, teachers and students of Owen's College, Professors and graduates of the Victoria University, (*and ye denizens of all over-crowded countries, whether it be Barbados or elsewhere*) instruct your mayor and corporation, your clergy of all denominations, your own household, that every case of typhoid fever, of scarlatina, of diphtheria, of small-pox, measles, whooping cough, can no longer be looked upon as natural, providential, or unavoidable, but that the existence of such a group of preventable diseases is a proof of ignorance or negligence and a disgrace to the country, to the town, to the family. And when men learn how much easier it is to prevent than to cure—that none of these diseases are spontaneously generated—we shall have gone a long way towards their total abolition, and they will be banished from our country."

Dr. Vivian Poore's address, entitled "the Living Earth," to the Sanitary Congress held at Brighton, confirms and intensifies all that we attempted to urge in a former number of this journal, on the value of the soil as a purifying agent. All organic matters added to the soil are quickly changed, and the hardest substances undergo disintegration; birds, insects, and worms, all aid in the process until finally, "by the action of Saprophytic fungi these organic matters become fertile, humus." Oxidation and nitrification go on until that which was noxious and deadly becomes healthful and useful. And further, "it seems to be a fact that the great doctrine of the 'survival of the fittest' holds good for microbes in the soil, as for all the organized things elsewhere and that organisms which flourish in the human body languish and cease to multiply in the soil, where the conditions are unsuited for their multiplication or even for their survival. They get over-

grown by Saprophytic microbes, and even if they do not die, the risk of their finding their way into the ground water is practically *nil*, for humus is the best of filters."

We hope there is no skeptic remaining amongst us, but that the conviction will steadily gain ground that our present methods are wrong that we dig cess-pits—break through our filter—and contaminate our wells, or collect fæcal masses which disgust the senses and propagate disease. Let us consider these things in hideousness, and soon the abomination will be committed to the earth, and the surface cleansed: but if demonstration and argument will not prevail, then people should be taught by some mild compulsory law—intended to inculcate gently and firmly a new habit—that it is just as culpable to breed typhoid germs as it would be to sprinkle about arsenic or strychnine. Indeed we think more culpable, for the effects of the drugs would be defined and limited, whereas the fever poison spreads in ever-widening circles, each new case being a fresh centre of propagation. For the new method, as regards the country districts, a fitting receptacle and a box of earth, and the ever-ready hoe—our paddle—for the purpose of daily burial are all that is necessary. At District B Station this cleanly mode of disposal is easily worked: and in one private family, to our knowledge, no excreta or disagreeable effluvia can be found, the soil receives it, and it vanishes.

There would be more difficulty as regards Bridgetown, but not greater than that which Nottingham has successfully solved. Surely we can readily learn and follow their methods. As a matter of fact, thirteen barrels full of fæcal matter, mixed with mould, were recently carted from a busy part of Bridgetown to the country, and applied as manure without any one being offended, or even conscious of the fact. For many years a leading planter has been in the habit of purchasing from a contractor at the garrison, night-soil mixed with earth, and applying it, as he observed, with benefit to his fields. We once heard an Analytical Chemist tell him that it was of small manurial value. We hope the planter preferred to believe the evidence of his senses, and that the luxuriance of his canes, rather than the dictum of the analyst, influenced his future action. As a matter of fact, night-soil treated

with earth as we advocate, is of high manurial value, being mixed with urine which is highly nitrogenous. Unfortunately the analyst has rather stood in the way of sanitary progress, only because we use him as an analyst and nothing but an analyst: let us utilize the other side of him, and we shall find that his chemical knowledge, like rays of light, spreads out in many directions. On this point Dr. Poore says, manurial value is a "term used by chemists to express the amount of nitrogen that may be present. Now I do not doubt the ability of chemists to make a quantative estimation of nitrogen, nor their power of informing farmers of the extent to which they may, or may not, have been cheated when they purchase artificial manures. I would humbly suggest, however, that the most practical manurial value, depends not only upon the amount of plant-food present, but also upon whether the plant-food is present in a form in which it can be disgested, and exhaustively utilized by the plant. For the latter information, which is of the highest importance, I would sooner apply to a practical farmer or gardener, than to a chemist. A chemist for instance, who had regard to his analysis *and nothing else*, might tell us that nut shells had a certain dietetic value, but ordinary men and monkeys know better than that. He might tell us that gin was richer in certain dietetic ingredients than ginger beer, but we know that ginger beer is the better article of diet." The fact is, night-soil is a very assimilable plant food. Assimilability is the real test of all food whether for plant or animal.

But be this as it may, for, after all, the "money value" is only an additional reason why night-soil should be promptly restored to the soil, it is our bounden duty to see that no preventable deaths occur in our borders through our culpable negligence of those sanitary laws, which, taught by Moses, have been confirmed and ratified by modern discovery. Surely it is to our advantage, in every way, to keep our island in a clean and healthy state, to promote our own health and increase our profit, and to make the land a better habitation for man, and more pleasing in the sight of Nature's God.—*Barbados Agricultural Gazette.*

CANE CULTURE.

The progress made upon scientific lines in the fields and factories of the sugar estates of this colony during the past ten years can be instanced with justifiable pride whenever the question of advanced tropical agriculture is brought forward. To link field and factory together as we here do under the head of agriculture is proper enough in a country where, generally speaking, there is no plantation of canes without a factory and no factory without a plantation of canes. And as between the two branches of the planter's calling—the field and the factory—it is, we dare to say, undeniable that the latter has received far greater attention than the former, the manufacture of dry sugar with us having reached a higher standard of excellence than the culture of the cane. In Barbados the reverse of this is the case. There the vacuum pan is as yet unknown to large numbers of estates, while the triple effect, the yaryan, the Rillieux, and the diffusion plant are almost if not altogether unknown, and the open tayche is still a fetich of expensive adoration. But in the canefield the Barbadian planter has gained a success which quite counterbalances that of his Demerara friend in the factory. An estate possessing in full degree the merits of both schools, would simply be a model, and as near perfection as we need ever hope to find in these latitudes. It is not to-day, though, that the Barbadians have come to know the value of agricultural skill. Their system of careful tillage has long been famous throughout the West Indies; and other colonies less favored in the matter of labor supply could only admire and hope in vain to emulate it. It was when they had to resort to the wares of the artificial manure manufacturer that the Bims found they did not know everything about agriculture that it was possible to learn. They wasted money right and left, either in applying the wrong kinds of manure or in paying the price of good manure for useless trash that was not worth the cost of carrying it from the buildings to the field. It was after they had gained experience in this common but expensive fashion that, being a practical people, they combined together and arranged for obtaining, on the spot, analyses of the manures that were offered them for sale, and also

of the soils for which the manures were being bought. The agricultural chemist became an important personage in the colony, and his skill saved the planters from mis-spending large sums of money. It was in this connection that our present Analyst, Professor Harrison, established a reputation which will gain him a welcome to Barbados, whenever he cares to return there. The planters in Demerara also had their experience of bogus manures, but they have never had the faculty of combining together for the common good without the intervention of Government; and no attempt was made to appoint a planters' analyst. This lack of public spirit was supplied to a certain extent by the action of individual firms represented in England, in getting their purchases carefully analyzed before shipment; and in the attachment by those who could afford it, of analytical chemists to the staff of their estates. This was not the way to obtain information *pro bono publico*, and only in one or two instances have the proprietors in question vouchsafed any of their acquired knowledge for the benefit of their less opulent neighbors. The most valuable gratuity of this kind has just been issued by the Colonial Company, Limited, who have published for private circulation a very elaborate report on "Results obtained with various manures in experimental fields on the estates of the Colonial Company, Limited, in British Guiana." Mr. N. Lubbock in the preface, says the idea of making the experiments was begotten by the field experiments which have been for so many years carried on at Rothamstead by Sir J. B. Lawes, to whom the Company is much indebted for advice and assistance. The report is drawn up by Mr. Scard, who is complemented by Mr. Lubbock on the able manner in which he conducted the experiments. A field of 12 acres in area, as suitable for the purpose as could be obtained, was chosen on each of the Company's estates, and the fields were then divided into 12 sections upon each of which a distinct experiment was conducted. Two of the fields had to be abandoned, for reasons given; and the report contains the results of the experiments with various kinds of manures, singly and in combination, on the other six. The information which the report contains shows the result of the application of manure in the following ways:—

The result of increased application of Nitrogen in the form of Nitrate, in the presence of Phosphates.

The influence of increased Phosphoric Acid, in the presence of Nitrogen as Nitrate.

The relative effects of Nitrogen, as Nitrate and as Ammonia, in the presence of Phosphates.

The effect of increased Phosphoric Acid, in the presence of Ammonia.

The effect of increased Nitrogen, as Ammonia, in presence of Phosphates.

Comparison between the effects of dissolved and undissolved Guano.

Influence of Muriate of Potash, in presence of Nitrogen and Phosphates.

Comparison between Ground Mineral Phosphate and Superphosphate, in presence of Nitrogen.

Effect of Manuring and Liming generally.

The tables include all the information the most careful agriculturist would think of seeking. They have the quantity of manure applied, the weight of canes obtained, the cost of manuring, the yield of sugar, net loss or net gain, and so on. The "general conclusions" form the kernel of the nut, and as it is evident the Company are desirous of giving the benefit of the information they have acquired to the planting world at large, we make no apology for quoting from Mr. Scard's memorandum :—

That Lime alone gives a pecuniary gain, but only to a small extent.

That Lime, when associated with manures, gives sufficient increase of yield to pay for itself, only when used in conjunction with the larger quantities of soluble Nitrogen in the form of Sulphate of Ammonia.

That of the Nitrogenous manures, Sulphate of Ammonia, in the greater quantity of 2 cwts. per acre, gives the best result.

That Ground Mineral Phosphate appears to have produced an increased yield, when compared with Superphosphate.

That Guanos, especially in conjunction with Lime, fall far short of soluable Nitrogen in beneficial influence.

That increase of Phosphoric Acid over the minimum employed fails to give satisfactory pecuniary results.

From the above it would appear that the proper course of treatment to pursue for Demerara soils would be to apply Sulphate of Ammonia and Ground Mineral Phosphates, but in this case it would have to be considered whether there would be proper compensation for abstraction of nutriment, and sufficient security against exhaustion, taking into consideration the fact that Potash, which is not added under this system of manuring, exists already in considerable quantity in the soils.

There is one point very clearly brought forward by the observation, and this is an extremely interesting one from its antagonism with existing traditions, and that is, that neither Lime nor manures produce any perceptible difference in the quality of the juice, and merely affect the weight of cane. It is true that the juice for the unlimed and unmanured plot was slightly sweeter than the rest, containing, on an average, 1·69 per gallon as against about 1·60, but this was due rather to the greater exposure to sun from the lesser quantity of cane than from the influence of manures or lime.

Information of this kind forms an excellent guide to the planter, and the more of it the colony can obtain the better for the future of the sugar industry. In the competition of prices that is strengthening in the sugar market everyday only those planters who utilize the knowledge that the researches of the chemist and the engineer have brought to light will be able to maintain a place. The man who believes he can succeed by following the old rule of thumb must drop out of the running sooner or later.—*Demerara Argosy.*

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PRESERVATION AND ANALYSIS OF SUGAR SOLUTIONS.

BY HUBERT EDSON.

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In 1871, C. Houghton Gill pointed out the presence of an error in the examination of low grade sugars and molasses due to the compound formed by the invert sugar with basic lead acetate. To illustrate the amount of this error some of his experiments are given below:

15 cc. of a solution of invert sugar made up to 50 cc. by water	Read—28.25 at 24° C.
15 cc. of same solution with water and 2 cc. of saturated solution of basic lead acetate to 50 cc.	Read—24.7 at 24° C.
15 cc. of same solution with basic lead acetate solution alone to 50 cc.	Read+57 at 25° C.

This alteration of the rotatory power effects only the levulose of the solution, the dextrose retaining its normal effect on the polarized ray.

A solution of nearly pure levulose, prepared by Dubrunfaut's method, and reading—44 at 20° C. made up to two vols. by solution of basic lead acetate	Read—6 at 20° C.
A solution of pure dextrose, prepared from invert sugar, and reading 60.3, made up to two vols. by strong solution of basic lead acetate.	Read 30.5.

Gill corrected this optical error by the addition of a solution of sulphur dioxide to acidity thus breaking up the levulose compound which cannot exist in an acid solution.

These experiments were overlooked by sugar chemists for several years, the use of basic lead acetate being continued

as a clarifying agent without acidifying the solution to destroy the levulose compound. Last year, however, Mr. G. L. Spencer of the U. S. Department of Agriculture, recalled attention to them and also made many experiments himself which corroborated the results of Gill in almost every particular, he using acetic acid to acidify the solution instead of sulphur dioxide. Mr. Spencer secured very accurate polariscope work and developed a method of analysis which has proved to be of great value in examinations of raw sugars and molasses.

Besides being used as a clarifying agent, basic acetate of lead is also used as a preservative of sugar solutions. This is done mostly where raw juices are worked and where there is not time to analyze samples immediately on coming into the laboratory. From solutions preserved in this way both sucrose and invert sugar are to be determined. It was from certain peculiarities in the amount of invert sugar secured that led me, last winter on Calumet Sugar Plantation, La., to investigate as thoroughly as I could, with the apparatus there, the effect of basic lead acetate on a solution in which invert sugar is to be determined and I am now prepared to state the results are unreliable. Below are some of the representative analyses I have made on the work:

	GLUCOSE.		
	Basic Lead Acetate added.	Basic Lead Acetate and Acetic Acid added.	No Lead or Acetic Acid added.
	per cent.	per cent.	per cent.
Clarified juice	0.92	1.13	1.17
Syrup	2.99	3.49	3.76
First Masse cuite	5.66	6.71	6.91
" "	5.47	6.50	6.35
" "	6.39	6.25	7.04
Second "	11.67	13.72	14.06
" "	14.86	17.73	17.29
" "	13.56	14.54	15.65
" "	13.54	15.21	15.47
" "	12.97	15.31	15.82
Final molasses	17.54	20.15	20.93
" "	17.28	18.76	20.56
" "	16.87	19.04	20.45

These analyses were made with the greatest possible care, and yet it is seen that no regularity even exists in the results. The method pursued in the examination was as follows:

Three samples were weighed out, care being taken to have the same amount in each case. To the first was added basic lead acetate solution, made up to known volume, filtered, and aliquot portion taken, excess of lead precipitated, solution made up to known volume, filtered and reducing sugars determined by Violette's modification of Fehling's solution.

To the second sample basic lead acetate and acetic acid to acidity were added, solution made up as in the first, lead precipitated, solution neutralized and diluted to same volume as first, and reducing sugars determined.

The third sample had no lead or acetic acid added but was made up to the volume in the same manner as the other samples.

This last was taken as the standard and the others compared with it. The first method gives an enormous error, amounting to about 20 per cent of the reducing sugars present. Much work, especially in sugar houses, has in the past been done by this method and consequently is useless in comparison with results now obtained, though fortunately, such results are fairly comparable with each other.

The second method, in which acetic acid is added to the solution after the basic lead acetate, is much nearer correct. The main difficulty with it is its unreliability, the results sometimes being too high and then again too low. They are in the main too low by from eight to two-tenths of one per cent in samples containing comparatively large amounts of reducing sugars, and nearer the low error in samples containing a small amount of these sugars. Accurate determinations of reducing sugars cannot be secured from either of the above methods.

Having proved the existence of an error when basic lead acetate was used, it became necessary to find some other reagent to take its place. The idea in adding acetic acid to basic lead acetate solution was, of course, to convert the lead oxide combined with the levulose into an acetate and leave the levulose in solution uncombined. Now when in the end this has to be done there is no reason why the normal acetate

should not be used in the first place, as the lead, in conbining with the impurities present in a sugar solution, frees enough acetic acid to prevent the levulose compound being formed.

There were three essential things which the normal lead acetate had to accomplish to fill the requirements of sugar work. These were a good clarification, preservation of juices, and non-interference with correct analytical results. In the first of these it is most defective, but serves equally as well as the basic acetate after acetic acid has been added to the solution; and as nothing approximating accurate results can be secured by the latter without the use of acetic acid, the two are on an equality at this point.

In regard to the preservation of juices unaltered, I measured out duplicate samples of a juice the per cent. solids of which was 15, added normal lead acetate to each, determined the reducing sugars in one immediately and allowed the other to stand one hundred hours before the determination was made. In the first 1.124 per cent. of reducing sugars were found, and in the second 1.120 or a difference of only four one-thousandths of one per cent. The polariscope reading on the same sample which was at first 24.475, average of four readings, was at the end of one hundred and fourty-two hours 24.5, average of same number of readings. Reduced to percentages of sucrose these are respectively 12.238 and 12.25, a difference of twelve one-thousandths of one per cent.

As to the last requisite of the normal acetate, i. e., non-interference with analytical work, a table is given below showing its influence on the determination of reducing sugars:

	GLUCOSE.	
	Normal Lead Acetate Added.	No Lead Added.
	per cent.	per cent.
Clarified juice	1.15	1.17
" "	1.12	1.13
Syrup	3.76	3.79
Final molasses	17.45	17.50
" "	27.04	27.08

These samples were examined in the same manner as the basic lead acetate solutions. There is in each case a slightly less percentage of invert sugar shown in the normal lead acetate solutions than in the juice to which no lead had been added, but even in the molasses this does not in any case amount to more than five one-hundreths of one per cent., and can be entirely disregarded in most all sugar work.

There is a slight error in the polariscopic work which is corrected by the addition of a little acetic acid at the time of analysis.

We can conclude then that the normal lead acetate simplifies the work and that we can insure correct determinations of invert sugar from solutions in which it has been used; a thing that cannot be done where basic lead acetate is the clarifying agent.

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HISTORY OF THE BEET ROOT SUGAR IN AMERICA, 1830 TO 1890.

For the purpose of making a record of this industry to the present time, we will briefly review the attempts which have been made to introduce sugar beet culture into the United States.

1830—PENNSYLVANIA.—Two Philadelphians made the first experiment, but from lack of knowledge of the culture of the roots and the extraction of the sugar, it did not succeed, and a second trial has not since been made in this State, although the subject received some attention around Chester in 1879. (France produced about 5,000 tons of beet root sugar in 1830.)

1838-1839—MASSACHUSETTS.—Mr. David Lee Child experimented in a small way at Northampton, making 1,300 lbs. of sugar, at an estimated cost of 11c. per ℔. He obtained from the roots 6 per cent. of sugar and 2½ per cent. of molasses. He made the cost of culture at the rate of $42 per acre, with an average yield of 13 to 15 tons of beet roots. No further efforts were made in this State until 1879. (France produced 26,930 tons beet root sugar in 1840 and 76,151 tons in 1850.)

In 1870 the Massachusetts Legislature exempted from taxation for ten years all capital and property engaged in the beet sugar industry, and later gave a bounty of one cent per

pound on all sugar produced. The Franklin Sugar Refining Co., was organized in 1879, with $75,000 capital, at Franklin, Massachusetts, and furnished seed to farmers under contract for a certain number of acres cultivation. The writer visited some of the beet fields and found that the farmers as a rule paid very little extra attention to the culture, and the roots they did raise were worth more for feeding to cattle than the factory could afford to pay. The company therefore failed in a very thort time, and the industry has not started again in this State.

1863-1871—ILLINOIS.—The third experiment, and really the first of any magnitude in the United States, began in 1863, at Chatsworth, in Illinois, by the Germania Beet Sugar Company, under the management of the Genert Brothers, experts from Braunschweig, Germany. The machinery was imported from Europe and paid a heavy duty. About 1,000 acres of land were under cultivation. During the early years 3¼ per cent. of sugar was obtained, which was increased later to 5½ per cent. under a change of management. The small percentage of sugar obtained from the beets during the early years, bad culture in 1868, drought in 1870, and generally a lack of sufficient labor at the right time, led to a disastrous ending. About $300,000 were said to have been lost in this enterprise. Serious difficulty was experienced from the large amount of nitre and potash in the soil, and the scarcity of water. There being no stream at Chatsworth, all the water had to be pumped from a well, the level of which was fifty feet under ground, the depth of the well being 1,327 feet. It required fifteen cubic feet of water per minute to run the factory of 100 tons of beets per day. In 1871 the Germania Beet Sugar Company removed its machinery to Freeport in Illinois, where the soil was better but the climate unchanged, and the company went out of existence at the end of the year. The industry has not yet started again in this State. (France produced 100,876 tons beet sugar in 1860 and 272,109 tons in 1870.)

1868-1871—WISCONSIN.—A company with $12,000 capital was started in 1868 at Fond du Lac, Wisconsin, by two German experts, Messrs. Bonesteel and Otto, who made a good success for two years on a small scale, but receiving an

offer to take charge of the Alvarado Sugar Company, California, they abandoned their works at Fond du Lac. A co-operative enterprise was started in 1870 at Black Hawk, Wisconsin. The crop partially failed through drought; only a portion of the roots were worked for lack of water and the rest were fed to cattle. Additional machinery was brought from Freeport and Fond du Lac in 1871, but the enterprise did not succeed, and beet culture for sugar in Wisconsin has not yet been resumed.

1870-90--NEW JERSEY.—This State exempted from taxation for ten years all capital and property engaged in the beet sugar industry. Nothing but the smallest kind of experiments in beet sugar manufacture have been made in this State. These experiments still continue, in connection with the sorghum factory at Rio Grande, but the industry has made no progress beyond experiments to the present time.

1876-MAINE.—The State Legislature in session in 1876-1877 offered a bounty of one cent per pound for the manufacture of sugar from beets grown in the State, the amount so paid not to exceed $7,000 in any one year, and not to extend beyond a term of ten years. This action was brought about by a series of experiments which showed that the soil and climate of Maine was capable of producing beets of a high sugar yielding quality. The Forest City Sugar Refining Works in Portland were adapted to beet sugar making by the addition of machinery brought from Germany, and the "Maine Beet Sugar Company" was incorporated in 1877, with Mr. Ernest Th. Gennert as superintendent for the first year, and Mr. Joseph A. Barker afterwards. The first year was largely experimental, the company making 180,000 lbs. sugar and melada. German and French sugar beet seed was distributed to the farmers, who were paid during the second year $5 per ton for roots delivered at the railroads and $6 per ton delivered at the factory. About 1,700 farmers entered upon the culture, and about 1,200 acres were planted with varying success, according to the care taken to follow the instructions given out with the seed. Many farmers could not make it profitable even at the high prices paid for the roots. One farmer planted two acres and raised 23 tons of beets, using on the land 40 cartloads of manure and $20 worth of

superphosphates. Other farmers raised as high as 40 tons to the acre, and in one instance 49½ tons. The roots yielded variously, but an average of about 10 per cent. of sugar. The factory used 120 to 150 tons of beets per day, and produced beet melada and refining sugar of good quality, which was sold to sugar refineries. The year 1879 showed a small profit in the business but no dividends. 9,000 tons of beets were worked into 900 tons of sugar and melada in 65 working days, and sold for over $100,000. The difficulty of obtaining a supply of beets led to an early abandonment of the industry, and it has not since been renewed in this State.

1887—DELAWARE.—The Delaware Legislature in 1877 appointed a State Commission, and gave it $1,500, to be expended in seed, and in premiums, etc., to stimulate sugar beet culture. In 1879 the Delaware Beet Sugar Company built a three-story brick factory at Edgemoor, three miles north of Wilmington. Having at the outset no refining machinery they produced beet melada or syrup, and obtained 4 per cent. to 6 per cent. of saccharine from the roots. They paid the farmers $4 per ton for the roots. Only short crops resulted from the ignorant cultivation. No profits were made, and the industry was soon abandoned and has not been renewed in this State.

1879—MARYLAND.—The Beet Sugar Company, of Hartford, Maryland (R. B. McCoy, president) produced a few beets, which averaged within a fraction of 10 per cent, of sugar, but for some reason the industry was soon abandoned, and has not since been renewed in this State. (France produced 333,614 tons of beet root sugar in 1880.)

1890—KANSAS.—This State, while principally engaged in sorghum culture, is also experimenting in beet root culture to a small extent. There are eight sugar companies in the State. This year the Parkinson Sugar Company, at Fort Scott, raised 1,000 acres of sorghum and 10 acres of sugar beets. The latter are an experiment, as sugar beets have never been raised in this section of the State. The Topeka Sugar Company, of Topeka, also raised 1,200 acres of sorghum and 10 acres of beets. The Medicine Lodge Sugar Works and Refining Company at Medicine Lodge, planted 4 7-10 acres of sugar beets in 1889, producing 63 23-100 tons of beets, from which

there were made 10,158 lbs. sugar, of which 2,800 lbs. were seconds or molasses sugar. In 1890 they have 160 acres in beets and 2,400 in sorghum. The Ness County Sugar Company, of Ness City, planted 800 acres in sorghum and 15 acres in beets (besides contracts for 1,200 acres sorghum outside). We believe their factory was burned down before manufacture began. The Kansas State Sugar Company, of Attica, had 1,200 acres sorghum and no beets. The Southwestern Sugar Company of Liberal, Arkalon and Meade, had 900 acres of sorghum and 6 acres of beets at Liberal and 790 acres of sorghum at Arkalon. Their factory at Meade remains idle. The Conway Springs Sugar and Syrup Company of Conway Springs, is a new company which has leased the plant of the Southwestern Kansas Sugar Company. They had 300 acres of cane and no beets. In 1889 there were less than five acres of beets planted in Kansas, while in 1890 there are 200 acres planted. A careful record is being taken of the results of the beet root culture, which will be given out later. Kansas pays a bounty of two cents per pound on all sugar produced.

1889—NEBRASKA.—To Mr. Henry T. Oxnard, the son of one of New York's best sugar refiners, and especially educated to the business himself, is due the first grand experiment of sugar beet culture in the United States east of the Rocky Mountains, which promises to result in unbounded success. Before deciding to locate his factory in Nebraska he distributed beet seeds throughout the State in 1889, and as a result obtained from 385 analyses of different beets produced, an average of 16 1-10 per cent. of saccharine against an average in Europe of a little over 14 per cent., which show apparently that the soil and climate are better adapted to the growth and development of sugar beets than that of Europe. The Oxnard Beet Sugar Company was organized at Grand Island, Nebraska, and has built a factory with a capacity of 350 tons of beets per day, equipping it with the latest and best machinery from Germany, imported free of duty. The factory was completed during the present autumn, and has now been running for some time. The results for 1890 are being carefully noted by Government officials, and will be given out later. If as satisfactory as was anticipated, many new enterprises will be entered upon for the coming year in this and

other states. Nebraska pays a bounty of one cent a pound on all sugar produced. (France produced 770,000 tons of beet root sugar in 1890.)

Besides the foregoing private enterprises, the Government in 1889 tested beets at its experimental stations in the States of Indiana, Michigan, Wisconsin, Iowa, Nebraska, South Dakota, Kansas, and the published reports are very interesting and encouraging. The report says that the exceptionally high percentage of sucrose found in some samples show very conclusively that there are many parts of this country where sugar beets of the highest grade can be produced.

1869—CALIFORNIA.—The first attempt to manufacture beet root sugar in California was made at Alvarado in 1869. Messrs. Bonesteel, Otto & Co., from Fond du Lac, Wisconsin, with others, organized, the California Beet Sugar Company, with a capital of $250,000. The factory was built in 1870, on the farm of E. H. Dyer, on the east side of the Bay, 24 miles from San Francisco. After running four years it proved a financial failure. A new company bought the machinery and removed it to Soquel, Santa Cruz County, where, after operating a few years at a loss, the enterprise was abandoned. The quantity of beet sugar produced in California was 500,000 lbs, in 1870, 800,000 lbs, 1871, 1,125,000 lbs. in 1872, 1,500,000 lbs. in 1873. Mr. E. H. Dyer bought the buildings and a portion of the land of the old company at Alvarado, and in 1879 the Standard Sugar Manufacturing Company was organized with a capital of $100,000, which was soon increased to $200,000, and the name changed to the Standard Sugar Refinery. This company made a success of the business from the start, and in 1884 had enlarged to a capacity of about 100 tons per day, employing 125 men and 1,000 to 1,570 acres of land were under cultivation, producing 20,358 tons (2,000 lbs.) from which 2,134,273 pounds of refined sugars were made. In 1885, 1,343,148 lbs. was produced. In 1886, 1,688,258 lbs.; 1887, 572,466 lbs. The factory at Alameda was again re-organized and supplied with new machinery, and is now known as the Alameda Sugar Company. It produced in 1888 about 1,000,000 lbs. sugar, and in 1880 about 2,000,000 lbs. sugar. Its present capacity is about 150 tons beet a day, which will be increased to 250 tons. The Western Beet Sugar Factory,

established in 1887, at Watsonville, began manufacture in 1888, producing in that year 1,640 tons (2,000 lbs.) from 14,077 tons beets (2,000 lbs.). The average polarization of beets was 14.60 and the average sugar recovered 11.65 per cent. $5.04 was paid for beets per ton and 5.64 cents per lb. obtained for the sugar, which averaged 95.40 polarization. The factory run 61 days and employed 135 men. The company produced 1,585 tons (2,000 lbs.) in 1889, out of about 16,000 tons beets cultivated. Its present capacity is 300 tons beets a day. The farmers made considerable money in 1889 and put in larger crops in 1890. A movement was also made to establish the industry in Los Angeles and other places during the year.

The production of beet root sugar in California has been as follows:—1870, 225 tons; 1871, 357 tons; 1872, 500 tons; 1873, 670 tons; 1874, to 1879, little if any; 1880 to 1882, small; 1883, 535 tons; 1884, 953 tons; 1885, 600 tons; 1886, 800 tons; 1887, 255 tons; 1888, 1,910 tons; 1889, 2,308 tons; 1890, estimated, 4,000 tons.

The production of beet root sugar in the United States may be given in figures as follows:—1830, a few hundred pounds; 1831 to 1837, none; 1838 and 1839, 1,300 lbs.; 1839 to 1862, none; 1863 to 1871, 300 and 500 tons per annum; 1872, 500 tons; 1873, 700 tons; 1874 to 1877, under 100 tons per annum; 1878, 200 tons; 1879, 1,200 tons; 1880, 500 tons; 1881 to 1882, less than 500 tons; 1883, 535 tons; 1884, 953 tons; 1885, 600 tons; 1886, 800 tons; 1887, 255 tons; 1888, 1,910 tons; 1889, 2,600 tons; 1890, estimated, 10,000 tons. At the close of 1890 there are three beet root sugar factories in the United States, one at Grand Island, Nebraska, with a capacity of working 350 tons of beet a day; one at Alvarado, California, with a capacity of working 150 tons of beets a day, and one at Watsonville, California, with a capacity of working 300 tons beets a day. The U. S. Government will pay a bounty of two cents a pound on all sugar produced in 1891 and until 1905.

This record completes the history of sugar beet culture in the United States, east and west of the Rocky Mountains, up to the present time. It is not a satisfactory record, particularly when compared with the parallel column showing how the beet sugar industry in France has grown under the fost-

ering care of the Government. With the advantage now of the knowledge acquired by Europe in growing beets, and extracting all the sugar by the best machinery and methods, and with a Government bounty of two cents per pound, the United States may yet astonish the world by the rapid increase in the production of home grown sugar.—*Willett & Gray's Circular.*

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PROSPECTUS OF THE HAWAIIAN COFFEE AND TEA COMPANY, LIMITED.

A joint stock company has been formed under the name of the Hawaiian Coffee and Tea Company (Limited) for the purpose of carrying on the cultivation of Coffee and Tea in the District of Kona, Island of Hawaii. The cultivation of the former, however, will form the main feature in the enterprise—a small area will also be devoted to the cultivation of Liberian Coffee. This plant produces a much larger and hardier tree than the other species. It is said to stand a prolonged drought, and it is not so susceptible to the attacks of blight. The plant can also be successfully cultivated at a considerably lower elevation than the ordinary tree, and yields a much heavier crop. It will be the object of the company to prosecute the business in an intelligent and scientific manner, and to procure the most modern machinery for the proper handling and curing of the crop.

Mr. Charles D. Miller, a gentleman of several years experience in coffee planting in Ceylon, is the originator of the enterprise.

With a view to selecting a suitable site for the proposed plantation, he has made several visits to the District of Kona, with the object of inspecting available lands for coffee culture.

Mr. Miller is of the opinion that the above-named district taken as a whole, but more especially that portion known as North Kona, is admirably adapted, not only for coffee culture, but also for that of tea.

He feels confident that if the cultivation of both the above-named products, but especially that of the former, be con-

ducted on thoroughly scientific principles, and after the manner as adopted in other coffee growing countries,—with certain modifications, as the nature of the soil and climate of these Islands may require,—the industry would be established on a paying basis, and would be the means of opening up a field for further development.

In the matter of land, negotiations have already been entered into with the Trustees of the Bishop Estate, and the natives, for a tract on the lands, known as Kahaluu, situated in North Kona. The above tract is most favorably located, and is accessible to a good landing at Keauhou. With regard to the quality of the soil, it is without doubt one of the choicest pieces in the whole district, and is admirably adapted to coffee culture. The land can be obtained on a long lease on favorable terms.

Mr. Miller has likewise the refusal of another tract, not far from the above, known as Kaumalumalu, on somewhat similar terms. There are portions on this land which are suitable for coffee planting; and though perhaps taken as a whole, the tract may not be as prepossessing as the first piece mentioned, still there is a sufficient area of good available land. Both the pieces referred to run down to the sea, and it has been ascertained that there will be no difficulty in securing, say, from five to six acres, conveniently situated with regard to the landing, on which to erect the necessary buildings for curing operations, and to construct the drying grounds.

With regard to the enterprise in Ceylon, before the advent of the "leaf disease," he quotes the following taken from Furgusson's Ceylon Directory, and which appears in Mr. E. P. Hull's work on Coffee Planting in Southern India and Ceylon:

"In the year 1875 there were 37 districts in Ceylon in which the cultivation of coffee was carried on, containing in all some 1351 properties of which 1215 were in course of cultivation under the management of upwards of 1000 European superintendents and assistants. The total extent of the above 1351 properties was 481,539 acres, giving an average of 360 acres to each; the total cultivated area in that year however, was only 249,604 acres which gives an average of 205 acres to each of the 1215 plantations. The average crop per acre of land in bearing has ranged during

the 20 years from 1856 to 1875 from the highest point 5.07 cwts per acre in 1868 to 2.75 cwts. in 1874, the general average for the 20 years being rather under 4.25 cwts per acre. The largest estate in Ceylon is Hunasgiriya with 1986 acres of land under actual cultivation."

The above figures as regards the crop, reduced to pounds would represent from 567 to 308 pounds per acre with the average at 475 pounds, Since the year 1875 coffee has produced better results in Ceylon, the average yield in several districts, for many years, ranged from 5 cwts to 6 cwts per acre, or in pounds would represent from 560 to 672 pounds per acre.

THE PLANTATIONS.

It is proposed to lease on a long term of years from 300 to 500 acres of land in either, or both localities already referred to, and bring 100 acres under cultivation in the first two years.

The plants will be raised from seed in nurseries, and when matured, a portion will be set out 6x6 feet apart, and the remainder at 8x8 feet apart. This gives 1210 and 680 plants respectively per acre. Part of the above will be planted under shade, while the balance will be set out in the "open" as is the custom in India and Ceylon. The first crop is estimated on a basis of 1 ℔. per tree, and subsequent crops at from 1½ to 2 lbs. per tree. The returns from the above, at 15c per ℔. would represent for first crop the sum of $18,000, and for subsequent crops at from $27,000 to $36,000. Although the above quotation is considerably below the present market value, viz: 25c per ℔., it has been deemed advisable in the estimates, to adhere to the former figure. At the same time there is every reason to believe that the price of coffee will maintain an average of 20c per ℔. for many years to come.

Though the above returns may be considered high in comparison with the yields quoted for Ceylon, I see no reason why they may not be realized.

Take the Sugar Industry as an instance on which to base the argument.

The yield in these Islands is from 4 to 7 tons of sugar per acre, as compared with 1½ to 3 tons per acre in other sugar growing countries. If such has proved to be the case in one, why should it not be so in the other?

To show, however, what the coffee tree is capable of producing under a state of cultivation, I will again quote from Mr. Hull's work:

"I have myself picked a maiden crop (third year) of 9 cwts. (1008 lbs.) per acre in Ceylon, and have known a friend to get 13 cwts. (1456 lbs.) an acre. One estate also, in Hewahettie, yielded a crop of 22 cwts. (2464 lbs.) an acre, all over one year, and averaging 13 cwts. (1456 lbs.) in the year following. One field on this estate (of which I was then superintendent) bore 27 cwts. (3024 lbs.) of crop per acre!"

EXPENDITURE.

In an enterprise of this nature the greater portion of the expense will be incurred in the first four years, or before any returns can be expected.

The total amount of expenditure from the commencement of operations to the harvesting of the first crop, will be about $50,000. The estimates attached to this prospectus show, approximately, detailed cost of the various works to end of the fourth year, when the first crop will have been harvested.

After the plantation has been brought into full bearing viz: in the sixth year, the annual expenditure should be about $15,000, and the yield from 50 to 75 tons.

DIFFICULTIES TO BE ENCOUNTERED.

In every agricultural pursuit there are obstacles with which the farmer has to contend, and tropical industries form no exception. At the same time, however, there are remedies which, if systematically applied, though perhaps ineffectual in exterminating certain pests, at any rate will do a great deal towards keeping them in check.

By way of remedies which might be beneficially tried, I may mention the "Fumigating Process," or "Spraying" as adopted in the Orange Groves in California. A more practical and less costly method, however, though purely a theory, I believe, might produce marked results. To plant at convenient distances amongst the coffee the "Pyrethrum Cinerariœ Folium," or Buhach plant. If the shrub in a state of growth gives forth any of the properties for exterminating insect life, which it produces when manufactured into powder, what remains of the blight in Kona might soon become a thing of the past.

In these Islands the fear of blight has to a certain extent, prevented the investment of capital in the development of the coffee industry.

The experience of other coffee growing countries seems to show, that blight makes its appearance at periodical intervals, and after being more or less prevalent for a certain number of years gradually dies out.

When coffee was first started in these Islands on Kauai and Kona, Hawaii, after a while blight appeared and lasted for a number of years, then became gradually less prevalent. At the present time in Kona there are very few signs of the disease throughout the district.

Experience in India and Ceylon has proved that coffee planted at low elevations is more subject to the ravages of blight than when planted at a higher altitude.

A very large area of the coffee in Kona is to be found growing below the Government Road, at an elevation considerably under 1,000 feet above the sea; which is by no means the one most suitable for coffee culture in this country.

In Ceylon it was found that coffee planted at an elevation ranging from 2,000 to 3,500 feet gave the best results.

Taking into consideration the relative position of that country to these Islands, it would seem the most suitable altitude here would range from 800 to 1,800 feet above sea level.

LABOR.

The next point to be considered, and one which has always been brought up as another obstacle to successful coffee planting in this country, is the high price of labor prevailing here, as compared with the cooley labor of India and Ceylon.

The mere question of labor alone however, is not a fair basis on which to argue the matter of expenditure on a plantation. There are many other points which bear on the subject. For instance, the price of land in Ceylon ranges from £5 to £15 per acre, and in some cases even higher. The felling, burning, clearing off, etc., of the above costs from £2.5 to £3 per acre. Then there are heavy charges for the transport of crop to port of shipment; besides other costly works which

are absolutely necessary for the up-keep of a plantation; such as draining, manuring, etc., which would not be required in this country; the last mentioned at any rate for many years to come.

The above, with due regard to the respective yields of the two countries, more than offsets the difference in the price of labor.

The only true way to arrive at the real facts of the case, is by comparing the cost of bringing a given area of coffee under cultivation, and to full bearing, in both countries, and also by a comparison of their respective yields.

I beg to submit several estimates by practical planters, taken from Mr. Hull's work, already referred to, and also from a similar work by Mr. Sabonadiere. A comparison of which with the estimates attached to this prospectus, I think will show, that there are many other points, apart from the mere cost of labor, which will demonstrate whether the enterprise in these Islands, in likely to prove a success or a failure.

THE COMPANY.

It is proposed to incorporate the company with a capital stock of $60,000. The stock to be divided into 600 shares of the par value of $100 per share.

The liability of each stockholder to be limited to the amount due upon the stock held by him. No single stockholder to possess more than two hundred shares. Three-quarters of the stock to be subscribed for before incorporating, and 10 per cent. of the capital paid in before the commencement of the operations. The remainder of the capital to be paid in upon assessments as circumstances may require and the directors shall decide.

To hold property to the value of $200,000, with the privilege of increasing the capital stock to $150,000.

The following gentlemen have expressed their readiness to support the scheme, and have allowed their names to be attached to this prospectus, viz: T. May, Hon. H. P. Baldwin, F. A. Schaefer, J. F. Hackfeld, Chas. M. Cooke, Robert Lewers, Wm. W. Hall, Bruce Cartwright, G. P. Castle, J. B. Atherton, Hon. G. N. Wilcox, Hon. A. S. Wilcox.

APPROXIMATE ESTIMATE

FOR THE LEASE OF 300 ACRES OF LAND IN THE DISTRICT OF KONA, ISLAND OF HAWAII, FOR THE PURPOSE OF COFFEE AND TEA CULTURE, BRINGING 100 ACRES OF THE FORMER UNDER CULTIVATION AND TO FULL BEARING FOR SIX YEARS. LABOR CALCULATED AT 60 CENTS PER DAY FOR JAPANESE MEN, AND AT 40 CENTS PER DAY FOR WOMEN.

FIRST YEAR.

Lease of 300 acres of land, @ $1.50 per acre		$ 450 00
Purchase of tools		50 00
Erection of laborers' quarters for 8 men and temporary roof with R. W. tanks for storage of water for watering purposes		500 00
Clearing land and preparing same, making frames for shade for 150,000 plants and purchase of seed @ say $10.00 per thousand		1,500 00
For say 10 months @ $100.00 per month	$ 1,000 00	
Horse allowance @ $6.00	60 00	1,060 00
Surveying and laying out lands, making maps and expense of deeds, etc		250 00
Total expenditures first year		$ 3,810 00

SECOND YEAR.

Lease of 300 acres of land @ $1.50 per acre		450 00
For 30 Japanese men and 20 women:		
Advance, 30 men @ $65.00	1,950 00	
Passage, 20 women @ $30.00	600 00	
Incidental expenses, Honolulu, and landing on plantation 50@$5.00	250 00	2,800 00
Say 2 miles stone wall fence @ 30c per fathom or $264.00 per mile		528 00
Purchase of tools and implements		300 00
Felling, burning and clearing off 100 acres @ $20.00 per acre		2,000 00
Weeding, and up-keep of same		350 00
Manager's House and out buildings	1,000 00	
Overseer's Cottage	400 00	
Office, Store Room, etc	300 00	
Laborers' quarters for 50 laborers	700 00	
Stables or shed for animals	150 00	
Water tanks, R. W	500 00	3,050 00
Say 2 miles of graded path through clearing, 4 men to cut one chain @ 5 feet wide, 320 men per acre @ 60c or $192.00 per mile	384 00	
Laying out same and cutting stakes	50 00	434 00
Say 2 men and 6 women @ 1½ acres per day @ 60c and 40c respectively, or say $2.40 per acre	240 00	
Cutting 120,000 stakes @ $1.50 per thousand	180 00	
Transport and delivery in field @ 50c	60 00	480 00

To be 6x6ft apart—1210 holes per acre, to be cut 18x18in. and 18in. deep, one man to hole 40 per day, or 30½ men per acre @ 60c, $18.15 per acre.		1,815 00
120 holes per man per day, men and women at this work ⅔ men and ⅓ women, or say $5.35 per acre....		535 00
170 plants per man per day, men and women at this work as above, or say @ $3.80 per acre.....	380 00	
Taking up and transporting plants to the field.....	150 00	530 00
Say 6 women per acre @ 40c or $2.40 per acre per month, or $240.00 per month for 9 months.....		2,160 00
Planting out shade trees and purchase of same, say 20 acres @ $30.00 per acre.....		600 00
Purchase of 2 horses or mules	200 00	
Purchase of 10 pack animals @ $10.00.....	100 00	300 00
Salary Manager @ $150.00 per month.....	1,800 00	
Salary Overseer @ $75.00 per month.....	900 00	
Board Overseer @ $18.00 per month.....	216 00	
Horse allowance for 2 horses @ $15.00.....	180 00	3,096 00
Purchase of office furniture, books, stationery, etc.....		250 00
.....		500 00
Total expenditure second year...		$20,178 00
Less part of advance recovered from Japanese @ $2.60 per head per month say.....		936 00
		$19,242 00

THIRD YEAR.

Lease as before.....		$ 450 00
Topping 500 trees per man per day or say $1.45 per acre.	145 00	
Handling, men and women at this work 300 trees per man per day; three handlings in the year or say @ $6.45 per acre.....	645 00	790 00
Say 10 per cent. Vacancies or 12,000 plants as follows:		
Opening up holes 200 per man 60 @ 60 cents.....	36 00	
Refilling @ 120 " " 100 @ 60 cents.....	60 00	
Planting @ 170 " " 70 @ 60 cents.....	42 00	
Transport of plants to field.....	20 00	158 00
Up-keep of same.....		200 00
Repairing and up-keep.....		100 00
As before @ $240 per month for 12 months.....		2,880 00
As before.....		3,096 00
.....		500 00
Total expenditure third year.....		$ 8,174 00
Less part advance recovered say.....		800 00
		$ 7,374 00

FOURTH YEAR.

Lease as before.....		$ 450 00
Up-keep and preparing new lot of plants.....		700 00
Up-keep.		100 00
As before.....		2,880 00

Erecting Pulping House and Store for storing coffee...	$ 3,000 00	
Building and cementing four cisterns for washing parchment coffee.....	200 00	
Preparing and cementing "Barbacue" or drying ground for drying coffee.....	300 00	
2 miles of coffee spouting for spouting cherry to pulping House @ $450 per mile.....	900 00	
One Coffee Pulper, steam	400 00	
One do do hand	150 00	
Two Smout's Patent Peelers for hulling and cleaning coffee @ $250.....	500 00	
One 5-H. P. Steam Engine and Boiler complete.....	1,000 00	
Erecting Galv. Iron roof and cost of same and 15 tanks for storing water.....	1,000 00	
Erecting machinery and mechanics' wages and transport of material from landing to mill site.....	1,000 00	8,950 00
400 trees per man per day, men and women at this work as before three handlings @ $4.85 per acre. ..		485 00
Say 1lb per tree or 121,000 pounds, 100 acres,		
Picking above @ 2c per lb.....	2,420 00	
Curing, spouting, etc. @ 1 cent. per lb.....	1,210 00	
Shipping @ ½ cent. per lb say.....	300 00	
Commission, handling, etc., @ ½ cent. per lb say.....	300 00	
Purchase of 1,300 bags @ 15 cents say.....	200 00	4,430 00
150 trees per man per day or say @ $4.85 per acre.....		485 00
As before.....		3,096 00
.....		500 00
Total expenditure fourth year.....		$22,076 00
Less balance of advance recovered.....		214 00
		$21,862 00

SUMMARY.

Expenditure First Year.....	$ 3,810 00	
" Second Year.....	19,242 00	
" Third Year.....	7,374 00	
" Fourth Year.....	21,862 00	52,288 00

RETURNS.

By sale of first crop @ say 1lb per tree or 121,000 lbs @ 15 cents per lb.....		18,150 00
Balance Dr.....		$34,138 00

FIFTH YEAR.

Lease of 300 acres land @ $2.50 per acre.....		750 00
Up-keep as before.....		350 00
Up-keep as before.....		100 00
Say 4 women per acre @ 40c or $1.60 acre per month, or $160 per month for 12 months.....		1,920 00
Two handlings, men and women as before, or say @ $3.25 per acre.....		325 00

Say 1½ lbs. per tree or 181,500 lbs.		
Picking, curing, shipping, etc., @ 3½c per lb	$ 6,352 00	
Purchase of 2,000 bags @ 15c	300 00	6,652 00
Say 200 trees per man per day, or say @ $3.65 per acre.		365 00
Manager @ $200 per month	2,400 00	
Overseer @ 100 per month	1,200 00	
Board, Horse allowance, as before	396 00	3,996 00
.....		500 00
Total expenditure fifth year		$14,958 00

RETURNS.

By sale of second crop @ say 1½ lbs. per tree 100 acres, 181,500 lbs. @ 15c		$27,225 00
To balance brought forward fourth year	34,138 00	
To expenditure fifth year	14,958 00	
Balance Dr.		21,871 00
	$49,096 00	$49,096 00

SIXTH YEAR.

Lease as before	$ 750 00
Up-keep	200 00
Up-keep	100 00
Say @ $1.50 per acre or $150 per month for 12 months	1,800 00
Two handlings, 500 trees per man per day, as before, or $2.55 per acre	255 00
As per fifth year	6,652 00
250 trees per man per day, or say @ $3 per acre	300 00
As before	3,996 00
.....	500 00
Total expenditure sixth year	$14,553 00

RETURNS.

By sale of third crop		$27,225 00
To balance brought forward fifth year	$21,871 00	
Expenditure sixth year	14,553 00	
Balance Dr.		9,199 00
	$36,424 00	$36,424 00

The Plantation could be extended by bringing another 100 acres under cultivation at a proportionately lower figure than that incurred on the first 100 acres. The buildings and machinery at a small additional cost would be capable of handling the crop from 200 acres, and as there would be no further charges for lease of land, salaries, etc., the total amount should not exceed $12,000. The annual expenditure for the cultivation of the above would amount to the sum of $10,000.

Assuming the crop on a basis of 1½ pounds per tree for 200 acres at 15 cents per pound, the returns would represent the sum of $54,450. With a total annual expenditure of about $25,000, or a net return of $29,450.

By a comparison of the foregoing estimates with those submitted from Ceylon it would appear that the average expenditure in the latter for bringing 200 acres of coffee to full bearing is $46,591; whereas the sum of $50,000 is required to bring just half the above area to maturity in these Islands. On comparing the average yields of the four estimates submitted, however, it will be noticed for these Islands, on a basis of 1 pound per tree, the returns are over three times as much as those quoted from Ceylon.

CEYLON ESTIMATES FOR BRINGING 200 ACRES OF COFFEE TO FULL BEARING WITH PURCHASE OF LAND.

ESTIMATE NO. 1.

First year Expenditure	£4,790	$23,950
Second " "	2,400	12,000
Third " "	1,760	8,800
	£8,950	$44,750
Less value 800 cwts. @ 65s	2,600	13,000
" " 89,600 lbs., little over 14c		
	£6,350	$31,750

ESTIMATE NO. 2.

First year expenditure	£4,840	$24,200
Second " "	1,315	6,575
Third " "	3,220	16,100
	£9,375	$46,875
Less value 400 cwts. @ 67s	1,340	6,700
" " 44,800 lbs. @ 15c nearly		
	£8,035	$40,175

ESTIMATE NO. 3.

First year expenditure	£5,136	$25,680
Second " "	1,458	7,290
Third " "	3,351	16,755
	£9,945	$49,725
Less value 400 cwts. @ 67s	1,340	6,700
" " or 44,800 lbs. @ 15c nearly	£8,605	$43,025

ESTIMATE NO. 4.

First year expenditure	£4,647	$23,235
Second " "	821	4,105
Third " "	1,426	7,140
Fourth " "	2,109	10,545
Third year less value 125 cwts. @ 90s, £562	£9,003	$45,015
Fourth " " " 425 " " " £1,912	2,474	12,370
or 61,600 lbs @ little over 20c	£6,529	$32,645

In Ceylon an estate is clear in seven years; after which the expenditure should be about $10,000, with a crop of 672 pounds per acre, or $27,000, on 200 acres. Crop at 20 cents per pound.

MILL REPORT OF THE PAAUHAU PLANTATION.

EDITOR PLANTERS' MONTHLY,

DEAR SIR :—I send you the enclosed statement of the work done at Paauhau Plantation Co., L'd, during the past year, thinking it may be of interest to some of your subscribers.

The mill has 26″x54″ rolls, is of Glasgow make, and was erected in 1879, and is by no means a first class modern mill.

The lands of the plantation are as steep as any used for cane culture on the Islands, the difference in elevation between the mill and the Government road a distance of one and a half miles, being 1000 feet.

As all of the cane has to be transported on mule wagons from the fields to the railroad, the heavy rains of last year very seriously interfered with the progress of our work, the running of the mill depending on the condition of the roads and the length of the haul, sometimes running a short day, and at times 12 or 14 hours.

For the coming crop, weather permitting, our output should approach 7000 tons.

CONDENSED MONTHLY MILL REPORT OF THE PAAUHAU PLANTATION CO., L'D, FOR 1890.

Month of	Days of Grinding.	Bags of Sugar.	Tonnage.	Days Lost.	Rainfall, Inches, Elev. 300 ft.	Elev. 700 ft.
January	24	7,573	473. 625	2	10.13	16.15
February	23	7,483	467.1375	1	11.73	13.71
March	19	6,215	388. 875	7	12.25	16.52
April	19	6,620	413.1500	7	4.63	5.49
May	17½	6,332	395.1500	9½	5.20	6.75
June	18	5,975	373. 875	7	11.75	12.64
July	17½	5,676	354.1500	8½	20.60	21.99
August	24½	7,300	456. 500	1½	13.32	13.96
September	26	8,956	559.1500	.....	2.31	3.93
October	27	10,827	676.1375	.....	9.27	9.65
November	23	10,379	648.1375	2	12.29	14.39
December	21	8,924	557.1500	5	14.06	18.17
	259½	92,260	5,766. 500	50½	127.54	153.35

:o:

The following is worth knowing, if true. A California orange grower whose trees were troubled with black scale, introduced the red ants, which are said to have completely destroyed the scale. Generally, ants are a nuisance among fruit trees and in gardens.

TROPICAL FRUITS IN CALIFORNIA.

Any one who possesses a copy of the "Report of the Department of Agriculture for 1888," and who will turn to plate viii, of the portion of the volume devoted to pomology, will there see a picture of a strange yellow, purple-streaked fruit known as the "pepino." This fruit is a stranger from the land of Guatemala, but is becoming one of the products of Southern California. In the fall of 1887 the pepino was sold in the Santa Barbara market.

A Mr. Grelech, of Los Angeles, was the person who brought the pepino to California from the table-land of Guatemala. Some time before his death Mr. Grelech wrote of his experiment:

"Having decided upon the merits of this plant, and being satisfied that it will become a most welcome addition to the fruit, not only of California, but of all the Middle and Southern States of the Union, we decided to bring the same with us to California and try it here. After a good deal of trouble, and I must say no little expense and anxiety, we have now eminently succeeded. Our experience has been, we think, most valuable to us. The melon shrub grows in California even better than in Central America, and the fruit is decidedly superior."

"Melon shrub" is the other name of the pepino, scientifically known as *Solanum Guatemalense*, the plant belonging to the order that includes the potato, the tomato, tobacco, and red or cayenne pepper. Indeed, the flowers of the pepino are said to resemble those of the Chili pepper. Says Mr. Grelech:

"The melon shrub, as it grows in the Central American highlands, is, as the name defines it, a shrub. It reaches, at its best, two or three feet each way, but is generally smaller, and recalls in many respects, the Chili pepper vine, the tomato or the night-shade. The flowers resemble those of the Chili pepper, are very numerous and of a beautiful violet color, and are most charming when used in floral decorations. The plants should be set in rows four feet apart, and two feet in the rows. A month and a half after being set out the fruit will begin to set, and in three months after planting the fruit will ripen and continue to ripen until checked by frost. The fruit is of the size of a hen or goose egg, or even larger, and very much of the same shape. The color is lemon, or pale orange, with streaks or waves of bright violet, the whole making a fruit unrivaled in beauty. The interior of the fruit is a solid pulp, similar to that of a pear, also of a pale yellow color, and of a taste resembling that of a fine musk-melon, but which has besides a most charming acid, so wholesome and so delicious that when the fruit is partaken of on a very warm day it allays the thirst for several hours. The plant is an enormous yielder. I have seen plants of small size, say two

by two feet, bear thirty large fruits, which, from their size and weight, pressed the branches to the ground, and thus formed a most beautiful border all around the plant."

In spite of Mr. Grelech's assertion that the fruit is "delicious," there are some persons who fail to appreciate the pepino, as witnesses Professor Klee, State inspector of fruit trees, who says of pepinos: "Few persons seem to like their flavor, which is something like a tomato and melon mixed."

Probably the pepino, like many other tropical fruits, is destined to be liked by some persons, and detested by others.

In Northern or Central California the pepino will not probably be a success. Plants that have been raised in Berkeley, Alameda County, have not done well, and the Department of Agriculture says the pepino "has been quite thoroughly tested in the United States and found to succeed only in a very few places in Florida and California."

Another tropical fruit that has been tried here is the guava. Strawberry and pear guavas have been experimented with, the former having fruited as far north as Berkeley and Sacramento. In October, 1888, the Otay *Press*, of San Diego County, said:

"W. J. Wheeler has two acres of guavas that recently came into bearing on his place, and the growth is so prolific that he has found it hard work to care for them. He has been supplying the San Diego market for some time, and is now running them through a press and converting them into guava jelly."

Professor Klee, who, in his journeys up and down the coast, has had ample opportunity to observe fruit-trees, states that the largest specimens of guavas that he has seen were growing in Cholla Valley, near San Diego, the trees being about from twelve to fifteen feet high. Says Professor Klee:

"In the Los Angeles market are to be seen guavas ripe and for sale at good prices, because they come at times when other fruit is scarce."

The pear guava seems to be more delicate than the strawberry variety, the only section in which Professor Klee heard of the former having ripened fruit, being Santa Barbara.

I have in my possession a couple of carob pods that were brought me from the Sandwich Islands. My pods are six and seven inches long, yellow, and of the shape of large bean pods. The carob, algaroba, or "St. John's bread," as the tree is variously called, is capable of producing larger pods than

these. A Mrs. Arnerich, near Los Gatos, the widow of a Dalmatian, in 1886 showed to Professor Klee, pods that were ten inches long. These pods were of the Dalmatian variety. The same year a Mr. Yocco, in the Los Gatos hills of Santa Clara County, had an algaroba tree about to bear.

The carob pods are used in Europe as food for horses, pigs, etc., and are sometimes eaten by human beings. The taste of the carob pod, as I recollect it, is sweet and by no means unpleasant. The carob is quite hardy and has done well in some of the Gulf States. There seems to be no reason why this tree should not flourish in California. Professor Klee in his Report on Economic Plants and Trees cultivated at the Experimental Grounds of the State University at Berkeley, three years ago, said:

"During the last two years the growth of the young trees on the grounds has been very satisfactory, the oldest specimen in the garden of economic plants having grown at the rate of three feet a year without a particle of irrigation."

Professor Klee also mentions having found in the little hills south of Los Gatos a number of flourishing carob trees on Mrs. Arnerich's place. The carob seeds had been brought from Dalmatia in 1872 and planted in 1873 with about twenty-five trees as the result. In 1885, some of the trees began bearing. Said Professor Klee:

"The trees, although not irrigated, present a striking appearance, compared with other trees, such as figs, plums, etc., their glossy green indicating their superiority in resisting drought, while the other trees gave unmistakable evidence of the want of moisture in the ground.

"We thus have proof that the carob will grow with less water than any other fruit-tree, the olive not excepted. This demonstration is just what we have desired, and it warrants us in recommending the tree for general trial in this State."

Besides Berkeley and Los Gatos the algaroba has been successfully tried in Niles, Alameda County.

The pine-apple has been tried on this coast. The San Diego *Union*, during the latter part of 1888, contained the following:

"Pine-apples are being grown with success at Oceanside from seed brought from Florida last spring. The seed was planted on the 21st of March last, and the apples are now half-grown, or half the ordinary size. The fruit has a very healthy growth, indicating that soil and climate are adapted to its production."

Probably, however, it is only the southern portion of the State that is suited to pine-apple culture, as it is said that even in Florida the cultivation of the plant is restricted to those regions where severe frosts do not usually come, even a "light, white frost" being detrimental to the pine-apple.

The pine-apples of Florida have been troubled in the past by a scale insect, known as *Dactylopius adonidum*. Should pine-apple culture be carried on to any extent here, probably the same variety of a scale would make its appearance in this State, and several kinds of scale-insects already seem to like California as a place of residence. Mr. P. W. Reasoner, of Florida, speaking of this scale, says:

"Although found to some extenton pine-apple plants every where, it seems to do no serious damage when the plants are kept in a healthy growing condition. It infests the roots, leaves, fruit, and every part of the plant."

Mr. Reasoner considers this scale as identical with the "white, merely crimson-tinged insect" of Speechly, and says:

"Speechly gives a remedy ('Vine and Pine-apple Culture,' p. 321) destroying this scale in the English hot-houses: but we do not think it ever does serious damage to healthy growing plants in Florida."

—*M. E. Bamford, in Independent.*

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A STUDY OF McDONALD'S HYDRAULICS.

No invention of modern days bears so important a relation to cane mill work as does McDonald's hydraulic pressure regulator. This journal has advocated the use of these hydraulics from the beginning, not for pay, not to oblige Mr. McDonald, but simply because the good of the sugar industry demanded their use wherever cane mills were used. We might just as well run a cane mill without a governor on the engine as without a hydraulic on the mill. Why do we want a governor on the engine? Simply because of the varying work. Half the time the engine would be *running away* were there no governor, and the other half on the eve of stopping from excess of load. The engine governor admits less steam, when otherwise the engine would *run away* because of light work, and admits more steam when its speed is reduced from excess of work.

Thus the very basis of engine control assumes varying work. Now, in cane mill work, the desired end is to apply the full strength of the mill all the time, whether one cane or one hundred canes be then under pressure. The engine governor controls the admission of steam in order to maintain a given speed. The hydraulic establishes a given pressure and *prevents the limit from being exceeded.* If the governor opens when the engine slows down, and admits more steam, the pressure is bound to be increased unless limited, as is done by the hydraulic.

Many of the best cane mills in this state are still without these hydraulics, and yet such a course seems almost madness to those who have the hydraulics *in proper condition and in proper use.*

One of the earliest generalizations from the use of the hydraulics was that *the thinner the feed the better the bagasse* from a given pressure. Certainly 100 tons pressure would crush a stratum of canes one cane thick more effectively than if the stratum were two or three canes thick. Hence the entire strength of the mill may be utilized all the time if the hydraulics are applied to it so that it shall exert its full power on the thin feeds as well as upon the thick.

Very few old mills will stand more than 100 tons pressure. The roller wheels, pinions, spur wheels, mill bolts, housings or bed-plates break, and break under a dead strain and not under any choke or shock. The most frequent break is that of the turn-plate, and this is especially the case where double three-roller mills are used, or where the canes are shredded or cut up in any wise for the three-roller mill. The loss at a critical time from one day's delay in repairing a broken turn-plate, would equal the whole cost of the hydraulic. With the hydraulic attachment there is practically no danger of breakage of a properly set turn-plate, unless the hydraulic be loaded to excess.

Mr. Richards, the accomplished engineer on Mr. William Horner's Stella plantation, Plaquemines parish, has recently made some most interesting experiments with the hydraulic on the last new mill, which is of the two-roller type. Of course there is no turnplate to break, and the mill being a first-class new five-roller mill, has immense strength, and the

problem to solve has been that of making the last or two-roller mill receive the incoming feed of bagasse. Mr. Richards applied an eight-inch hydraulic to this mill and loaded it to 100 tons.

The mill then took readily 200 tons of cane per day. There being some difficulty in keeping the mill supplied with 200 tons and knowing it had strength enough, he then loaded the hydraulic to 125 tons pressure. The two-roller mill still took 200 tons of cane per day and made better bagasse from the increased pressure. He then loaded the second mill to 135 tons pressure, and it became extremely difficult to make the mill receive the bagasse and the work was cut down to 150 tons per day. At 135 tons pressure the mill ground off the ends of the incoming bagasse, milling it into powder, but constantly refusing to take the whole feed. Finding it impracticable to do their work at 135 tons, he reduced the pressure to 130 tons. The mill then received the bagasse more readily and they ground 180 tons of cane per day, and continued at that rate during the rest of the season.

There could hardly be a more striking instance of the value of the hydraulics in thus measuring and controlling the pressure to be applied, and due consideration and good judgment on the part of the engineer will enable him to constantly utilize the whole strength of his cane mill if it be weak, and to determine the best point for effective work, if the mill be strong.

Hundreds of thousands of dollars are now dependent upon the excellence of our mill work, and every planter should strive to do the very best possible with his apparatus, and in no single device can he get greater aid than in McDonald's hydraulics.—*Louisiana Planter.*

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WHERE THEY CAME FROM.

"Lemons were used by the Romans to keep moths from their garments, and in the time of Pliny they were considered an excellent poison. They are natives of Asia. Spinach is a Persian plant. Horse radish is a native of England. Melons were found originally in Asia. Filberts originally came from

Greece. Quinces came originally from Corinth. The turnip is a native of Rome. The peach originally came from Persia. Sage is a native of the south of Europe. Sweet marjoram is a native of Portugal. The bean is said to be a native of Egypt. Damson originally came from Damascus. The nasturtium came originally from Peru. The pea is a native of the south of Europe. Ginger is a native of the East and West Indies. Coriander seed came from the East. The cucumber was originally a tropical vegetable. The gooseberry is indigenous to Great Britain. Apricots are indigenous to the plains of America. Pears were originally brought from the East by the Romans. Capers originally grew wild in Greece and Northern Africa. The walnut is a native of Persia, the Caucasus, and China, The clove is a native of the Malacca Islands, as is also the nutmeg. Vinegar is derived from two French words, vin aigre, sour wine. Cherries were known in Asia as far back as the seventeenth century. Garlic came to us first from Sicily and the shores of the Mediterranean. Asparagus was originally a wild sea coast plant and is a native of Great Britain. Nectarine received its native name from nectar, the principal drink of the gods. The tomato is a native of South America, and takes its name from a Portuguese word. Greengage is called after the Gage family, who first took it into England from a monastery in Paris. Parsley is said to have come from Egypt, and mythology tells us it was used to adorn the head of Hercules. Apples were originally brought from the East by the Romans. The crab apple is indigenous to Great Britain. It is a curious fact that while the names of our animals are of Saxon origin, Norman names are given to the flesh they yield. The onion was almost an object of worship with the Egyptians 2,000 years before the Christian era. It first came from India. The cantaloupe is a native of America, and so called from the name of a place near Rome, where it was first cultivated in Europe. Before the middle of the seventeenth century tea was not used in England, and was entirely unknown to the Greeks. The word biscuit is French for "twice baked," because originally that was the mode of entirely depriving it of moisture."

THE CANE BORER.

We find in the Louisiana Planter the following item which may be of service to such as are troubled with borers:

"Prof. H. A. Morgan, the distinguished entomologist of the state university of Baton Rouge, being present, was called on and gave his views concerning the screw worm that has lately been causing so much trouble to stock in Louisiana, and concerning the life and habits of which he and Dr. Dalrymple have lately made very extensive investigations. Prof. Morgan, while investigating the cane *borer* trouble at the experiment station, on the solicitation of Dr. Stubbs, came upon quite a discovery in the shape of a small black worm, the offspring of a common beetle, which is proving very destructive to the *borer* pest. It crawls into the holes in the sugar cane and there attacks the *borer* while at this work, always coming out victorious, and in the end eating its enemy up. If these black worms can be cultivated and increased, it seems a possible and very valuable means of destroying the *borer*, especially since this latter pest has become unusually numerous this season."

As no name or description of the worm referred to has been given, sufficient to identify it; perhaps Dr. Stubbs can supplement the notice by furnishing it.

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The central sugar factories in Kansas have done very well so far this season, and are making arrangements for an increased business next year.

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The sugar cane disease in Java still defies the experts, who find all the suggested remedies break down. The importation of plant cane from abroad has proved utterly unavailing to stay the evil. The nature and causes of the disease baffle inquiry, and appearances point to no more satisfactory result in the near future and a necessarily decreasing annual yield, the crop of 1889 having been 310,000 tons, against 375,000 in 1887.